Eskom	Report	Nuclear Engineering

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Compiled by	Functional Responsibility	Authorised by
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ADDITIONAL CLASSIFICATION INFORMATION

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ALARA Review:	**No**
Functional Control Area:	**Engineering**

CONTENTS

1 INTRODUCTION - BRIEFING NOTE

Koeberg Nuclear Power Station (Koeberg) was commissioned in 1984 (Unit 1) and 1985 (Unit 2). It will reach the initial estimate for its operation by 2024 (assumed 40 years life). Extending the operational life of Koeberg will provide significant economic benefits as demonstrated in the Long Term Asset Management (LTAM) business case which was approved by the Eskom Board of Directors in 2010.

The International Atomic Energy Association (IAEA) have developed Safety Report No. 57 (SR-57) that details the process and requirements for entering into long term operation (LTO) with specific focus on the safety aspects for long term operation (SALTO) of nuclear power plants. In line with general international practice, The Koeberg Operating Unit (KOU) has selected this IAEA standard as the basis for demonstrating Koeberg's ability to enter LTO.

In order to verify compliance with SR-57, the IAEA produced the SALTO Peer Review Guide No 26 (SPRG No.26) on which this self-assessment template is based. The KOU is in the process of establishing the Koeberg SALTO assessment project (KBG-SALTO) with the key objective to demonstrate that Koeberg is safe to operate beyond its assumed design life of 40 years for an additional LTO period of 20 years. The requirements defined within SPRG No.26 are to be complied with at the end of the SALTO assessment period to demonstrate compliance; however, there are substantial benefits of performing an initial self-assessment based on the requirements as it will:

- require the line groups to review and understand the applicable requirements and expectations applicable to their relevant area required for LTO,
- support in identifying the gaps in order to meet the requirements,
- be an important input for defining overall project scope for meeting the IAEA SR-57 requirements; and finally
- support in verifying that pre-conditions as stated within SR-57 for entering the SALTO assessment have been met.

Accordingly, the intent of this self-assessment is not to confirm compliance to SR-57, but rather to identify the gaps (using SPRG No 26) so that plans can be established and actions taken to close the gaps to eventually meet the prescribed requirements of SR-57. The actions from the self-assessment are extracted and reviewed in 240-106374366 (SALTO Work Breakdown Structure (WBS) Report).

2 STRUCTURE AND ORGANISATION

This self-assessment has been structured in accordance with SPRG No.26. There are six areas which are to be assessed and an Area Leader is assigned from the organisation to each of the areas as represented in the table below:

AREA LEADS		
Area A	Darren Bissell	IPD-K
Area B	Raymond Maapola	SDE

Area C	Andrew Ceto	SPS
Area D	Kabelo Moroka	SPS
Area E	Anton Kotze	NE
Area F	Nyamie Ntlokombini	NE-PS

In addition, a leader is assigned for configuration management as this is an underlying theme affecting all areas.

Each area has various subsections and for each subsection, a specific Line Group has been assigned main responsibility for coordinating and completing that portion of the assessment. The Functional Lead assigned to each subsection must be included on the assessment sheet in order for Area Leaders to support and coordinate the overall assessment process.

Appendix A provides the Responsibility Mapping for the Pre-SALTO Self-Assessment.

Appendix B provides the supporting documentation that may be required from the IAEA and which are freely available from the IAEA website are listed

Appendix C provides the summary of the assessment item allocations and assessment outcome.

3 PLANNING AND CONSTRAINTS

A pre-SALTO mission is scheduled for Koeberg during the period 16-25 November 2015 during which the IAEA will assess Koeberg's readiness to enter into the SALTO process.
In order to demonstrate that Koeberg understands the requirements and know where its gaps are, it is required to have this self-assessment completed at the end of August 2015. The following key milestones are defined:

	Lead	Dates	Oversight
Issue Self-Assessment Notification to Line Groups	J Austin	2015-07-06	N
Line Group Preparation, mobilisation and planning	D Bissell	2015-07-06 to 2015-07-17	N
Training and Planning approval through committee	J Austin	2015-07-20 to 2015-07-31	Y
Assessments and presentation to committee	J Austin	2015-08-03 to 2015-08-28	Y
Consolidation and Finalisation	D Bissell	2015-08-31 to 2015-09-11	Y
Write Advanced Information Package (AIP) Chapters	D Bissell	2015-09-14 to 2015-09-25	N
Finalise AIP	D Bissell	2015-09-28 to 2015-10-09	N
Approve Self-Assessment and AIP	J Austin	2015-10-12 to 2015-10-16	Y
Issue AIP	J Austin	2015-10-19	N

It is imperative that Line Groups perform the planning required to complete the assessment within the required periods.

4 OVERSIGHT AND SUPPORT

In order to support the Area Leaders and Functional Leads with management advice and oversight, a Management Oversight Committee (MOC) is established for the planning and self-assessment periods. The objective of this MOC is to:

- Provide guidance and support in resolving issues/blocks not resolvable within the line
- Provide agreement on completed assessment findings and proposed actions.

The MOC meets twice a week (Monday and Wednesday - two x 3hr sessions per week) with the Area Leaders providing progress feedback during the first hour of the first session per week. The remainder of the time slots will be available for Functional and Area Leaders to discuss issues and present completed assessments.

The MOC members are as follows:

Name	Group	Attendance
Johann Austin	IPD-K	Mandatory
Ravid Goldstein	SDE	Optional
Nathir Jakoet	SPS	Optional
Haco Nicolson	IPD-K	Optional
Ahmed Kamroodien	PE	Optional
Archiebold Mthandi	SPS	Optional
AREA LEADS		
Darren Bissell (Area A Lead)	IPD-K	Mandatory
Raymond Maapola (Area B Lead)	SDE	Mandatory
Andrew Ceto (Area C Lead)	SPS	Mandatory
Kabelo Moroka (Area D Lead)	SPS	Mandatory
Anton Kotze (Area E Lead)	NE	Mandatory
Nyamie Ntlokombini (Area F Lead)	NE-PS	Mandatory

5 OTHER REQUIREMENT:

The templates are to be completed in electronic format. This will support in collating and integrating the information resulting from the assessment.

6 KEY CONTACTS

Self-Assessment Lead: Johann Austin
Self-Assessment Coordinator: Darren Bissell
Oversight Committee Secretary: Claudine Bemedie

7 ACTION REVIEW:

The actions generated by this self-assessment will be evaluated and allocated between the Koeberg SALTO Assessment Project and line groups in report 240-106374366 (*SALTO Work Breakdown Structure (WBS) Report*). Please refer to this report for further details.

AREA A: ORGANIZATION AND FUNCTIONS, CURRENT LICENSING BASIS, CONFIGURATION/ MODIFICATION MANAGEMENT

Subsection 3.1.1: Related regulatory requirements, codes and standards

Functional Group: IPD-K

Functional Group Lead: Darren Bissell

Date Performed: 2015-09-14

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.1.1.1	The operating organization should identify, from the existing national legal framework, a consistent and complete set of regulatory requirements, codes and standards, related to long term operation and ageing management. The identified set of regulatory requirements, codes and standards should provide a basis for developing the LTO programme.	• Requirements on LTO and LTO relevant aspects of plant activities; • Requirements related on plant programmes related to LTO; • Requirements on equipment qualification; • Requirements on ageing management; • Requirements on license renewal (if existing); • Requirements on PSR (if existing and relevant); • Requirements on FSAR updating, and on design basis; • Requirements on quality assurance; • Requirements on configuration management; • Requirements on control of the LTO evaluation process; • LTO programme documentation.	36-197 Rev 1: Koeberg Licensing Basis Manual Government Notice: R. 388 “National Nuclear Regulator Act (47/1999): Regulations: Safety standards and regulatory practices” National Nuclear Regulator Act 47 of 1999 NIL 01 Variation 18

Functional Group Lead:	Haco Nicolson	**A1.1**
Functional Group:	Nuclear Engineering	
Date Performed:	2015-08-13	

Item:

3.1.1.3 Bullet 1: *Verify if a complete and consistent set of regulatory requirements, codes and standards related to LTO and ageing management have been identified.*

Current status description and input document reference:

The regulatory requirements cover those elements necessary for safe operation of the plant, including safety assessment and applying good engineering and quality practice, on an ongoing basis (no specific time limit). Decommissioning requirements are also included.

INPUT REFERENCE DOCUMENTS:

- NIL 01 Variation 18
- National Nuclear Regulator Act 47 of 1999
- Government Notice: R. 388 "National Nuclear Regulator Act (47/1999): Regulations: Safety standards and regulatory practices"

Assessment:

There are no regulatory requirements or limits related to operating time periods or specifically to LTO and ageing management. However there are general requirements to do assessments to ensure safety and follow good engineering practice.

The licence further links directly to the Koeberg Licensing Basis Manual (KLBM) which is a document produced by Eskom and it is an expectation that this manual should include specific requirements which control and demonstrate how Eskom achieves safe operation of the plant, under all conditions.

Results: Meet: X | Don't Meet: | Partially Met: | N/A:

No	Action Description	Lead	Due Date

Functional Group Lead:	Haco Nicolson	**A1.2**
Functional Group:	Nuclear Engineering	
Date Performed:	2015-08-18	

Item:

3.1.1.3 Bullet 2: *Check if the regulatory requirements, codes and standards are consistent with the IAEA requirements and recommendations and whether the gaps, if applicable, are addressed by the plant in the LTO programme.*

Current status description and input document reference:

The regulatory requirements call for safety assessment and good engineering and quality management practice as part of ongoing plant operation and are thus do not prescribe specific the IAEA requirements and recommendations for LTO.

The licence refers directly to the Eskom KLBM document for specific requirements. The KLBM includes practice requirements for safe operation on an ongoing basis.

INPUT REFERENCE DOCUMENTS:

- NIL 01 Variation 18
- National Nuclear Regulator Act 47 of 1999
- Government Notice: R. 388 "National Nuclear Regulator Act (47/1999): Regulations: Safety standards and regulatory practices"
- 36-197 Rev 1: Koeberg Licensing Basis Manual

Assessment:

There are no regulatory requirements or limits related to operating time periods or specifically to LTO and ageing management.

The licence however links directly to the Koeberg Licensing Basis Manual (KLBM) which is a document produced by Eskom and it is an expectation that this manual should include specific requirements which control and demonstrate how Eskom achieves safe operation of the plant, under all conditions. The KLBM does not include specific requirements to invoke the IAEA requirements and recommendations for LTO and thus needs to be augmented to provide additional high level requirements for this.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Review KLBM for requirements and processes addressing ageing and LTO and augment these accordingly. Refer to WBS 11.	Koeberg SALTO	Q4 2020
2	Verify that updated KLBM are consistent with the IAEA requirements. Refer to WBS 1.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Haco Nicolson	**A1.3**
Functional Group:	Nuclear Engineering	
Date Performed:	2015-08-18	

Item:

3.1.1.3 Bullet 3: *Verify if the LTO programme meets the intent of the applicable regulatory requirements, codes and standards, IAEA requirements and recommendations, and best international practices.*

Current status description and input document reference:

Certain elements of what will be taken credit for in the LTO "programme" e.g. ISI and IST Programmes are in place.

The higher level requirements in the KLBM cover safe practice requirements for ongoing operation.

INPUT REFERENCE DOCUMENTS:

- 36-197 Rev 1: Koeberg Licensing Basis Manual

Assessment:

An LTO programme has not yet been established and the higher level requirements for LTO have not yet been formalised. These need to be put into place by the Koeberg SALTO Assessment Project and this verification will then be performed as part of the Project

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Establish the higher level requirements for LTO. Refer to WBS 1.	Koeberg SALTO	Q3 2016
2	Establish the LTO plan. Refer to WBS 1.	Koeberg SALTO	Q3 2016
3	Verify that LTO plan of work meets higher level LTO requirements. Refer to WBS 1.	Koeberg SALTO	Q3 2016

AREA A: ORGANIZATION AND FUNCTIONS, CURRENT LICENSING BASIS, CONFIGURATION/ MODIFICATION MANAGEMENT

Subsection 3.1.2: Organizational structure for LTO.

Functional Group: IPD-K

Functional Group Lead: Darren Bissell

Date Performed: 2015-09-14

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.1.2.1	The operating organization should establish an organizational plan for activities connected to long term operation and ageing management. The plan should indicate the general policies, lines of responsibility and authority, lines of communication, duties and number of staff and their required qualifications needed to conduct the necessary activities. The plant should adopt a suitable organizational structure and dedicate the necessary resources for preparation and implementation of the LTO programme. A special LTO oriented project team or similar organizational arrangement should be established.	• Organizational flowcharts and job descriptions; and • Plant procedures describing organizational structure in the plant.	238-8: Nuclear Safety and Quality Manual
			240-64602879: Koeberg Operating Unit Organisational Structures
			240-88257644: Koeberg Operating Unit: Functional Organisation Structure (F.O.S.) – Nuclear Engineering
			32-1155: Eskom Standard Project Life Cycle Model Policy
			331-2 Rev 1: Nuclear Engineering Management Manual
			KBG SALTO Assessment Project Statement of Work R0
			KBG-SALTO Self-Assessment Template R1
			Life of Plant Plan (LOPP)
			Nuclear Technical Plan (NTP) Electronic Database

Functional Group Lead:	Johann Austin	**A2.1**
Functional Group:	IPDK	
Date Performed:	2015-09-02	

Item:

<u>3.1.2.3 Bullet 1:</u> *Whether the responsibility for LTO preparation is well defined.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Nuclear Technical Plan (NTP) contains all the larger modifications and major refurbishments projects for the remainder of the plant life. This plan ensures that the plant and equipment will be upgraded and replaced at the appropriate time to ensure long term sustainability of the asset. Furthermore the NTP contains the projects that are required for Koeberg to stay aligned with international best practices as derived from the Periodic Safety Reassessments. The responsibility for the long term Nuclear Technical Plan resides with Nuclear Engineering and is coordinated by Integrated Plant Design-Koeberg (IPDK). Information to populate this plan is extracted from the system engineering Life Of Plant Plans (LOPP) which provides detailed information with regard to each system as well as from the Periodic Safety Reassessments.

Since the LTO objectives and program will be incorporated into to normal plant processes, the LTO work will form part of this technical plan.

The technical plan is currently populated for the next 5 to 10 years and is currently being expanded to end of plant life.

<u>INPUT REFERENCE DOCUMENTS:</u>

- Nuclear Technical Plan (NTP) Electronic Database
- 240-88257644: Koeberg Operating Unit: Functional Organisation Structure (F.O.S.) – Nuclear Engineering
- Life of Plant Plan (LOPP)

Assessment:

There are inconsistencies between documents regarding the use of Life Of Plant Plan (LOPP) and Nuclear Technical Plan (NTP), causing the terms to be used interchangeably. The naming of these documents needs to be clarified and properly defined and documented.

The Nuclear engineering FOS refers to the LOPP instead of the NTP.

The LTAM projects and balance of the LOPP up to 30 years have not been incorporated into the NTP, leaving the plan lacking.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Clarify and update the engineering documents with regard to the meaning of the terms LOPP and NTP.	IPD-K	Q4 2016
2	Update the Nuclear Engineering FOS to refer to NTP.	NE	Q4 2016
3	Update the NTP to include the LTAM and balance of LOPP projects. Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Hilton Roos	**A2.2**
Functional Group:	NPM	
Date Performed:	2015-08-25	

Item:

3.1.2.3 Bullet 2: *Whether the plant has adopted suitable organizational structure for preparation and implementation of LTO programme.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The organisational structure for preparation and implementation of the LTO will consist of a combination of the Strong Matrix and Projectized Organisation:

- The Strong Matrix portion will be represented by Functional Line Groups within the Koeberg Operating Unit (KOU) which will be responsible for LTO related activities within their domain of functional responsibility. The allocation of LTO related responsibilities, based on initial planning for the SALTO self-assessment, has been completed but may require revision following the initial self-assessment ***– Refer to KBG-SALTO Self-Assessment Template R1 dated 2015-07-17.***
- The Projectized portion will be represented by dedicated project management and project team members assigned to the Koeberg SALTO Assessment Project.

The establishment of the project organisation is in progress, however, an initial organisation for the pre-Planning Phase has already been defined and documented in the project lifecycle initiation documentation – ***Refer to KBG SALTO Assessment Project Statement of Work R0 (awaiting MRB approval scheduled for 2015-08-26)***.

INPUT REFERENCE DOCUMENTS:

- KBG SALTO Assessment Project Statement of Work R0
- KBG-SALTO Self-Assessment Template R1

Assessment:

An organisational structure has been defined for the LTO programme.

- Functional Line Groups that will be responsible for key activities relating to the programme have been identified and allocated – these may change following the initial self-assessment based on additional insights gained.
- The project organisation of the pre-planning phase has been established, however, this organisation will change and adapt in accordance with required project scope and project phases.

Organisational changes required as a result of the programme, will be determined during the programme and implemented as required in accordance with standard business processes.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
	None		

Functional Group Lead:	Hilton Roos	**A2.3**
Functional Group:	NPM	
Date Performed:	2015-08-25	

Item:

3.1.2.3 Bullet 3: *Whether the plant has established a special LTO oriented project team or similar organizational arrangements dealing with LTO activities and that it has responsibilities and duties as well as authorities defined within organizational policy and quality assurance system (including control of contractors and Technical Support Organisation(s) TSOs).*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The LTO Project Team has not been formally established (to date) as the project is still in the pre-planning phase in accordance with the Eskom Project Life Cycle Model (PLCM) governance processes - – ***Refer 2014-05-13 Nuclear PLCM Deliverables R0 [Based on Eskom Standard Project Life Cycle Model Policy 32-1155 Rev 0]***

In accordance with the PLCM deliverables, the SOW was approved by the MRB (in August 2015. The Project Charter and a Project Management Plan (PMP) will be prepared for the next phase of the project (target Q1 2016). These processes – Project Charter development as well as PMP development (including PMP subsidiary plans) – will require that a project organisation be established and that associated responsibilities, duties as well as authorities be defined. The PMP will also detail how contractors will be controlled, including technical support organisations.

INPUT REFERENCE DOCUMENTS:

- 32-1155: Eskom Standard Project Life Cycle Model Policy Rev 0.

Assessment:

Although the project initiation process has been started, formalised PMPs have not yet been compiled, but will be compiled in accordance with the Eskom PLCM process. The PMP and associated subsidiary plans will cover the requirements defined for this specific item.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Develop PMP and ensure that associated requirements of Self-Assessment Item A2.3 have been taken into account. Refer to WBS 2.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Hilton Roos	**A2.4**
Functional Group:	NPM	
Date Performed:	2015-08-25	

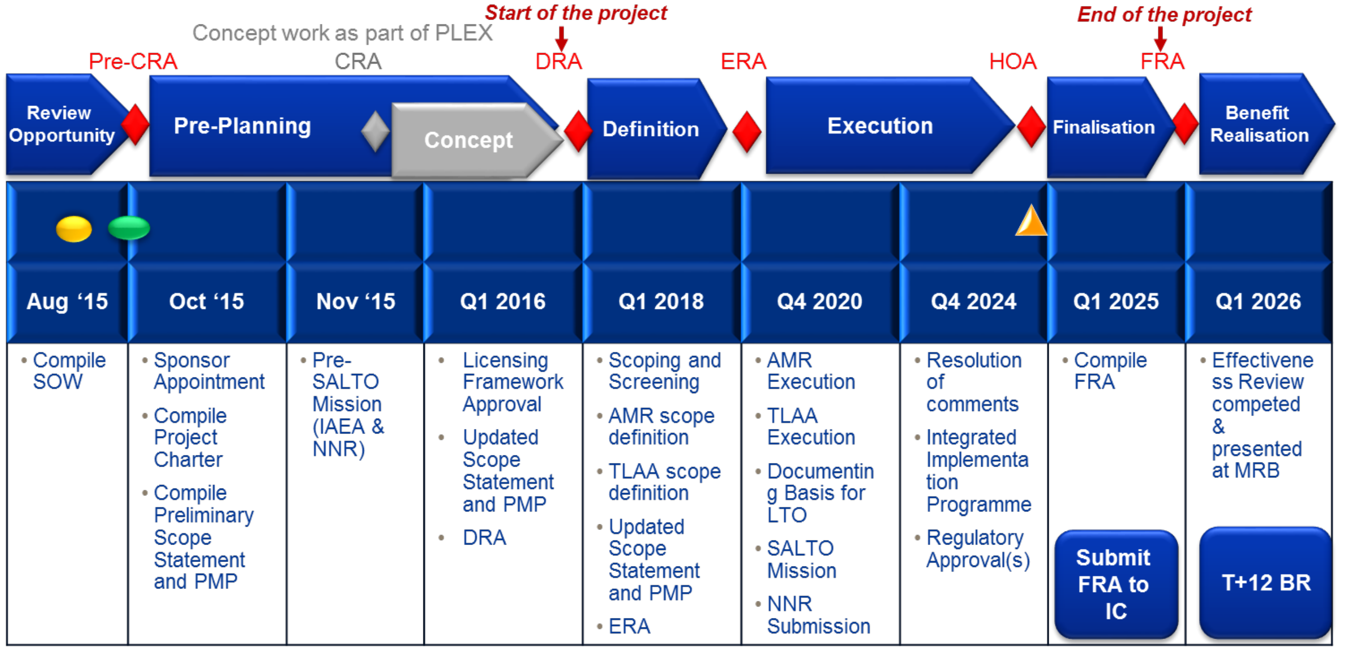
Item:

3.1.2.3 Bullet 4: *Whether the number of staff and their required qualifications are adequate for the scope of work and the assigned duties.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The resource requirements (number of staff and required qualifications) for the project, can only be determined as part of the detailed planning associated with the next phase of the project which will be the "Definition Phase" and will be based on the scope of work identified following the KBG-SALTO self-assessment (Aug 2015) as well as the pre-SALTO mission (Nov 2015).



Resource requirements for the organisation to sustain processes relating to LTO will be determined during the life cycle of the Koeberg-SALTO Assessment Project and be based on the number of additional processes, management and control activities required in addition to what is performed within existing Functional Line Groups.

Assessment:

Project resource requirements (i.e. number of staff and required qualifications) can only be confirmed during the PMP development processes of the project which occurs at various times throughout the project lifecycle.

- October 2015 – Preliminary Planning
- Q1 2016 – Planning Approvals for Definition Phase
- Q1 2018 – Planning Approvals for Execution Phase

Organisational resource requirements will be identified during the project lifecycle.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Develop PMP and ensure that number of staff and their required qualifications are adequate for the scope of work and the assigned duties. Refer to WBS 2.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Hilton Roos	**A2.5**
Functional Group:	NPM	
Date Performed:	2015-08-25	

Item:

<u>3.1.2.3 Bullet 5:</u> *Whether staff involved in LTO activities have specific job descriptions/task responsibilities*.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The job descriptions and task responsibilities for staff involved in LTO has not yet been defined. Project related job descriptions/task responsibilities can only be confirmed during the PMP development processes of the project which occurs at various times throughout the project lifecycle.

- October 2015 – Preliminary Planning
- Q1 2016 – Planning Approvals for Definition Phase
- Q1 2018 – Planning Approvals for Execution Phase

Organisational job descriptions/task responsibilities will be identified during the project lifecycle.

Assessment:

Project related staff will have roles and responsibilities defined as part of the resource planning processes which form part of PMP development throughout the various phases of the project. [Refer A2.4].

Additional job descriptions/task responsibilities required as part of Functional Line Group organisational structures, can only be defined during the life cycle of the Koeberg SALTO Assessment Project based on the number of additional processes, management and control activities required and will need to be assessed and approved in accordance with standard organisational HR processes and requirements.

Project related job descriptions/task responsibilities can only be confirmed during the PMP development processes of the project which occurs at various times throughout the project lifecycle.

- October 2015 – Preliminary Planning
- Q1 2016 – Planning Approvals for Definition Phase
- Q1 2018 – Planning Approvals for Execution Phase

Organisational job descriptions/task responsibilities will be identified during the project lifecycle.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Develop PMP and ensure project resources involved in LTO project have specific job descriptions/task responsibilities. Refer to WBS 2.	Koeberg SALTO	Q4 2020
2	Ensure organisational resources involved in LTO operations (post Koeberg SALTO) have specific job descriptions/task responsibilities. Refer to WBS 18.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Darren Bissell	**A2.6**
Functional Group:	IPD-K	
Date Performed:	2015-09-02	

Item:

3.1.2.3 Bullet 6: *Whether the plant managers have the appropriate resources to carry out their assigned responsibilities and accountabilities regarding LTO preparations.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The KOU organisational structure has recently been updated and documented in 240-64602879, *the Koeberg Operating Unit Organisational Structures* document. This document provides the organisational structure for KOU as well as a description of the roles and responsibilities of the departments and groups under KOU. The staff compliment and their respective grades are also provided.

Currently, there are still vacant roles.

INPUT REFERENCE DOCUMENTS

- 240-64602879 - Koeberg Operating Unit Organisational Structures

Assessment:

The organisational structure was developed without specific focus on the requirements for staffing an aging plant beyond 40 years of life. As such, it will be required to re-evaluate this structure for LTO.

Due to the financial constraints, identified roles are not currently being filled.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Review 240-64602879 for LTO purposes. Refer to WBS 17.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Darren Bissell	**A2.7**
Functional Group:	IPD-K	
Date Performed:	2015-08-26	

Item:

3.1.2.3 Bullet 7: *Whether the organizational structure has capability to manage LTO programme with long term perspective.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The KOU organisational structure has recently been updated and documented in 240-64602879, *the Koeberg Operating Unit Organisational Structures* document. This document provides the organisational structure for KOU as well as a description of the roles and responsibilities of the departments and groups under KOU.

INPUT REFERENCE DOCUMENTS

- 240-64602879 - Koeberg Operating Unit Organisational Structures

Assessment:

The organisational structure was developed without specific focus on the requirements for staffing an aging plant beyond 40 years of life. As such, it will be required to re-evaluate this structure for LTO.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Review 240-64602879 for LTO purposes Refer to WBS 17.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Haco Nicolson	**A2.8**
Functional Group:	Nuclear Engineering	
Date Performed:	2015-08-24	

Item:

3.1.2.3 Bullet 8: *Whether the management system and organizational matters address the necessary quality assurance of processes related to long term operation and ageing management.*

Current status description and input document reference:

The Nuclear Safety and Quality Manual provide the quality assurance requirements for all processes in the Koeberg Operating Unit. At the level of Nuclear Engineering, the Nuclear Engineering Management Manual 331-2 provides quality assurance requirements for all Nuclear Engineering processes.

INPUT REFERENCE DOCUMENTS:

- 238-8 Rev 2: Nuclear Safety and Quality Manual
- 331-2 Rev 1: Nuclear Engineering Management Manual

Assessment:

QA requirements are in place for all processes

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

AREA A: ORGANIZATION AND FUNCTIONS, CURRENT LICENSING BASIS, CONFIGURATION/ MODIFICATION MANAGEMENT

Subsection 3.1.3: Plant level documentation for LTO.

Functional Group: IPD-K **Functional Group Lead:** Darren Bissell

Date Performed: 2015-09-14

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.1.3.1	The plant should have plant level documentation describing the general concepts and approach for preparation and implementation of the LTO programme. Responsibilities in development, updating and implementing the LTO programme should be described in plant procedures. In a broader sense, plant programmes such as surveillance, inspection and maintenance as well as evaluation of operating experience feedback should have an essential role in ensuring the safe operation of NPPs in the original design period and during the planned period of LTO. The plant approach to LTO should be based upon the following principles: The existing regulatory process is adequate to maintain safe operation of the NPP for the current authorized operating period and LTO programme activities focus on the effects of ageing that need to be properly managed for the planned period of LTO. The current licensing basis (CLB) provides an acceptable level of safety for the original design period and is carried over to the planned period of LTO in the same manner and to the same extent, with the exception of any changes specific to LTO. Complementary requirements may apply for LTO and possible upgrading of the CLB on a one-time basis or in the context of the PSR (usually every 10 years). Plant programmes credited for use in LTO should be consistent with the nine attributes shown in.	• Plant level documentation for LTO; • LTO programme documentation; • Internal procedures for development, updating and implementation of LTO programme.	36-197 Rev 1: Koeberg Licensing Basis Manual NEXCO presentation Pre-SALTO Self-Assessment presentation

Functional Group Lead:	Haco Nicolson	**A3.1**
Functional Group:	Nuclear Engineering	
Date Performed:	2015-08-18	

Item:

3.1.3.3 Bullets 1: *Verify if a clear policy exists for activities related to long term operation and ageing management.*

Current status description and input document reference:

Higher level requirements exist for safe, ongoing operation of the plant.

INPUT REFERENCE DOCUMENTS:

- 36-197 Rev 1: Koeberg Licensing Basis Manual

Assessment:

The KLBM does not include specific higher level requirements for LTO and ageing management; it needs to be augmented in this regard. The above verification can then be done.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Augment the KLBM for LTO and ageing higher level requirements Refer to WBS 11.	Koeberg SALTO	Q4 2020
2	Verify that the KLBM for LTO and ageing higher level requirements are clear. Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Haco Nicolson	**A3.2**
Functional Group:	Nuclear Engineering	
Date Performed:	2015-08-18	

Item:

3.1.3.3 Bullets 2: *Whether the plant has plant level documentation covering LTO concept and approach.*

Current status description and input document reference:

The plant has documentation covering safe operation on an ongoing basis.

INPUT REFERENCE DOCUMENTS:

- 36-197 Rev 1: Koeberg Licensing Basis Manual

Assessment:

The KLBM does not cover LTO concept and approach; it needs to be augmented in this regard.

Results: Meet [ ] Don't Meet [x] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	KLBM to be augmented with LTO concept and approach Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Haco Nicolson	**A3.3**
Functional Group:	Nuclear Engineering	
Date Performed:	2015-08-18	

Item:

<u>3.1.3.3 Bullets 3</u>*:* *Whether the plant policy is consistent with and meets the intent of related IAEA Safety Standards*

Current status description and input document reference:

Higher level requirements exist for safe, ongoing operation of the plant.

<u>INPUT REFERENCE DOCUMENTS:</u>

- 36-197 Rev 1: Koeberg Licensing Basis Manual

Assessment:

The KLBM does not include specific higher level requirements for LTO and ageing management; it needs to be augmented in this regard. The above consistency check can then be done.

Results: Meet [ ] Don't Meet [x] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	KLBM to be augmented with LTO concept and approach. Refer to WBS 11.	Koeberg SALTO	Q4 2020
2	Verification of KLBM consistency with IAEA in regards to LTO. Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Johann Austin	**A3.4**
Functional Group:	IPD-K	
Date Performed:	2015-09-03	

Item:

3.1.3.3 Bullets 4: *Whether the plant staff is familiar with and understands the policy.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The LTO High Level Policy has been developed and presented to plant management. This has been incorporated into a draft strategy document.

Engineering departments involved in the Pre-SALTO assessments were presented with information regarding the IAEA SALTO approach in preparing for LTO. This was to assist with the completion of the Pre-SALTO self-assessment.

INPUT REFERENCE DOCUMENTS:

- NEXCO presentation
- Pre-SALTO Self-Assessment presentation

Assessment:

Initial information sessions regarding LTO and the IAEA approach to be used at Koeberg in preparation have been performed for management and engineering personnel. However, these efforts will need to be substantially increased through the duration of the project.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Provide training to plant staff regarding the approach for extending the life of Koeberg. Refer to WBS 1.	Koeberg SALTO	Q3 2016

AREA A: ORGANIZATION AND FUNCTIONS, CURRENT LICENSING BASIS, CONFIGURATION/ MODIFICATION MANAGEMENT

Subsection 3.1.4: LTO implementation programme

Functional Group: IPD-K **Functional Group Lead:** Darren Bissell

Date Performed: 2015-09-14

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.1.4.1	The plant should have a programme of actions/measures identified on the basis of review of AMPs and revalidation of time limited ageing analyses. This programme should cover modifications, major reconstructions and scheduled replacements, and other plant commitments needed for assuring necessary safety margins during the LTO period. This programme should be supported by safety analyses, and it can be part of the PLiM programme. This programme should integrate all similar long-term issues arising from different types of reviews such as OSART and other IAEA missions, WANO missions, PSR or regulatory requirements.	• List or database of issues with supporting information originating from the AMPs, EQ programme and reviews of time limited ageing analyses; • LTO programme document, including description of programmes for modifications, reconstructions and replacement; • Internal procedures for development and updating of ageing management programmes and plant programmes; • Plans of actions, corrective measures defined as result of PSR or other safety reassessment; • Internal procedures for the implementation of ageing management programmes and plant programmes.	331- 102 - ETMM TOR 331-148 - Programme Engineer guide 331-148 – Programme Engineers Guide 331-275 - Ageing Management Matrix KAA- 503: MODIFICATIONS TO SIMULATOR KAA- 505: MODIFICATIONS TO SOFTWARE ON THE KIT SYSTEM KAA 688: Corrective Action Process KAA 826 - Plant Health committee KAA-501: Project Management Process for Koeberg Nuclear Power Station Modifications KAA-502:Project Management Process for new facilities and changes to existing facilities at Koeberg Nuclear Power Station KAA-717: Management Review Board Constitution KAA-803: Processing Minor Modifications KAD 025: Processing of Operating Experience KGA 035 – OE from EDF KGU 011 – Life of Plant Plans KGU 031 - System Health reporting KGU-011; Preparation of Life of Plant Plans LOPPs LTAM Business Case NEPP 001 – Concept of position papers

Functional Group Lead:	Archiebold Thabo Mthandi	**A4.1**
Functional Group:	SPS	
Date Performed:	2015-08-31	

Item:

<u>3.1.4.3 Bullets 1:</u> *Whether the plant has programme(s) or action plan for the resolution of issues identified during the development of AMPs, EQ programme and time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-148, "Programme Engineers Guide" provides guidance to effectively establish a series of planned and on-going plant management activities to achieve plant reliability and performance objective. Where new technical issues or a need for a new engineering programme is identified a nuclear position paper (NEP) as described in the concept of position papers, NEPP 001, is developed with corrective actions to provide the resolution of the issue. Depending on the safety significance, the issue is presented to ETMM as per 331-102 or Plant Health Committee (KAA 826). The development of new programmes follows the guidance provided in 331-148 and benchmarked against EDF and other industry experience. This same approach is applicable to new time limited ageing analyses.

Specification, Programmes & Sciences (SPS) currently have the SPS Technical Review Meeting (SPS TRM) that discusses and develops action plans for the resolution of technical and programme related issues. This also includes the process of elevating issues to other forums such as the Engineering Technical Management Meeting, Plant Health Committee and or requesting issues leads to clarify areas of concern, present progress feedback etc.

Ageing Management Matrix, 331-275, represents the ageing management matrix (AMM) derived from the EDF comprehensive ageing assessment. The EDF AMM has been reviewed by the System Engineers and Programme Engineers SMEs for Koeberg specific component and applicable degradations. Where gaps are identified, these are presented to ETMM for resolution with appropriate management strategies.

<u>INPUT REFERENCE DOCUMENTS:</u>

- 331-148 – Programme Engineers Guide
- 331- 102 - ETMM TOR
- KAA 826 - Plant Health committee
- NEPP 001 – Concept of position papers
- 331-275 - Ageing Management Matrix

Assessment:

In performing SA 88540 for Programmes, the IGALL AMP's will be evaluated against the current KOU programmes and any gaps will be evaluated and the required programme updates will be initiated following this evaluation. The actions required to address the identified issues will be captured in the SA 88540 document and be assigned to the various leads for investigation and resolution through DevonWay, the corrective action management program. The SA 88540 will expand on the actions for ageing management to date. Addressing these actions will be challenging for the current ETMM schedule as well as with the current programmes resourcing structure.

A number of the actions that may be generated from the SA 88540 will be specific to LTO. The addressing of these items will be covered under the Koeberg SALTO project plan. This will be assessed following the finalisation of the SA 88540 results.

The KOU SALTO project will track all issues identified during the overall LTO readiness self-assessment and the required actions to address the identified issues will be documented in this document

A process exist however has not been discriminative for LTO issues. Since this process is open to all technical issues of concern.

Results:	Meet		Don't Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	Capture identified actions following SA 88540 in the document Refer to WBS 7.	Koeberg SALTO	Q4 2020
2	Capture identified actions following the KOU SALTO readiness self-assessment in the document or create a issues and action list for the project Refer to WBS 7.	Koeberg SALTO	Q4 2020
3	SPS-TRM to review actions from pre SALTO actions and prioritise issues SPS and drive identified issues at ETMM Refer to WBS 7.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Rida Cassim	**A4.2**
Functional Group:	IPDK	
Date Performed:	22 August 2015	

Item:

3.1.4.3 Bullets 2: *Whether the plant has programmes for major modifications, reconstructions and replacements.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

KAA-501 describes the Koeberg major modification process and responsibilities for plant engineering as well as for project management. In addition, Koeberg has also developed a minor modification process for simpler engineering changes where no safety evaluation is required. Major modifications to the simulator and Plant Data Acquisition and Processing Computer (KIT) are governed by KAA-503 and 505 respectively. KAA-502 describes the process for facilities projects (civil) inside the owner controlled area of the Koeberg site.

All major engineering changes stems from the LOPP which serves as a document to record how the plant system is being managed over its life- KGU-011. All engineering changes which include major and minor modifications are assessed by an Engineering Change Management Committee. This is followed by the Management Review Board that governs the management and implementation of modifications at Koeberg.

INPUT REFERENCE DOCUMENTS:

- KAA-501: Project Management Process for Koeberg Nuclear Power Station Modifications
- KAA-502:Project Management Process for new facilities and changes to existing facilities at Koeberg Nuclear Power Station
- KAA- 503: MODIFICATIONS TO SIMULATOR
- KAA- 505: MODIFICATIONS TO SOFTWARE ON THE KIT SYSTEM
- KGU-011; Preparation of Life of Plant Plans
- KAA-717: Management Review Board Constitution
- KAA-803: Processing Minor Modifications
- KAA-501: Project Management Process for Koeberg Nuclear Power Station Modifications
- KAA-502:Project Management Process for new facilities and changes to existing facilities at Koeberg Nuclear Power Station
- KAA- 503: MODIFICATIONS TO SIMULATOR

Assessment:

The above-mentioned programmes are sufficient to deal with modifications, reconstructions and replacements at Koeberg. The ECMC TOR and process have not yet been finalised. As a result the current LOPP is not reflecting the all modification contingencies for entire life of plant. The LTAM/PLEX projects and decommissioning scope have not been incorporated.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1.	ECMC TOR and Process to be finalised and implemented.	IPD-K	Q4 2016
2	The LTAM/PLEX projects to be incorporated into the LOPPs. Refer to WBS 11.	Koeberg SALTO	Q4 2020
3	Decommissioning plan to be updated and incorporated into LOPPs.	IPD-K	Q4 2016

Functional Group Lead:	Mvuseleli Hermanus	**A4.3**
Functional Group:	Nuclear Engineering	
Date Performed:	25 August 2015	

Item:

3.1.4.3 Bullets 3: *Verify that evaluation of the plant programmes and documentation was performed. Confirm that evaluation results are a sound basis for successful LTO and will remain effective for the planned period of LTO. This evaluation would determine if modifications or new plant programmes are necessary to ensure that SSCs are available and qualified to perform their intended function for the planned period of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All the traditional industry programs have already been implemented. Koeberg Nuclear Power Station has already started implementation of an ageing matrix closely aligned with that of EDF to inform regarding augmentation of the traditional programs and establishment of new ageing management programs.

Assessment:

The SALTO project is still to be implemented.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Benchmark Koeberg's ageing management against IGALL. Refer to WBS 7.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Mvuseleli Hermanus	**A4.4**
Functional Group:	Nuclear Engineering	
Date Performed:	25 August 2015	

Item:

3.1.4.3 Bullets 4: *Check how the plant had applied the measures taken in connection with identified issues and how they are incorporated into a relevant plant programme. Verify if the LTO implementation programme covers activities such as modifications, major reconstructions and scheduled replacements, and other plant commitments needed for assuring plant safety during LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Life Of Plant Plan (LOPP) is being updated. LTAM Business case was developed to support extending operations to 60 years. LTAM business plan listing all components that needs to be upgraded/replaced was derived and is currently being incorporated into nuclear technical plan up to end of 60 year life. Nuclear Technical Plan (NTP) is incorporated into the bigger Eskom financial plan.

INPUT REFERENCE DOCUMENTS:

- LOPPs
- LTAM Business Case

Assessment:

Until the NTP has been fully populated, the detailed long term replacement and refurbishment strategy cannot be finalised.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Incorporate LTAM into NTP. Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Johann Austin	**A4.5**
Functional Group:	IPD-K	
Date Performed:	2015-09-03	

Item:

3.1.4.3 Bullets 5: *Review how and to what extent the LTO implementation programme is supported by safety analyses and if applicable by business evaluations, and how coordination of the plant activities is done in respect to an overall programme for LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

A business case which supports the expenditure and investment for extending the life of Koeberg was submitted to and accepted by the Eskom board. In order to ensure that the LTO processes and objectives are adequately incorporated into the organisation, the LTO implementation programme will incorporate LTO elements into the normal plant processes rather than create new stand-alone processes. The normal business processes will be evaluated and where improvements are required, these processes will be revised.

Where specific interventions are required to facilitate studies and once off updates of documents, these will be performed by the use of contracts and outside resources. However, the results of these studies and the updated documents will be incorporated into the normal Koeberg processes.

No changes or updates to the safety analysis as a result of LTO have yet been identified.

Assessment:

A business case for extending the life of Koeberg has been submitted to and approved by the Eskom board.

Incorporating LTO into the normal business will make the implementation part of the project part of the normal activities.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Johann Austin	**A4.6**
Functional Group:	IPD-K	
Date Performed:	2015-09-15	

Item:

<u>3.1.4.3 Bullets 6</u>: *Verify that relevant operating experience and research findings are taken into account.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Koeberg is a Framatome constructed CP1 series plant. Koeberg was the 1st nuclear power plant constructed by Framatome, outside of France. For this reason the equipment at Koeberg are in most cases the same as the equipment installed on the Électricité de France (EDF) operated CP1 power plants. Eskom has therefore, since the construction of Koeberg, maintained a close relationship with EDF, with Tricistan being the Safety Reassessment reference plant for Koeberg.

Eskom therefore leans heavily on the knowledge base and operational experience inside EDF. Long term contracts between Eskom and EDF ensure that this environment of mutual cooperation is maintained. These contracts provide Eskom with access to EDF information and documentation to assist with the safe operation of the station. A large percentage of this information pertains to aging of plant equipment.

<u>OEM links</u>

Eskom has maintained a close relationship with AREVA, the Koeberg nuclear OEM. This relationship is supported through long term contractual agreements.

Eskom is furthermore a member of the Framatome Owners Group (FROG), which consists of all the utilities who operate nuclear power plants using Framatome and AREVA designed and constructed Nuclear Steam Supply Systems. Through this forum Eskom receives knowledge regarding operational challenges and concerns which includes equipment aging and degradation.

<u>Industry links</u>

Eskom is a member of the Pressurized Water Reactor Owners Group, to which most utilities that operate Pressurized Water Reactors belong. Through this membership Koeberg has access to industry knowledge and experience.

<u>Technology Links</u>

Eskom is a member of the Electrical Power Research Institute (EPRI) and Equipment Qualification Database (EQDB) Forum which performs extensive research on issues affecting the nuclear power industry and equipment qualification. EPRI has published a vast set of technical documentation detailing engineering and operational information that is used by Koeberg to maintain the level of knowledge in line with international norms.

Assessment:

Although Koeberg makes good use of operational experience the processes controlling and governing the incorporation of this experience are lacking. Information does not flow into the engineering processes in a consistent and integrated manner.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Formalise the incorporation of Operational Experience and Research information into the Koeberg processes. Refer to WBS 14.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Archiebold Thabo Mthandi	**A4.7**
Functional Group:	Engineering Programmes	
Date Performed:	31 August 2015	

Item:

3.1.4.3 Bullets 7: *Verify if recommendations and other suggestions arising from different types of reviews are incorporated into the plan activities.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Lessons learned from different types of reviews, EDF collaborations, WANO peer reviews, periodic Safety Re-assessments (SRA), group participation (FROG, PWR Owner Group, etc.) and training & development initiatives are incorporated into the KOU plan for improvements. Recommendations and suggestions from the peer reviews and industry OE are captured on DevonWay (previously EPMS) as corrective actions and recommendations for resolution as per KAA-688. This process aims to ensure that OE information is effectively identified; screened; classified; investigated, distributed and tracked.

The procedure that describes the process for evaluating and disseminating Operating Experience in Koeberg is provided in KAD 025. The station has a designated Koeberg integrated team (KIT) and Operating Experience (OE) group to analyse and co-ordinate all aspects of Operating Experience (internal and external). Operating Experience from WANO SOERs; EdF Affaire Parc and Eskom Events are reviewed for applicability to KNPS prior to being distributed to the relevant staff.

Research results and OE are well identified and made available to technical leads and system engineers to decide on management methods. Reference documents such as AMM, IGALL, EDF OE, EPRI research, WANO concerns, FROG and PWROG items, PSR reports, LOPPs and NEPPs are considered.

INPUT REFERENCE DOCUMENTS:

- 331-148 - Programme Engineer guide
- 331- 102 - ETMM TOR
- KGU 011 – Life of Plant Plans
- NEPP 001 – Concept of position papers
- KGU 031 - System Health reporting
- KAA 826 - Plant Health committee
- KGA 035 – OE from EDF
- KAD 025: Processing of Operating Experience
- KAA 688: Corrective Action Process

Assessment:

The process is adequate and needs to be maintained.

Results:	Meet	**X**	Don’t Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date
	None		

AREA A: ORGANIZATION AND FUNCTIONS, CURRENT LICENSING BASIS, CONFIGURATION/ MODIFICATION MANAGEMENT

Subsection 3.1.5: Current safety analyses report and other current licensing basis documents.

Functional Group: IPD-K **Functional Group Lead:** Darren Bissell

Date Performed: 2015-09-15

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.1.5.1	The CLB is a collection of documents or technical criteria that provides the basis upon which the regulatory body issues a licence valid for the given period. Justification of LTO should be properly documented in the CLB, in particular in documents like FSAR, PSR report or in other licensing basis documents. *Note:* Depending on the national regulations, PSR may have an important role in justification of LTO. The objective of a PSR is to determine the safety of NPP by means of a comprehensive assessment. There are aspects of PSR which are directly linked to the justification of LTO (e.g. actual condition of SSCs, EQ, ageing management). The scope of a PSR includes all nuclear safety aspects of an NPP. For this purpose, a plant consists of all facilities and SSCs on the site covered by the operating licence (including, for example, waste management facilities and on-site simulators) and their operation, together with the staff and its organization. The review also covers radiation protection, emergency planning and radiological impact on the environment. For the SALTO mission, it is important to focus on the LTO relevant issues.	• FSAR; • PSR report; • Other current licensing basis documents.	238-147 – Periodic Safety Reviews of Koeberg Nuclear Power Station.
			EERT-11-013: rev 1 Koeberg External Events Safety Re-assessment Interim Report
			IAEA NS-G-2.10 “Periodic Safety Review of Nuclear Power Plants”
			IAEA NS-G-2.10 “Periodic Safety Review of Nuclear Power Plants”;
			KAA 697: Control of the Safety Analysis Report
			NEI-98-03: Guidelines for Updating Final Safety Analysis Reports
			Safety Analysis Report Revision 5/5A
			SRA-2 - Second Koeberg Safety Reassessment;
			SRA2-QRA-51 to 56 – SRA2 Qualitative Safety Risk Assessment;
			US NRC RG 1.181: Content of the Updated Final Analysis Report in accordance with 10 CRF 50.71(e)
			LD-1091, Rev 3: Requirements on Licensees of Nuclear Installations Regarding Risk Assessment and Compliance with the Safety Criteria of the NNR

Functional Group Lead:	Khaliel Isaacs	**A5.1**
Functional Group:	Safety Case Group	
Date Performed:	17 August 2015	

Item:

3.1.5.3 Bullets 1: *Whether the justification for plant safety during the planned period of LTO is properly documented in e.g. FSAR and/or PSR report.*

Current status description and input document reference:

The Koeberg Safety Analysis Report (SAR) documents the justification for design basis and plant safety. The current revision of the SAR is revision 5/5A which was authorised in April 2015 and is up-to-date for the current plant configuration. The SAR is periodically revised to include changes that result from modifications to the plant, operational experience feedback, the correction of errata, and the results of new safety analyses. The updating of the SAR is procedurised in the Control of the Safety Analysis Report (KAA-697) which is aligned to the NRC document US NRC RG 1.181 and NEI-98-03, and meets the requirements of the NNR stipulated in LD-1091 Rev 3.

The current Safety Analysis Report (SAR) Revision 5/5A does not contain a justification for the planned period of LTO. The current PSR report is the second safety reassessment for Koeberg which was undertaken 24 years after commissioning. The Koeberg PSR process is not linked to renewal of CLB for a prescribed period.

Eskom is in the process of improving the overall Safety Case process to align with the latest international practices and IAEA generics which will be used for consolidating the safety argument that will support extending plant life.

INPUT REFERENCE DOCUMENTS:

- Safety Analysis Report Revision 5/5A
- US NRC RG 1.181: Content of the Updated Final Analysis Report in accordance with 10 CRF 50.71(e)

Assessment:

Updating of the SAR is the final step to record and capture appropriate selected outcomes which should define the design basis boundaries for the planned period of LTO.

Key aspects from the LTO implementation with impact on the design basis should be identified and if, there are limiting conditions these must be recorded in an update to the affected sections in the SAR.

The consolidated Safety Case is not currently in place and the plant relies on the current license base manual (CLBM) to affirm compliance.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1.	Determine the scope of the update to the SAR resulting from LTO implementation. Update the SAR as required. Refer to WBS 11.	Koeberg SALTO	Q4 2020
2.	Implement the Safety Case process.	IPD-K	Q1 2020

Functional Group Lead:	Haco Nicolson	**A5.2**
Functional Group:	Nuclear Engineering	
Date Performed:	2015-08-13 (Rev 1)	

Item:

3.1.5.3 Bullets 2: *If available, review the results of the PSR report or similar safety assessment with focus on chapters relevant to LTO and ageing management.*

Current status description and input document reference:

The current, standardised PSR report is the second safety reassessment for Koeberg which was undertaken 34 years after commissioning (report issued in 2011). The Koeberg PSR process is also not linked to renewal of CLB for a prescribed period. Due to these two factors, it did not specifically address readiness for LTO, but as it included the 14 elements laid out in IAEA NS-G-2.10, it obviously did cover elements important to both current operation and LTO.

In particular, in addition to important processes and programmes such as EQ, the safety reassessment included plant ageing, covered in chapter 4, and that assessment is summarised as follows:

"The assessment of how ageing of plant equipment is being managed indicated that Koeberg should have a comprehensive ageing matrix that provides confidence that all possible degradations have been considered for all safety equipment. While recognizing the absence of a comprehensive ageing/degradation matrix as a gap, comparison of EDF with the equivalent Koeberg ageing management documentation shows that the ageing management strategy for each major safety related equipment type is addressed at Koeberg. It is further accepted that Koeberg is at an age where the Ageing program is to be implemented (EDF included the Ageing program as part of VD3) and it will be required for motivation of operation beyond the original design life of 40 years."

A qualitative safety risk assessment (SRA2-QRA-84) of this gap was performed as part of the SRA which concluded as a "drop".

The current status is that significant progress has been made in establishing an ageing matrix using EDF input and a controlling procedure (Nuclear Engineering Procedure 331-275) is being compiled.

While the SRA-2 report contains a number of areas for improvement in areas key for both current and longer term operation (e.g. maintenance bases, scope of EQ) there were no urgent safety concerns noted, as compared to the benchmark used for the re-assessment, and the improvements were taken up in normal business processes.

In light of the lessons learned from the Fukushima-Daiichi nuclear accident on 11 March 2011, and as directed by the NNR, Eskom has also completed a specific safety re-assessment of Koeberg Nuclear Power Station focussed on external events both in the design basis and risk analysis domains.

This re-assessment (interim report issued in December 2011) identified various means of increasing the robustness of the design, in terms of preventing and mitigating core damage and release of radioactivity, and for improving the ability to cope with a prolonged loss of off-site support and infrastructure. Proposals were made and are in the process of being implemented, while further assessments are ongoing.

INPUT REFERENCE DOCUMENTS:

- IAEA NS-G-2.10 "Periodic Safety Review of Nuclear Power Plants"
- Second Koeberg Safety Reassessment (SRA-2)
- EERT-11-013: rev 1 Koeberg External Events Safety Re-assessment Interim Report
- 238-147 – Periodic Safety Reviews of Koeberg Nuclear Power Station.

Assessment:

The SRA-2 addresses key elements which are common to both current and longer term ageing but does not cover the additional elements specific to LTO.

This is as expected considering the timeframe of and licensing framework for SRA-2.

In the chapter on ageing, however, the gap identified focuses on the need for an ageing matrix; it did not identify the need for establishing higher level requirements for managing ageing.

In addition to the matrix and its controlling procedure, we needed to establish higher level requirements for managing ageing. At this point, these can be extended to include LTO.

Furthermore, we need to follow-up on the process used to ensure that the issues identified for improvement in the other key elements needed for LTO (EQ, plant condition) are being managed accordingly.

The Koeberg External Events Safety Re-assessment also addresses issues common to both current and longer term operation.

SRA-3 is due to commence at the beginning of 2018 and conclude at the end of 2020. SRA-3 will need to cover the state of preparation work for Koeberg LTO, including any relevant actions stemming from SRA-2 and the External Events Safety Re-assessment.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Khaliel Isaacs	**A5.3**
Functional Group:	Safety Case Group	
Date Performed:	18 August 2015	

Item:

3.1.5.3 Bullets 3*: Review trends of reported events in PSR and assess their possible connection with degradation of SSCs.*

Current status description and input document reference:

The current PSR report is the second safety reassessment for Koeberg which was undertaken 24 years after commissioning. The Koeberg PSR process is also not linked to renewal of CLB for a prescribed period. Due to these two factors, it did not specifically address readiness for LTO, but as it included the 14 elements laid out in IAEA NS-G-2.10, it did cover elements important to both current operation and LTO.

The safety reassessment included the actual condition of SSCs, covered in chapter 2, and that assessment is summarised as follows:

"In view of the EPRI assessment, and their support for the Koeberg Response Programme, it can be concluded that Koeberg's current position on Equipment Reliability is satisfactory. Identified areas for improvement with regard to fuel have been tracked through Koeberg's formal corrective action process."

The Corrective Action Process that Koeberg uses constantly assesses the possibility of adverse trends, which are then investigated and corrective actions implemented.

INPUT REFERENCE DOCUMENTS:

- IAEA NS-G-2.10 "Periodic Safety Review of Nuclear Power Plants";
- SRA-2 - Second Koeberg Safety Reassessment;
- SRA2-QRA-51 to 56 – SRA2 Qualitative Safety Risk Assessment;

Assessment:

The focus of chapter 2 was heavily on the Equipment Reliability process and alignment to AP-913. There were 6 gaps identified in Chapter 2 and these were assessed in QRAs SRA2-QRA-51 to 56.

Three of the gaps were assessed as "Drop" and three were assessed as "Low".

The focus of these gaps is heavily on the process for driving improvement in equipment reliability. Most of the applicable principles are universal in the preservation of equipment integrity and lifespan, and managing failure rates and are applicable to LTO.

Station processes governing equipment reliability and component failure such as non-conformance evaluations, system health, component health and programme health will need to be updated to ensure they encompass the principles and concepts of LTO.

Appendix 1 of chapter 2 of the second Koeberg Safety Reassessment contains a list of issues under review by KSRC (now ETMM). These issues are related to the actual condition of SSCs and include issues such as RPV Radiation Embrittlement and Segregation, External Driven Stress Corrosion Cracking on Components, Steam Generator Vibration-Induced Fatigue Cracking, etc.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1.	Draft and implement a policy for integrating LTO principles and concepts into ER processes. Refer to WBS 11.	Koeberg SALTO	Q4 2020
2.	The list of key technical issues in Appendix 1 of Chapter 2 of SRA needs to be assessed for impact on LTO. Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Khaliel Isaacs	**A5.4**
Functional Group:	Safety Case Group	
Date Performed:	19 August 2014	

Item:

3.1.5.3 Bullets 4: *Whether the FSAR is updated to reflect the results of activities to justify safe LTO (preconditions for LTO, AMR, review of AMPs, TLAAs).*

Current status description and input document reference:

The current Safety Analysis Report (SAR) Revision 5/5A is not updated for the planned period of LTO. The updating of the SAR is procedurised in the Control of the Safety Analysis Report (KAA-697) which is aligned to the NRC document US NRC RG 1.181 and NEI-98-03, and meets the requirements of the NNR stipulated in LD-1091 Rev 3.

The current PSR report is the second safety reassessment for Koeberg which was undertaken 24 years after commissioning. The Koeberg PSR process is not linked to renewal of CLB for a prescribed period. Due to these two factors, it did not specifically address readiness for LTO, but as it included the 14 elements laid out in IAEA NS-G-2.10, it did cover elements important to both current operation and LTO.

INPUT REFERENCE DOCUMENTS:

- Safety Analysis Report Revision 5/5A
- KAA 697: Control of the Safety Analysis Report
- US NRC RG 1.181: Content of the Updated Final Analysis Report in accordance with 10 CRF 50.71(e)
- NEI-98-03: Guidelines for Updating Final Safety Analysis Reports
- LD-1091, Rev 3: Requirements on Licensees of Nuclear Installations Regarding Risk Assessment and Compliance with the Safety Criteria of the NNR

Assessment:

Updating of the SAR is the final step to record and capture appropriate selected outcomes which should define the design basis boundaries for the planned period of LTO.

Key aspects from the LTO implementation with an impact on the design basis should be identified and if, there are limiting conditions these must be recorded in an updated to the affected sections within the SAR.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Determine the scope of the update to the SAR resulting from LTO implementation. Update the SAR as required. Refer to WBS 11.	Koeberg SALTO	Q4 2020

AREA A: ORGANIZATION AND FUNCTIONS, CURRENT LICENSING BASIS, CONFIGURATION/ MODIFICATION MANAGEMENT

Subsection 3.1.6: Configuration management and modification management including design basis documentation.

Functional Group: IPD-K **Functional Group Lead:** Darren Bissell

Date Performed: 2015-09-14

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.1.6.1	The plant should have a configuration management and modification management programme encompassing the status of the plant and all modifications of SSCs, releases of process software, operational limits and conditions, set-points, instructions and procedures. Management/QA systems should contain the processes and activities related to the configuration management and modification management programme. The plant should also have adequate design basis documentation reflecting all the design changes and planned LTO. Original design basis should be collected and documented in the plant. Design basis should contain design basis requirements and supporting design information. Design basis should be updated according to the current configuration and conditions. Design basis information can be part of FSAR or separate design basis documentation. If design basis documentation is not complete or obsolete, an appropriate design basis reconstitution programme should be in place.	• Database or records on permanent modifications; • Database or records on set-points; • FSAR sections with plant modifications; • FSAR sections with design basis information; • Modification control procedure; • QA manual section on document control modification requirements; • Configuration management manual or procedures and configuration management performance indicators; • Report on PSR on the assessment of management of modifications (if exists) • Methodology for design basis collecting, maintaining and reconstitution; • Design basis documentation; • Databases/documentation containing design basis information.	240-88257644: Koeberg Operating Unit: Functional Organisation Structure (F.O.S.) – Nuclear Engineering
			238-15: NOU Configuration Management Policy
			238-25: Nuclear Commercial Business Area Management Manual
			238-8: Nuclear Safety and Quality Manual
			239-QWA-022: Quality Assurance Data Package
			240-86502715: Process for Minor Modifications
			331-121: Configuration Management at Koeberg
			331-130: Controlling Documentation and Responsibilities for Configuration Management at KNPS
			331-143: The Equivalency Process to Change Plant
			331-146: The Obsolescence Process
			331-2: Nuclear Engineering Management Manual
			331-215: Nuclear Engineering Configuration Management Implementation Programme Exists
			331-219: Environmental Qualification Maintenance Manual
			331-342: Integrated Plant Design, Process for Changes to Systems, Structures or Components at Koeberg Operating Unit

			331-5: Audit, Surveillance and Self-Assessment Procedure
			331-83: Standard for Plant changes affecting Design of KNPS
			331-85: Design Basis Documentation Change Process
			331-86 (KAA-815): Design Changes to plant, plant structures or operating parameters
			331-87: Design Engineering Guide
			331-88 (KAA-506): Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base
			36-190: NSA Process Workflow
			36-197: Koeberg Licensing Basis Manual
			ASME NQA-1:2008 Quality Assurance Requirements for Nuclear Facility Applications
			ASME, ANSI, IEEE Codes and Standards
			FSAR
			IAEA GS-R-3: The Management System for Facilities and Activities
			INPO SOERs and EPRI Guides
			INPO-97-011: Guidelines for the use of Operating Experience
			KAA-501: Project Management Process for Koeberg Nuclear Power Station Modifications
			KAA-503: Modifications to Simulator
			KAA-505: Modifications to Software on the KIT system
			KAA-558: Modifications to Off Site Plant and structures that affect the safety and operation of Koeberg Nuclear Power Station

			KAA-560: The Control of Plant Documents as a result of a Plant Design Change, Plant Anomaly or Document Anomaly
			KAA-688: The Corrective Action Process (Problem Management System)
			KAA-697: Control of the Safety Analysis Report
			KAA-709: Performing of Safety Screenings, Evaluations, Justifications and Safety Cases
			KAA-815: Design Changes to Plant, Plant Structures or Operating Parameters.
			KAB-029: Control of Plant Configuration
			KGA-035: Processing of Experience Feedback received through the EDF Co-operation Agreement
			KGA-093: Processing of Operating Experience
			KSA-011: The Requirements for Controlled Documents
			KSA-113: Standard for Plant Changes Affecting the Design of Koeberg Nuclear Power Station
			LD-1012: Requirements in Respect of Proposed Modifications to Koeberg Nuclear Power Station
			NEI 96-07, Rev 1: Implementing 10 CFR 50.59 for safety assessments.
			NEI 97-04: Design Bases Program Guidelines
			OTS: Operating Technical Specifications
			Protection design files
			RD-0034 Quality and Management systems for Nuclear Installations

			Regulatory Guide 1.186 – Guidance and Examples for Identifying 10 CFR 50.2 Design Bases
			Setpoint manual
			System DSEs – System Description

Functional Group Lead:	Johann Austin	**A6.1**
Functional Group:	IPD-K	
Date Performed:	2015-09-15	

Item:

3.1.6.3 Bullets 1: *Whether the plant activities are effectively managed to verify that the plant physical configuration and operation conform to design requirements and to design documents all the time.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The operating department is responsible for ensuring that the plant operational configuration is maintained to confirm with the design requirements and design documentation. For this the operators make no changes to the plant without the use of approved operating procedures. These operating procedures are written by the Operating Procedure Group (OPG). The Operations Engineering Group in Nuclear Engineering is responsible for supporting OPG by providing design base information to the procedure writers.

The Project Engineering Group is responsible for ensuring that the plant configuration matches the design of the plant when modifications are performed. The project Engineering Group works closely with the Nuclear Project Management Business Unit under procedure KAA 501, which ensure that all changes to the plant are documented and according to the design.

INPUT REFERENCE DOCUMENTS

- KAB-029: Control of Plant Configuration
- KAA-501: Project Management Process for Koeberg Nuclear Power Station Modifications

Assessment:

The Operations Engineering Group does not perform the mandate that they have been given because of a lack of resources. Only one resource is currently responsible for providing the full scope of support.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Deploy additional resources in the Operations Engineering Group.	IPD-K	Q4 2016

Functional Group Lead:	ASTRID HOLLAND	**A6.2**
Functional Group:	Configuration Management	
Date Performed:	2015-08-24	

Item:

3.1.6.3 Bullets 2: *Whether the configuration management programme is established and implemented at the plant.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The responsibility of establishing the Configuration Management programme at KOU is currently held by the Configuration Management Group within the Nuclear Engineering Business Area.

The overall governance of configuration management at the KOU can be seen through the hierarchy starting at the Koeberg Licensing Basis Manual, through to the NOU Configuration Management Policy and then to the Configuration Management Standard at Koeberg. These top tier documents clearly illustrate the requirements for a configuration management programme at Koeberg.

The design change processes that are defined lower down in the configuration management hierarchy clearly follow the expected configuration management requirements.

INPUT REFERENCE DOCUMENTS:

- 36-197: Koeberg Licensing Basis Manual
- 238-15: NOU Configuration Management Policy
- 238-25: Nuclear Commercial Business Area Management Manual
- 331-83: Standard for Plant changes affecting Design of KNPS
- 331-85: Design Basis Documentation Change Process
- 331-88: Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base
- 331-121: Configuration Management at Koeberg
- 331-130: Controlling documentation and responsibilities for Configuration Management at KNPS
- 331-143: The Equivalency Process to Change Plant
- 331-146: The Obsolescence Process
- 331-215: Nuclear Engineering Configuration Management Implementation Programme Exists
- 331-342: Integrated Plant Design Process for Changes to Systems, Structures or Components at Koeberg Operating Unit
- KAA-501: Process for Modifications at Koeberg
- 240-86502715: Process for Minor Modifications

Assessment:

A document titled, “Configuration Management Programme” does exist but is not written as a programme, but more a list of actions that need to be in place at KOU.

With our Configuration Management document hierarchy in place, we have experienced instances of design change processes not having been implemented correctly/fully.

Implementation concerns exist in the arena of responsibilities of business areas as well as full and complete execution of all design change processes.

There are currently no documented KPI’s to measure the health of the Koeberg Operating Unit’s Configuration Management Programme.

Results: Meet [ ] Don’t Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Update NE Configuration Management Programme to be represented in a comprehensive suite of documents that represents the KOU CM strategy and governance model	NE-PS-CMG	Q4 2017
2	Review and update where required, all configuration governance documentation.	NE-PS-CMG	Q4 2017
3	Perform an effectiveness review of all design process changes carried out in 2014. (Assessment period 2014-04-01 to 2014-12-31)	NE-PS-CMG	Q4 2016
4	Develop KPI’s to measure the health of the KOU Configuration Management Programme.	NE-PS-CMG	Q4 2016

Functional Group Lead:	Darren Bissell	**A6.3**
Functional Group:	IPD-K	
Date Performed:	2015-08-26	

Item:

<u>3.1.6.3 Bullets 3</u>: *Whether the design authority exists.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Nuclear Engineering is the design authority as detailed in the purpose of the KOU Functional Organisation Structure for Nuclear Engineering (240-88257644):

(The purpose of Nuclear Engineering is) "To establish and maintain the Eskom Nuclear Installations design and safety basis, to monitor and support the utilisation of the assets in line with the design and safety basis and to optimise the nuclear asset design in partnership with the Operator."

<u>INPUT REFERENCE DOCUMENTS:</u>

- 240-88257644: Koeberg Operating Unit: Functional Organisation Structure (F.O.S.) – Nuclear Engineering

Assessment:

Nuclear engineering is clearly defined as the design authority in the KOU FOS for Nuclear Engineering. This achieves the IAEA definitions of Design Authority listed below.

<u>IAEA definition of Design Authority:</u>

- *Design Authority: The design organization with appropriate knowledge of the design basis that is responsible for establishing the design requirements and ensuring that design documentation (document and/or data) appropriately and accurately reflect the design. The design authority is responsible for design control and the technical adequacy of the design process throughout the lifetime of the nuclear facility*.
  SRS no. 65 - APPLICATION OF CONFIGURATION MANAGEMENT IN NUCLEAR POWER PLANTS
- *An operating organization must set up internally a formal process to maintain the design integrity as soon as it takes control of the plant. This may be achieved by setting up a design capability within the operating organization, or by having a formal external relationship with the original design organizations or their successors. There must be a formally designated entity within the operating company that takes responsibility for this process. This entity needs to formally approve all design changes. To do this, it must have sufficient knowledge of the design and of the overall basis for safety. In addition, it must have access through a formal process to all the underlying design knowledge to ensure that the original intent of the design is maintained.*
  INSAG-19 - MAINTAINING THE DESIGN INTEGRITY OF NUCLEAR INSTALLATIONS THROUGHOUT THEIR OPERATING LIFE

Results:	Meet	X	Don't Meet		Partially Met		N/A	

<u>No</u>	<u>Action Description</u>	<u>Lead</u>	<u>Due Date</u>

Functional Group Lead:	Darren Bissell (Neil Boonzaier)	A6.4
Functional Group:	SDE Elec and I&C	
Date Performed:	2015-08-25	

Item:

3.1.6.3 Bullets 4: *Whether the plant has design basis documentation.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The current on-site design basis documentation is found in the following documentation listed below (See KAA-709 definition).

There is also off-site original construction design base documentation available at the OEM documentation repository (Alstom, Framatone, Spie Batignolle. Sofenol).

INPUT REFERENCE DOCUMENTS:

- FSAR
- ASME and ANSI codes specified in the FSAR
- System DSEs –system description
- Technical specification
- Setpoint manual
- Operating Technical Specifications
- Protection design files

Assessment:

The above listed input document references define the design basis according to KAA-709. However the general consensus is that certain analyses and calculations used to establish design requirements such as set-points are not always available and would need to be requested from the OEM.

Continued access to OEM DB material required for LTO.

Results:	Meet		Don't Meet		Partially Met	×	N/A	

No	Action Description	Lead	Due Date
1	Determine what essential design base analyses and calculations, if any, need to be requisitioned. Refer to WBS 9.	Koeberg SALTO	Q4 2016
2	Secure access to the essential OEM DB documentation until updated EOL. Refer to WBS 13.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Deon Kruger	**A6.5**
Functional Group:	SDE	
Date Performed:	2015-08-24	

Item:

3.1.6.3 Bullets 5: *Whether the plant launched a design basis reconstitution programme, if necessary.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Koeberg's design basis information can be found in the following documents: SAR, DSEs, OTS, protection files and set point manuals and at the OEM repositories.

Koeberg considered a Design Basis Engineering project in 2005, assisted by a Technical Support Mission from TXU. One of the objectives of this project was to establish a set of Design Basis Documents in accordance with NEI 97-04, "Design Bases Program Guidelines". Although a considerable amount of work was performed under this project, it did not carry through to completion and it was decided not to reconstitute the design base as the information would be available from the OEM ad-hoc.

INPUT REFERENCE DOCUMENTS:

- NEI 97-04 – Design Bases Program Guidelines
- Regulatory Guide 1.186 – Guidance and Examples for Identifying 10 CFR 50.2 Design Bases

Assessment:

There is however no clear consensus regarding what information should be included in design basis documents and what the minimum set of necessary design documents to support the design basis are. For illustrative purposes, design calculations supporting the existing plant configuration and operating parameters are often not readily accessible. Without these original design calculations and hence knowledge of the margin to limits, it is not possible to say that a proposed modification falls within the existing design limits.

While the reconstitution of the complete set of design documents may not be necessary, it is important that certain design documents are available to support plant operation. NUREG 1397, "An Assessment of Design Control Practices and Design Reconstitution Programs in the Nuclear Power Industry", refers to "essential design documents", being those that are (1) necessary to support or demonstrate the conservatism of technical specification values such as pump flow calculations and set point calculations and (2) those necessary both for use by engineering personnel to support plant operations and for use by the operators to quickly respond to events.

A technical review should therefore be performed to determine the availability and adequacy of Koeberg's design basis. If the basis is not fully documented, or not complete, it may need to be updated to the extent required considering the facility life-cycle, the cost of reconstituting the information, and the need for the information.

NEI 97-04 was developed by the NRC specifically to help utilities organise and collate design basis information and supporting design information. These guidelines provide a useful standard framework for implementing design reconstitution programmes.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Determine what essential design base analyses and calculations, if any, need to be requisitioned. Refer to WBS 9.	Koeberg SALTO	Q4 2016
2	Secure access to the essential OEM DB documentation until updated EOL. Refer to WBS 13.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Johann Austin	**A6.6**
Functional Group:	IPD-K	
Date Performed:	2015-09-15	

Item:

3.1.6.3 Bullets 6: *Whether the responsibility for plant modifications and set-points are well defined.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Nuclear Engineering FOS clearly assigns the responsibility for detailed engineering design to the Systems Design Engineering Department. This is in line with the responsibilities associated with the detailed design of the plant.

Input document reference

- 331-2: Nuclear Engineering Management Manual
- 240-88257644: Koeberg Operating Unit: Functional Organisation Structure (F.O.S.) – Nuclear Engineering

Assessment:

The responsibility was found to be clearly defined and assigned as per the FOS

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Khaliel Isaacs	**A6.7**
Functional Group:	Safety Case Group	
Date Performed:	20 August 2015	

Item:

3.1.6.3 Bullets 7: *Whether the impact of the modification on plant safety is properly assessed.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The impact on plant safety on all plant changes including modifications is governed by the Process for Performing Safety Screenings, Safety Evaluations, Safety Justifications and Safety Cases. The process is aligned to NRC document NEI 96-07, Rev 1 which provides the framework for implementing 10 CFR 50.59 for safety assessments.

The process description is stated as:

"To describe the process and responsibilities for performing safety screenings, safety evaluations, safety justifications and safety cases for activities or plant conditions, the consequence of which could have an impact on the Koeberg licensing basis.

To ensure consistency in the approach to performance of safety screenings, safety evaluations, safety justifications and safety cases.

To ensure quality and configuration control of the safety evaluation process."

One of the areas of change in modifications which is defined as:

"Modification – Any change, deletion, or addition to structures, systems, or components or part thereof or changes to operating parameters that affect the design base."

INPUT REFERENCE DOCUMENTS:

- KAA-709, Rev 6: Process for Performing Safety Screenings, Safety Evaluations, Safety Justifications and Safety Cases
- NEI 96-07, Rev 1: Implementing 10 CFR 50.59 for safety assessments.

Assessment:

KAA-709 is robust and in principle is in alignment with LTO. It will form the foundation for assessing safety impact of changes that are made that result from LTO outputs, where applicable.

The fundamental change will the reference documents stated in KAA-709 such as the Safety Analysis report, Operating Technical Specifications, other licensing basis documentation, etc.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Darren Bissell (Compiler: E Kerr)	**A6.8**
Functional Group:	SDE - Electrical	
Date Performed:	2015-08-17	

Item:

3.1.6.3 Bullets 8: *Whether the operational limits and conditions are reassessed and revised, as necessary, following any safety related modifications at the plant or any changes to the safety analyses report, and also on the basis of accumulated experience and technological developments.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

For activities such as Plant Modifications and Safety Analysis report changes, the Safety Evaluation process (KAA-709) will ensure that there are no unassessed operational limits applied without an Un-Reviewed Safety Question (USQ) being initiated. This either leads to a Safety Justification or, to avoid a USQ, a reassessment of the operational limits and conditions.

Peer reviews and INPO SOERs are two examples of accumulated experience or technological developments that are shared with Koeberg via Nuclear bodies such as INPO, WANO, and the IAEA. These are evaluated using the Operating Experience processing guide, KGA-093, to determine its applicability to Koeberg. The results are recorded and tracked in the Problem Management System. Plant change Corrective Actions are then initiated which are controlled by the plant change process, 331-86, including KAA-709.

In addition, the plant design process, 331-86, assesses the options of using updated technology based on experience from other nuclear plants and industry in general. Examples of reference sources, some of which are design basis (i.e. mandatory), includes the INPO SOERs, EPRI Guides, IAEA/ASME/ANSI/IEEE Codes and Standards.

INPUT REFERENCE DOCUMENTS:

- KAA-709: Performing of Safety Screenings, Evaluations, Justifications and Safety Cases
- KAA-697: Control of the Safety Analysis Report
- 331-85: Design Basis Documentation Change Process
- 331-86: Design Changes to Plant, Plant Structures, and Operating Parameters
- KGA-093: Processing of Operating Experience
- KGA-035: Processing of Experience Feedback received through the EDF Co-operation Agreement
- INPO-97-011: Guidelines for the use of Operating Experience
- KAA-688: The Corrective Action Process (Problem Management System)
- INPO SOERs and EPRI Guides
- ASME, ANSI, IEEE Codes and Standards

Assessment:

The reassessment and revision of the operational limits and conditions is covered by existing systems and processes at Koeberg

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date
	None.		

Functional Group Lead:	Raymond Maapola (Peter Harrisankar)		A6.9
Functional Group:	SDE		
Date Performed:	17/08/2015		

Item:

<u>3.1.6.3 Bullets 9</u>: *Whether QA involvement is in place during the modification process to ensure that all updating of controlled drawings, documents and required training was completed before the actual operation of the modified system or equipment.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

The modification process is governed by KAA-501. This administrative procedure together with KAA 815 (331-86) ensures that all modification related configuration and quality requirements are met during the life cycle of a modification. The process is mainly driven by the Project Manager to ensure that controlled drawings, document and required training are completed according to approved procedures. Specific controls, such as a Construction Status Certificate (CSC), are in place to ensure that plant cannot be operated after modification until all relevant operational documentation and training is complete. There is also a QM function within Nuclear Project Management (NPM) to ensure that the modification process is followed and that document updates and training occurs as per the stipulated time frames found in relevant approved procedures. Depending on the nature of the modification and its impact on plant operations some document updates and training may only be completed after the actual operation of the modified system or equipment.

NPM Quality Management and Configuration Group communicates with the KOU Configuration Group at the Configuration Management Forum monthly, on all plant related documentation updates, i.e.: DDR's, SAR's, TCR's and maintenance basis.

Koeberg's QA department involvement in this process is performing periodic audits on the modification process and adherence thereof. Koeberg QA also conducts surveillances of modifications during outage implementations.

The QADP Work Instruction (239-QWA-022) is used as a record of activities performed between NPM and Koeberg. This document is used to record all modification related activities as well as used as a handover document for implemented modifications.

<u>INPUT REFERENCE DOCUMENTS:</u>

- KAA-815 Design Changes to Plant, Plant Structures or Operating Parameters.
- KAA-501 Project Management Process for Koeberg Nuclear Power Station Modifications.
- 239-QWA-022 Quality Assurance Data Package

Assessment:

With NPM having its on QM function within the group there is continuous oversight during the modification process to ensure that controlled drawings, documents and required training are completed when required.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

<u>No</u>	<u>Action Description</u>	<u>Lead</u>	<u>Due Date</u>

Functional Group Lead:	Darren Bissell (compiled by S Kiewitt)	**A6.10**
Functional Group:	IPDK (SDE)	
Date Performed:	Aug 2015	

Item:

<u>3.1.6.3 Bullets 10</u>: *Determine if QA programme deals with configuration management issues to the extent necessary for assurance of all plant modifications and design changes during the current operational period as well as period of LTO.*

Current status description and Input data document reference:
(NOTE: to be copied & pasted into the AIP)

238-8, "Nuclear Safety and Quality Manual" prescribes the quality management system requirements and assignment of major functional responsibilities. It promotes strong nuclear and industrial safety culture as referred also in RD-0034 as the Safety and Quality Management system (S&QMS).

The KOU S&QMS is based on ISO 9001:2008 and the requirements of RD-0034, "Quality and Safety Management Requirements for Nuclear Installations," supplemented by ASME NQA-1:2008 and IAEA GS-R-3 and associated documents as referenced in RD-0034.

331-130 "Controlling Documentation and Responsibilities for Configuration Management at KNPS" prescribes the configuration management baseline elements, the associated controlling documentation and the responsible group/department for ensuring the configuration element is maintained.

WANO AFI 2014 Operational configuration control – Area of Improvement (CM.2-1) indicated that managers have not established effective methods for accessing and maintaining design basis documents that supports engineering, procurement, and maintenance activities. Contributing, managers have not coordinated multiple record management systems to establish clear document control standards.

<u>INPUT REFERENCE DOCUMENTS:</u>

- 331-219 Environmental Qualification Maintenance Manual
- 331-130 Controlling Documentation and Responsibilities for Configuration Management at KNPS
- 331-121 Configuration Management at Koeberg
- 238-8 Nuclear Safety and Quality Manual
- ASME NQA-1:2008 Quality Assurance Requirements for Nuclear Facility Applications
- IAEA GS-R-3 The Management System for Facilities and Activities
- RD-0034 Quality and Management systems for Nuclear Installations
- 331-86 (KAA-815) Design Changes to plant, plant structures or operating parameters
- KAA-558 Modifications to Off Site Plant and structures that affect the safety and operation of Koeberg Nuclear Power Station
- KSA-011 The Requirements for Controlled Documents
- LD-1012 Requirements in Respect of Proposed Modifications to Koeberg Nuclear Power Station
- KAA-501 Project Management Process for Koeberg Nuclear Power Station Modifications
- KAA-503 Modifications to Simulator
- 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-560 The Control of Plant Documents as a result of a Plant Design Change, Plant Anomaly or Document Anomaly
- KSA-113 Standard for Plant Changes Affecting the Design of Koeberg Nuclear Power Station
- 331-342 Integrated Plant Design, Process for Changes to Systems, Structures or Components at Koeberg Operating Unit
- 331-87 Design Engineering Guide

Assessment:

Important engineering and design documents are managed using several different record management systems that are not well integrated to guide users to the proper source for current information. The difficulty and confusion in locating official documentation increases the potential for individuals using outdated or incomplete information and has contributed to configuration control events, as well as maintenance and component procurement errors.

KOU still use the same systems for configuration management and the potential still exist that the configuration management criteria will remain challenged.

The WANO AFI of 2014 as well as the NSA IRA is evident that KOU has had difficulty to clear the CM QA issues.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Implement the resolution actions from the WANO AFI & NSA IRA to address the configuration management control and effectiveness	NE-PS-CMG	Q4 2021

Functional Group Lead:	Nyamie Ntlokombini	**A6.11**
Functional Group:	Process Support – QM group	
Date Performed:	14 August 2015	

Item:

<u>3.1.6.3 Bullets 11</u>: *Determine specifically that plant quality assurance plan is dealing with configuration management to an extent that assures availability of the necessary input for LTO analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Configuration management at KOU is governed by the Koeberg Licensing Basis Manual (top tier document); followed by the NOU Configuration Management Policy; Configuration Management Standard. These documents set out the requirements of configuration management.

There are established processes for permanent and temporary modifications. These processes are to ensure proper design, evaluation, control, execution and documentation of design changes. Plant modifications are subjected to review (independent), and evaluation prior to implementation – to ensure safety significance and its impact on design configuration is taken into account.

Furthermore, these modification processes form part of the Nuclear Engineering Integrated Management System (i.e. Nuclear Safety and Quality). As part of monitoring the management system, a KOU Audit Programme (2013-2016, rev 7d) was developed in line with the licensing and management requirements. Configuration management activities are also audited from time to time.

<u>INPUT REFERENCE DOCUMENTS:</u>

- 36-197 Koeberg Licensing Basis Manual
- 331-2 Nuclear Engineering Management Manual
- 238-15 NOU Configuration Management Policy
- 331-83: Standard for Plant changes affecting Design of KNPS
- 331-85: Design Basis Documentation Change Process
- 331-88: Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base
- 331-5 Audit, Surveillance and Self-Assessment Procedure
- 36-190 NSA Process Workflow
- 331-121: Configuration Management at Koeberg
- 331-130: Controlling documentation and responsibilities for Configuration Management at KNPS
- 331-143: The Equivalency Process to Change Plant
- 331-215: Nuclear Engineering Configuration Management Implementation Programme Exists
- 331-342: Integrated Plant Design Process for Changes to Systems, Structures or Components at Koeberg Operating Unit

Assessment:

The KOU Audit Programme was an initiative to combine all the IMS Monitoring Plans within the station. However, Nuclear Engineering does not have a Quality or Monitoring Plan.

The CM Policy has passed its review date of March 2015.

331-5 also passed its review date of May 2015.

Results:	Meet		Don't Meet		Partially Met	x	N/A	

No	Action Description	Lead	Due Date
1	Nuclear Engineering to align to KOU Monitoring Plan.	NE-PS-ROC	2016/09/30
2	Review KOU CM governance documents to represent the implementation of Configuration Management principles at KOU.	NE-PS-CMG	Q1 2017

Functional Group Lead:	Johann Austin	**A6.12**
Functional Group:	IPD-K	
Date Performed:	2015-09-15	

Item:

3.1.6.3 Bullets 12: *Whether the plant has design basis documentation which contains design basis requirements and supporting design information or if alternative arrangements are in place, which compensate for the lack of complete design basis documentation at the plant.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Koeberg was handed over with a complete set of documentation stipulating the actual configuration of the plant. The OEMs furthermore supplied a set of documents that elaborate on the design objectives at a system level. These documents are called the DSEs and they stipulate the design base requirements for plant systems.

However, not all the design and/or analyses calculations for the constructed hardware were supplied. In place of the calculations Eskom received conformance from the OEMs that the components had been designed/analysed to the required specification. The exception to this is the calculations for the Safety Class 1 components, which are part of the NSSS system, as well as all classified pressure vessels on site. Eskom has all the detailed calculations for these components.

Most of the balance of the design base and the calculations are held by the plant OEMs. This information is made available to Koeberg as and when required.

Assessment:

Eskom does not have any agreement in place to ensure that the Koeberg information is adequately secured and maintained. Furthermore, there is no agreement in place to ensure access to the Koeberg design base information and calculations into the future.

Results:	Meet		Don't Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	Secure agreements with the Koeberg OEMs to ensure long term access to and maintenance of the Koeberg design base and detailed calculations. Refer to WBS 13.	Koeberg SALTO	Q4 2020

Functional Group Lead:	RAYMOND MAAPOLA (Compiled: A MGULWA)	**A6.13**
Functional Group:	SDE Elec / I&C	
Date Performed:	2015-08-27	

Item:

3.1.6.3 Bullets 13: *Whether design basis also contains design requirements and supporting design information.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Design basis documentation as listed below contains design requirements and supporting design information.

The level and detail of system design requirements and supporting information covered by the different documents is dependent on the particular application and focus area.

Higher tier documents such as the SAR, OTS focus on the safe operational boundaries for the plant; postulated accident scenarios / studies and set about pertinent design requirements and codes to be adhered to.

Lower tier documents such as the DSEs protection files and set point manuals are pitched at a technical and applications level.

INPUT REFERENCE DOCUMENTS:

- FSAR
- ASME and ANSI codes specified in the FSAR
- System DSEs –system description
- Technical specification
- Set point manual
- Operating Technical Specifications
- Protection design files

Assessment:

Design requirements and supporting as found in the aforementioned documentation has adequately served its purpose over the years and is updated and kept relevant through the various station configuration management processes e.g. modification DCIFs, SAR Change Requests etc. However in light of possible upgrades to plant life, certain analyses and calculations to establish design requirements such as set-points may need to be revisited and where not available be requested from the OEM or alternative vendor or support arrangements such as AREVA.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Determine what essential analyses and calculations need to be requisitioned. Refer to WBS 9.	Koeberg SALTO	Q4 2016

AREA B: SCOPING AND SCREENING AND PLANT PROGRAMMES RELEVANT TO LTO

Subsection 3.2.1: Methodology and criteria for scoping and screening of SSCs for LTO.

Functional Group: Nuclear Engineering (SDE, IPD-K) **Functional Group Lead:** Raymond Maapola

Date Performed: September 2015

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.2.1.1	The plant should have the following elements necessary for the scoping and screening processes: a basic policy on the scope of LTO, a systematic process and criteria to identify SCs within the scope including boundary conditions (in scope/out of scope), a systematic method and criteria to determine which SCs within the scope of LTO are subject to revalidation of time limited ageing analyses, and which SCs require evaluation of programmes for managing ageing. The plant staff should have a clear understanding on safety functions and safety classification of SSCs. These safety functions should not be limited to those for design basis events but also include those to prevent/ mitigate design extension conditions. The plant should have a clear definition of SCs not important to safety within the scope of LTO and methodology to identify those SCs. Plant walk-downs, the insights from deterministic safety analyses and/or the plant specific PSA results (if available) should be used to determine those SCs not important to safety in the scope of LTO assessment. The above mentioned policy, methods for scoping and screening and their criteria should be documented in plant procedures and relevant data should be accessible. The processes for scoping and screening should ensure that SSCs that perform required safety functions are identified for evaluation of their suitability for LTO. The scoping process is carried out at the structure, system and	• Document for safety classification of SSCs (usually included in FSAR); • Plant policy document on the scope of LTO; • Plant procedure providing method to identify the SCs in scope of LTO; • Documentation on definition and identification of SCs not important to safety within the scope of LTO; • Drawings which show boundaries of the scope (normally P&I diagrams with colour identifications);	238-8-Safety & Quality Management Manual
			331-2-Nuclear Engineering Management Manual
			331-93(KGA-003)- Guide for Classification of Plant Components, Structures & Parts
			331-94 (KLA-001)- Importance Category Classification Listing
			SAP functional location listing
			KAA-709- Process For Performing Safety Screenings, Safety Evaluations, Safety Justifications And Safety Cases
			KSA-010 - Nuclear Safety, Seismic, Environmental, Quality And Importance Classification
			331-275 – Process for the Development and Control of Ageing Management Matrix at KOU
			RD-0034 – Quality and Safety Management Requirements for Nuclear Installations
			IAEA SAFETY REPORTS SERIES No. 57 - Safe Long Term

	component level, and the screening process at the structure and component level. Those processes should be carried out specifically for mechanical, electrical and I&C and civil SCs. The plant should demonstrate that the effects of ageing on all SCs within the scope of LTO are covered by plant programmes, newly established ageing management programmes or revalidation of time limited ageing analyses.		Operation of Nuclear Power Plants
			IAEA SAFETY REPORTS SERIES No. 82 - Ageing Management For Nuclear Power Plants: International Generic Ageing Lessons Learned (IGALL)
			IQReview Equipment Reliability Database
			KGU-035 - Integrated Equipment Reliability Process: Scoping & Classification of Components
			INPO AP-913 - Equipment Reliability Process Description
			331-219 - Environmental Qualification Maintenance Manual
			Pericles Cables Database
			Access Cables Database
			Safety Analysis Report (SAR)
			DSEs
			Protection Files
			Set Point Manuals
			Isometric Drawings
			Instrumentation Loop Diagrams (including SIP diagrams)
			KBA 00 00 G00 032: List of Systems
			Piping and Instrumentation Diagrams

Functional Group Lead:	Raymond Maapola (Earvine Cornelissen)	**B1.1**
Functional Group:	System Design Engineering	
Date Performed:	2015-09-21	

Item:

3.2.1.3 Bullets 1: *Whether the plant has a clear policy on the scope of LTO which includes:*

- Relation to safety classification system;

- Criteria for scoping including boundary conditions;

- Definition of SCs not important to safety within the scope.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

KLA-001 is a list of all SSCs classified for importance. It is compiled using deterministic and PSA analysis – the more conservative importance category is used. KSA-010 provides the rules for classification of components and 331-93 provides further guidance on how to apply these rules. It classifies SSCs as Critically Safety Related (CSR), Safety Related (SR), Availability Related (AR) and No Safety or Availability Function (NSA). Our definition of SR encompasses what the IAEA defines as should be in scope, with the following exceptions:

- Items that are only important because they must be Non-Destruct (ND) in an earthquake (some of those might currently be NSA, but ND)
- There are some items that might currently be classified NSA, but that are mentioned in either the seismic study or flooding study done for the plant
- Items such as cable trays, cables, pipe supports are not uniquely identified in our standard (SAP) component list

A listing of SSCs with more classification detail than KLA-001 can be drawn from SAP, a business software package designed to integrate all areas of a business.

Currently, the plant policy document on SALTO scope does not exist.

INPUT REFERENCE DOCUMENTS:

- KSA-010: Nuclear Safety, Seismic, Environmental Quality and Importance Category
- 331-93: Guide for Classification of Plant Components, Structures & Parts
- 331-94 (KLA-001): Importance Category Classification Listing
- SAP functional location listing
- The importance classification definition is also elaborated in SAR II-1.2.2.1.3 and II-1.2.2.2.3

Assessment:

Plant Policy document on SALTO scope does not exist but the scoping policy will be stated into the LTO methodology document.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Policy / procedure or framework document to be developed for the methodology for scoping SSCs for LTO Refer to WBS 1.	Koeberg SALTO	Q3 2016
2	Verify the historical importance classifications in KLA-001 (older than 10 years) aligns to the requirements in current KSA-010. Refer to WBS 3.	Koeberg SALTO	Q1 2017

Functional Group Lead:	Alan Lawrence	**B1.2**
Functional Group:	IPD-K	
Date Performed:	24 August 2015	

Item:

3.3.1.3 Bullet 3: *Verify if SCs to prevent / mitigate design extension conditions are within the scope of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

For all plant functions, systems, structures, services, processes, software, components and parts at Koeberg Nuclear Power Station a classification process is used to determine their respective:

- Importance category
- Nuclear safety class
- Seismic class
- Environmental category
- Quality level
- Safety level

Importance Category defines the importance of functions, systems, processes, components, structures, services and software, pertaining to nuclear safety and plant availability.

Safety Class defines the impact on nuclear safety of functions, systems, components, structures, parts and software in accordance with the criteria defined in ANSI/ANS N18.2-1973 and IEEE 308-1971 for mechanical and electrical requirements respectively.

Seismic Class defines the functional or structural integrity required in the event of a Design Base Earthquake.

Environmental Category defines the nuclear environment in which components, structures and their parts are required to operate.

Quality Level defines the level of oversight required by Eskom during the design, manufacturing and procurement phases due to nuclear and/or technical requirements.

Safety Level defines the management system and other requirements of organisations providing products to KNPS in accordance with the requirements of RD-0034.

As governed by KSA-010, the document KLA-001 is a listing of the SSCs and their respective importance category.

INPUT REFERENCE DOCUMENTS:

- 331-94 (KLA-001) – Importance Category Classification Listing
- KSA-010 - Nuclear Safety, Seismic, Environmental, Quality And Importance Classification
- 331-93 (KGA-003) – Guide For Classification of Plant Components, Structures and Parts
- 331-275 – Process for the Development and Control of Ageing Management Matrix at KOU
- RD-0034 – Quality and Safety Management Requirements for Nuclear Installations

Assessment:

The importance category listing, 331-94, does not identify SSCs required to prevent / mitigate design extension conditions.

The KOU classifications standard and guide, KSA-010 and 331-93 respectively, do not define a methodology to determine / identify SSCs required to prevent / mitigate design extension conditions.

The SSCs required to prevent / mitigate design extension conditions have not been identified and are consequently not confirmed to be in the LTO scope.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Revise KSA-010 and 331-93 to include the necessary classification changes to ensure that SSCs required to prevent / mitigate design extension conditions are identified. Refer to WBS 3.	Koeberg SALTO	Q1 2017
2	Revise 331-94 (KLA-001) to include all SSCs identified to prevent / mitigate design extension conditions. Refer to WBS 3.	Koeberg SALTO	Q1 2017
3	Ensure that the SSCs identified to prevent / mitigate design extension conditions are within the scope of LTO. Refer to WBS 3.	Koeberg SALTO	Q1 2017

Functional Group Lead:	Raymond Maapola (Riana Aschmann)	**B1.3**
Functional Group:	SDE	
Date Performed:	2015-08-19	

Item:

3.2.1.3 Bullets 3: *Whether an appropriate method has been used for identifying SCs within the scope of LTO, especially for identifying SCs not important to safety within the scope.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

KLA-001 is a list of all SSCs classified for importance. It is compiled using deterministic and PSA analysis – the more conservative importance category is used. KSA-010 provides the rules for classification of components and 331-93 provides further guidance on how to apply these rules. It classifies SSCs as Critically Safety Related (CSR), Safety Related (SR), Availability Related (AR) and No Safety or Availability Function (NSA). Our definition of SR encompasses what the IAEA defines as should be in scope, with the following exceptions:

- Items that are only important because they must be Non-Destruct (ND) in an earthquake (some of those might currently be NSA, but ND)
- There are some items that might currently be classified NSA, but that are mentioned in either the seismic study or flooding study done for the plant
- Items such as cable trays, cables, pipe supports are not uniquely identified in our standard (SAP) component list

A listing of SSCs with more classification detail than KLA-001 can be drawn from SAP, a business software package designed to integrate all areas of a business.

INPUT REFERENCE DOCUMENTS:

- 331-94 (KLA-001): Importance Category Classification Listing
- SAP functional location listing

Assessment:

No formal plant policy or procedure document exists on the methodology for setting the scope for LTO at KOU at present. However the decision had been made to utilise SAP as the master listing and all SR equipment will be within the scope. It must still be decided if ND equipment must be made SR to be included, or all SR and ND equipment will form the scope.

SAP does not have a comprehensive list of SR equipment yet. As part of the scoping project, SAP:

- Must be cleaned up - remove all duplicates etc.
- Must have all additional SR components identified - include seismic and flooding studies detail.
- Decide on SR classification for ND components.
- Decide on inclusion of cables – decision on possible trigramme, or reference to SR cables within the scope methodology document to another document.
- Ensure all errors in SAP that could impact the SR listing is corrected. Many errors had been raised as part of the AP 913 project. It went through SAP and all P&IDs and identified about 400 mistakes on drawings. A CA were raised and corrections were started. To be completed.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Policy / procedure or framework document to be developed for the methodology for scoping SSCs for LTO Refer to WBS 1.	Koeberg SALTO	Q3 2016
2	Update the classification system with results of walk-downs performed for seismic and flooding assessment Refer to WBS 3.	Koeberg SALTO	Q1 2017
3	Update classifications for new equipment introduced though modifications since plant walk downs for seismic and flooding assessment Refer to WBS 3.	Koeberg SALTO	Q1 2017
4	Consider integrating the civil classifications into the standard classifications and lists. Refer to WBS 3	Koeberg SALTO	Q1 2017

Functional Group Lead:	Raymond Maapola (Neil Boonzaier)	**B1.4**
Functional Group:	SDE Elec and I&C	
Date Performed:	2015-08-25	

Item:

3.2.1.3 Bullets 4: *Whether this method meets the intent of the recommendations provided in or is in line with other proven best international practices.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The following method for identifying SCs has been proposed but is not yet formally documented.

331-94 (KLA-001) is a list of all classified for importance SSCs. It is compiled from using deterministic as well as PSA analysis – the more conservative importance category is used. It classifies SSCs as Critically Safety Related (CSR), Safety Related (SR), Availability Related (AR) and No Safety or Availability Function (NSA). Our definition of SR encompasses what the IAEA defines as should be in scope, with the following exceptions:

- Items that are only important because they must be Non-Destruct (ND) in an earthquake (some of those might currently be NSA, but ND)
- There are some items that might currently be classified NSA, but that are mentioned in either the seismic study or flooding study done for the plant
- Items such as cable trays, cables, pipe supports are not uniquely identified in our standard (SAP) component list

A listing of SSCs with their respective classifications can also be drawn from SAP, a business software package designed to integrate all areas of a business.

INPUT REFERENCE DOCUMENTS:

- KSA-010: Nuclear Safety, Seismic, Environmental Quality and Importance Category
- 331-93: Guide for Classification of Plant Components, Structures & Parts
- 331-94 (KLA-001): Importance Category Classification Listing
- SAP functional location listing

Assessment:

The proposed method based on Importance Category according KSA-010 - Nuclear Safety, Seismic, Environmental, Quality and Importance Classification, broadly meets the requirements for the scope setting process described in IAEA document Safe Long Term Operation of Nuclear Power Plants §4.1.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Policy / procedure or framework document to be developed for the methodology for scoping SSCs for LTO. Refer to WBS 1.	Koeberg SALTO	Q3 2016

Functional Group Lead:	Deon Kruger	**B1.5**
Functional Group:	SDE	
Date Performed:	2015-09-03	

Item:

<u>3.2.1.3 Bullets 5</u>: *Whether the scoping method and SCs within the scope are properly documented, and relevant data are accessible (indicating e.g. intended function, safety class, other scoping criteria, etc.).*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The scoping method and SCs within the scope have not been formally documented.

Relevant data is accessible from the following sources:

331-94 (KLA-001), “Importance Category Classification Listing”, is a list of all SSCs with their importance categories. It is compiled using deterministic as well as PSA analysis – the more conservative importance category is used. It classifies SSCs as Critically Safety Related (CSR), Safety Related (SR), Availability Related (AR) and Not Safety or Availability Related (NSA).

The SAP Equipment List is a business software package that contains a list of all plant components, together with the safety, seismic, quality, environmental and importance classifications.

331-275, “Ageing Management Matrix”, used the EDF ageing matrix (with inputs from the EDF Ageing Analysis Sheets and Continued Operation Capability File) to derive a matrix that contains a list of components and the ageing mechanisms applicable to the components. All safety related SSCs are included as well as some selected non-safety related equipment based on asset management considerations.

The IQReview Equipment Reliability Database stipulates which maintenance tasks must be done at which frequencies. The methodology used to identify the scope and determine the component ER Classifications is described in the guide KGU-035, “Integrated Equipment Reliability Process: Scoping & Classification of Components”. This methodology is based on the recommendations in INPO AP-913, “Equipment Reliability Process Description”, it is aligned with the methodology employed by EDF, and provides a structured approach to classify components in terms of their functional importance, duty cycle and service conditions.

331-219, “Environmental Qualification Maintenance Manual”, aims to provide documented proof that the equipment is qualified for its specific application in the plant in order to provide an adequate level of safety, throughout the life of the station. Current focus for EQ is on 1E electrical and I&C equipment inside containment, and harsh conditions outside of containment.

The Pericles Cables Database contains information regarding all cables installed on the plant during construction and commissioning stages. Later, an Access Database was developed and used to record information regarding cables installed as a result of modifications.

The design basis information can be found in the following documents: SAR, DSEs, OTS, protection files and set point manuals.

<u>INPUT REFERENCE DOCUMENTS:</u>

- 331-94 (KLA-001) - Importance Category Classification Listing
- SAP Equipment List
- 331-275 - Ageing Management Matrix
- IQReview Equipment Reliability Database
- KGU-035 - Integrated Equipment Reliability Process: Scoping & Classification of Components
- INPO AP-913 - Equipment Reliability Process Description
- 331-219 - Environmental Qualification Maintenance Manual
- Pericles Cables Database
- Access Cables Database
- SAR
- DSEs
- Protection Files
- Set Point Manuals

Assessment:

All the relevant scoping data is accessible, but the scoping method and SCs within the scope have not been formally documented.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Formally document the scoping method and SCs within the scope. Refer to WBS 1.	Koeberg SALTO	Q3 2016

Functional Group Lead:	Raymond Maapola (Compiler: E Kerr)	**B1.6**
Functional Group:	SDE - Electrical	
Date Performed:	2015-08-17	

Item:

<u>3.2.1.3 Bullets 6</u>: *Whether the plant has a clear division of SCs which include interfaces between different areas (mechanical, electrical, I&C and civil structures) like control valves.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

The current Koeberg design and design basis documentation identifies, or enables the identification of the points where there is interfacing between different structures and components. These interfaces include physical interface points identifiable on documents such as P&IDs, instrumentation loop diagrams, and isometrics; and safety importance differentiation identifiable by the Functional Locations (in SAP), and the trigrammes and bigrammes in KLA-001, and KBA 00 00 G00 032.

<u>INPUT REFERENCE DOCUMENTS:</u>

- Isometric Drawings
- Piping and Instrumentation Diagrams
- Instrumentation Loop Diagrams (including SIP diagrams)
- Safety Analysis Report
- KLA-001: Importance Category Listing
- KBA 00 00 G00 032: List of Systems

Assessment:

The current documentation and databases can be used to assist in identifying the structures and components to assist in the scoping and screening of the LTOs.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

<u>No</u>	<u>Action Description</u>	<u>Lead</u>	<u>Due Date</u>

Functional Group Lead:	Raymond Maapola (Peter Harrisankar)	B1.7
Functional Group:	SDE	
Date Performed:	August 2015	

Item:

3.2.1.3 Bullets 7: *Whether the plant has prepared a procedure on screening of SCs within the scope of LTO.*

Current status description and input data document reference: (NOTE: to be copied & pasted into the AIP)

Following the scoping process, the screening of the LTO items will be done in accordance with the IAEA screening methodology guidance in SR 57. However, this is still to be formally documented.

References

- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032 Systems Listing
- 331-275 Ageing Management Matrix

Assessment:

Other than the existing equipment already subjected to time limited ageing analyses TLAA and programmes for managing ageing, there isn't a procedure with criteria to systematically determine which SCs within the scope of LTO must be subjected to revalidation of TLAA, and which SCs require evaluation of programmes for managing ageing.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Prepare a procedure to screen SCs within the scope of LTO. Refer to WBS 1.	Koeberg SALTO	Q3 2016

Functional Group Lead:	Raymond Maapola (compiled by S Kiewitt)	**B1.8**
Functional Group:	SDE	
Date Performed:	Aug 2015	

Item:

<u>3.2.1.3 Bullets 8</u>: *Whether and how the SC commodity groups (group of components/ structures which have similar functions, similar materials or are in similar environment) have been defined.*

Current status description and Input data document reference:
(NOTE: to be copied & pasted into the AIP)

All related electrical and I&C SCs are listed as per KBA00 00 G00 32 and classified by 331-94 Importance Category Classification Listing (KLA 001). All safety related equipment (within LTO scope) is indicated as such.

331-275, "Ageing Management Matrix" where the commodity groupings and equipment/degradation couples (equipment of the same material that is susceptible to the same degradation mechanisms) are reflected has been derived from the EdF grouping. The AMM is reviewed by Koeberg SMEs and expanded and made Koeberg specific.

<u>INPUT REFERENCE DOCUMENTS:</u>

- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032 Systems Listing
- 331-275 Ageing Management Matrix

Assessment:

Currently, the ageing matrix provided from EdF is being updated to be Koeberg specific. This will be used for the scope of LTO to identify equipment subject to degradation.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

<u>No</u>	<u>Action Description</u>	<u>Lead</u>	<u>Due Date</u>
1	Review and update 331-275 to include the basis and process for degradation management. Refer to WBS 4.	Koeberg SALTO	Q4 2020

Functional Group	RAYMOND MAAPOLA (Compiled: A MGULWA)	**B1.9**
Functional Group:	SDE Elec / I&C	
Date Performed:	Aug 2015	

Item:

3.2.1.3 Bullets 9: *Whether the results of the scoping and screening processes are documented, in a manner that complies with the requirements of the quality assurance programme:*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The procedure for screening of ageing is documented in 331-275. (These processes exist under the management procedures listed below. The management procedures detail the QA requirements to be adhered to)

The KOU ageing management approach used the EDF ageing matrix (with inputs from the EDF Ageing Analysis Sheets and Continued Operation Capability File) to derive a matrix that contains a list of components and the ageing mechanisms applicable to the components. All safety related SSCs are included as well as some selected non-safety related equipment based on asset management considerations.

The scoping and screening for LTO is still to be done and the results documented. The procedure for and the results emanating from the process will have to comply with the KOU quality assurance programme.

INPUT REFERENCE DOCUMENTS:

- (331-94) KLA-001 - Importance Classification Listing
- SAP Functional Location Listing
- 331-275: Process for the Development and Control of Ageing Management Matrix at KOU
- 331-2: Nuclear Engineering Management Manual
- 238-8: Safety & Quality Management Manual
- KAA-709: Process For Performing Safety Screenings, Safety Evaluations, Safety Justifications And
- Safety Cases

Assessment:

The procedure for and the results emanating from the process will have to comply with the KOU quality assurance programme.

The scoping & screening methodology is still to be developed & will be created under the NE management requirements.

Currently, 331-275 does not explicitly deal with TLAAs.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Document the scoping & screening methodology. Refer to WBS 1.	Koeberg SALTO	Q3 2016
2	Update 331-275 to include the TLAA references. Refer to WBS 4.	Koeberg SALTO	Q3 2016

Functional Group Lead:	Raymond Maapola (Earvine Cornelissen)	**B1.10**
Functional Group:	System Design Engineering	
Date Performed:	2015-09-04	

Item:

3.2.1.3 Bullets 10: *Whether the plant has verified if SCs within the scope of LTO are subjected to appropriate programmes such as AMPs, revalidation of time limited ageing analyses or other plant programmes.*

I Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The screening of the scoped SCs has not yet been done.

INPUT REFERENCE DOCUMENTS:

- 331-275 - Ageing Management Matrix
- SAR
- IAEA SAFETY REPORTS SERIES No. 82 - Ageing Management For Nuclear Power Plants: International Generic Ageing Lessons Learned (IGALL)
- IAEA SAFETY REPORTS SERIES No. 57 - Safe Long Term Operation of Nuclear Power Plants

Assessment:

The screening of the scoped SCs has not yet been done and therefore this item cannot currently be verified.

Plant Policy document on SALTO scope does not exist but the scoping policy will be stated into the LTO methodology document.

The screening of the scoped SCs has not yet been done.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Verify those SCs within the scope of LTO are subjected to appropriate programmes such as AMPs, revalidation of time limited ageing analyses or other plant programmes. Refer to WBS 6.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Tjaart van der Walt	**B1.11**
Functional Group:	SDE	
Date Performed:	2015-09-07	

Item:

3.2.1.3 Bullets 11: *Verify if the plant uses risk based information (e.g. PSA) to extend the scope for LTO (PSA results should not be used to exclude SCs from the scope of LTO.).*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

KSA-010 classifies the importance of SSCs using both deterministic and PSA analysis. The more conservative importance category of the analyses is used. KSA-010 is used to classify the importance category of components in the SAP listing used for scoping.

Assessment:

PSA is used for the scoping of items for LTO by virtue of using the importance classification as specified in KSA-010.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

AREA B: SCOPING AND SCREENING AND PLANT PROGRAMMES RELEVANT TO LTO

Subsection 3.2.2: Plant Programmes Relevant for LTO/Maintenance.

Functional Group: Plant Engineering (Reliability Engineering) **Functional Group Lead:** Susan Van Wyk

Date Performed: September 2015

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.2.2.1.1	Maintenance activities should be conducted to maintain availability of structures, systems and components during plant operation by controlling degradation and preventing failures. An appropriate maintenance programme, e.g. preventive or predictive maintenance, should be applied to SCs according to safety class and past maintenance history. Actual and potential ageing mechanisms should be taken into account in preventive and predictive maintenance programmes for SCs important to safety to determine a suitable maintenance method, e.g. overhaul maintenance and condition based maintenance, and an appropriate maintenance frequency. Preventive and predictive maintenance programmes should be periodically evaluated based on past maintenance history, dose received during maintenance and new knowledge and research findings. Maintenance programmes, such as predictive and preventive maintenance programmes, used to manage the effects of ageing on SCs within the scope of LTO should be evaluated against the nine attributes shown in [6] and the result should be properly documented. The review provides a technical basis that demonstrates the programmes manage the ageing effects and are effective in maintaining the intended function of	• Procedures and reports on maintenance; • Procedures and reports on reliability centred maintenance including FMECA; • Report on PSR (if exists); • Documents on assessment of effectiveness of the maintenance programmes and evaluation against the nine attributes.	239-QWR-013 Maintenance Basis Change / Update Request Process
			331-146, Rev 0: The Obsolescence Process
			331-148:Programme Engineer's Guide
			KSM-LIC-001:Requirements for the Control of Maintenance
			KAA-614:Control of Spares Assessments and New Stock Applications (Rev 8), 2013
			KAA-615:Control of Issuing of Stock Items from Stores (Rev 7), 2014
			KAA-617:Identification and Resolution of Spares Problems and Anomalies (Rev 5A), 2013
			KAA-638:Communication Process with EDF (Rev 3), 2010
			KAA-688:The Corrective Action Process (Rev 16), 2015
			KAA-647:Control of Non-Routine Testing and Infrequently Performed Activities (Rev 4d), 2015
			KAA-648:Administration and responsibilities for Requalification Testing (Rev 4), 2013
			KAA-820:Updating the Work Management Planning Database

	each SC. The effectiveness of maintenance in detecting and characterizing degradation mechanisms should be assessed. Maintenance programmes should have links with ageing management programmes, specify the frequency of maintenance activities and provide specific information on the tasks, the associated records and their storage. Existing preventive and predictive maintenance programmes for LTO should be evaluated against the nine attributes shown in and the result should be properly documented. Obsolescence of SSCs during the operating period of a plant including the proposed period of LTO should also be addressed. A programme to address obsolescence could be part of the normal plant maintenance programme.		KAA-830:Process for Management of Quality Records
			KAA-840:Non-conformance Report (NCR) Process (Rev 1), 2014
			KAA-852:Equipment Reliability Index
			KAA-913:Integrated Equipment Reliability Process
			KAD-023:Quality Control Function, (Rev 6), 2010
			KAM-106:Lubricant/Oil Sampling and Analysis
			KAM-113 :Classification of Maintenance Activities, (Rev 4), 2002
			KBA 0022 N NEPO NEPP 115, Rev 2:Obsolescence Management at Koeberg Operating Unit (KOU)
			KGA-035 :Processing of Experience Feedback received through the EDF co-operation agreement (Rev 3), 2012
			KGA-051:Benchmarking Guide at Koeberg Nuclear Power Station (Rev 1), 2009
			KGA-053:Self-Assessment at Koeberg Nuclear Power Station (Rev 4), 2012
			KGA-076:Performing Trending & Trending Analysis (Rev 3a), 2013
			KGM-005:Infrared Thermographic Inspections (Rev 2), 2010
			KSA-913:Integrated Equipment Reliability Standard: Preventive Maintenance Basis
			KAA-913:Integrated Equipment Reliability Process
			KGU-035:Integrated Equipment Reliability Process: Scoping & Classification of Components
			KGU-037:Integrated Equipment Reliability Process: Developing PM Templates

			KGU-039:Integrated Equipment Reliability Process: Developing PM Strategies
			331-94:Importance Category Classification Listing
			KLM-005:Mandatory Preventive Maintenance Listing
			AP-913:INPO Equipment Reliability Process Description
			KGU-022:Maintenance Basis Development by Alignment to the EDF Preventive Maintenance Programme *(Superseded/ Withdrawn)*
			KGU-027:The Reliability Centred Maintenance (RCM) Analysis Process *(Superseded/Withdrawn)*
			331-148:Programme Engineers Guide (Rev 0), 2013
			KGU-002 :Guide for System Engineers (Rev 11), 2014
			KGU-018:Guide for the Preparation of an Equivalency Study (Rev 1), 2007
			KGU-023:Guide for Component Engineers (Rev 5),2014
			KGU-029:Monitoring and Trending in Plant Engineering (Rev 1), 2013
			KGU-031:System Health Reporting Guide
			KGU-033:Failure Investigation of Plant Equipment and Evaluation of Experience (Rev 2), 2013
			KGU-034 :Guide for Reliability Engineers (Rev 1), 2014
			KSA-011:The Requirements for Controlled Documents (Rev 13), 2015
			KSA-017:Standard for performing an Equivalency Study (Rev 4),

			2007
			KSA-038:Requirements for Quality Records
			KSA-068:Supply Chain Management (Rev 3),2010
			KSA-126:Control of Statutory and Non-Statutory Work Activities (Rev 1), 2011
			KSM-001:Compilation, Use and Adherence to Maintenance Working Procedures (Rev 4), 2009
			KSM-006:Investigating, Compiling and Execution of Maintenance Work Packages (Rev 10), 2012
			KSM-015:Maintenance History Records (Rev 6), 2013
			KSM-016:Equipment Failure Investigation and Evaluation of Experience (Rev 2), 2005 [To be superseded by KSA-913 rev 2 currently in draft]
			KSM-020:Post Maintenance Requalification Testing (Rev 6), 2013
			KWM-RM-VIB-001:Condition Monitoring of Rotating Machinery (Rev 7), 2015
			KWM-RM-VIB-001:Condition Monitoring of Rotating Equipment
			MBAP Project Clarification Note 1, Rev 4:Dealing with other “Koeberg Plant Condition Management Programmes” when developing the PM Programme using IQReview

Functional Group Lead:	Ahmed Kamroodien	**B2.1**
Functional Group:	Plant Engineering	
Date Performed:	2015-08-17	

Item:

<u>3.2.2.1.3 Bullets 1</u>: *Whether an appropriate maintenance programme, e.g. preventive, predictive and corrective maintenance, is applied to each SC taking its safety class and past maintenance history into account.*

Current status description and input document reference:

<u>INPUT REFERENCE DOCUMENTS:</u>

- KSM-LIC-001: Requirements for the Control of Maintenance
- KSA-913: Integrated Equipment Reliability Standard: Preventive Maintenance Basis
- KAA-913: Integrated Equipment Reliability Process
- KGU-035: Integrated Equipment Reliability Process: Scoping & Classification of Components
- KGU-037: Integrated Equipment Reliability Process: Developing PM Templates
- KGU-039: Integrated Equipment Reliability Process: Developing PM Strategies
- 331-94: Importance Category Classification Listing
- KLM-005: Mandatory Preventive Maintenance Listing
- AP-913: INPO Equipment Reliability Process Description

CURRENT STATUS DESCRIPTION:

The plant process for developing the Preventive Maintenance requirements is currently in a transition phase. The pre-existing Maintenance Basis process (based on RCM principles & EDF alignment) has been replaced by the Integrated Equipment Reliability Process, which is aligned to the INPO AP-913, ‘Equipment Reliability Process Description’ and to the approach employed by EDF. As this process has only recently been initiated, most of the current PM requirements that are implemented on SAP originate from authorised Maintenance Basis documents. The Maintenance Basis documents are being replaced over time with PM Strategies, which are developed on the ‘IQReview’ Equipment Reliability Software database.

The planned scope for the pre-existing Maintenance Basis process included all CSR and SR plant systems and components, and although most safety related systems and major components were completed, the full scope was not achieved prior to the project to align the Koeberg processes to INPO AP-913.

As part of the Integrated Equipment Reliability Process, a component PM Strategy identifies and justifies the preventive maintenance requirements on a component level. The appropriate PM requirements are developed in the PM Strategy through the application of the Koeberg PM Templates, while considering the specific component ER Classification.

Component ER Classification provides a structured approach to classify components in terms of their functional importance, duty cycle and service conditions. This is used to focus maintenance on components that support important functions.

The PM Templates define the proposed PM Tasks and periodicities for families of components, and are developed based upon established EDF PM Templates or using an FMEA approach with input from the EPRI PM Templates or pre-existing Maintenance Bases. Past maintenance history, Operating

Experience and vendor recommendations are required to be considered when developing PM Templates. Component specific operating experience is then also evaluated and used to optimise the PM tasks and frequencies in the PM Strategies. Any significant deviations from the PM Template recommendations are justified in the PM Strategy.

This association of the component ER Classification, the relevant PM Template and the component specific OE results in the PM Strategy and collectively forms the PM Basis.

The process is further described below, for background information.

BACKGROUND:

The plant process for determining the maintenance programme requirements has been recently updated and now forms part of the Koeberg 'Integrated Equipment Reliability Process'. This process has been updated based upon the recommendations contained in INPO AP-913, 'Equipment Reliability Process Description' and also aligned with the methodology employed by Electricite de France (EDF).

The top tier document governing the maintenance process is **KSM-LIC-001, Rev 2, 'Requirements for the Control of Maintenance'.** The purpose of this document is to define the requirements for the maintenance process and the controls to be in existence in order to comply with the requirements of the Nuclear Licence. The National Nuclear regulator (NNR) approval is required for changes to this document. The document prescribes the high level requirements for the control of:

- The PM Basis
- Planning and Scheduling of Work
- Working Documentation
- Failure Analysis and the Integration of Operating Experience
- Execution of Work
- Post-Maintenance Requalification
- Equipment History and Plant Asset Configuration
- Programme Compliance
- Maintenance Effectiveness and Performance Monitoring
- Action Plans
- Quality
- Staff Training and Authorisation

The requirements for the preventive maintenance basis are expanded on in **KSA-913, Rev 0, 'Integrated Equipment Reliability Standard: Preventive Maintenance Basis'.** This standard establishes the approach to preventive maintenance (PM) and defines the requirements and controls for the management of the PM Basis. The PM Basis is the technical basis for the preventive maintenance regime applied to a specific plant system or component. The PM Basis comprises the following elements:

- Component Equipment Reliability (ER) Classification
- PM Template
- Component Specific Operational Experience (OE)
- Resulting PM Strategy

The association of the component ER Classification with the relevant PM Template, influenced by the component specific OE, results in the PM Strategy, and collectively forms the PM Basis.

PM Basis

ER Classification + PM Template + Component Specific OE = PM Strategy

The process and responsibilities for the Koeberg Integrated Equipment Reliability Process are described in **KAA-913, Rev 0, 'Integrated Equipment Reliability Process'.** This document identifies, organises and integrates equipment reliability activities into a single process. The scope of the document covers:

- Scoping and Classification of Components
- Continuing Equipment Reliability Improvement
- PM Implementation
- Long-Term Planning and Life-Cycle Management
- Corrective Action
- Performance Monitoring

The methodology used to identify the scope and determine the component ER Classifications is described in the guide **KGU-035, Rev 2, 'Integrated Equipment Reliability Process: Scoping & Classification of Components'**. This methodology is based on the recommendations in INPO AP-913, Equipment Reliability Process Description and aligned with the methodology employed by EDF, and provides a structured approach to classify components in terms of their functional importance, duty cycle and service conditions. This methodology employs a four-tiered approach and components are assigned to one of the four functional importance categories:

- Critical
- Significant
- Economic
- Run-to-Maintenance

Components that could affect nuclear safety, plant reliability or power generation, are assigned to the Critical category and receive the most aggressive PM Strategies. Components assigned to the Run-to-Maintenance category are maintained on a corrective basis, while components assigned to the other categories are maintained on a preventive basis.

Plant components identified in 331-94, Rev 0, 'Importance Category Classification Listing', with an Importance Category of Critical Safety Related (CSR), Safety Related (SR) or Availability related (AR), and Beyond Design Basis Accident equipment, are included in the scope of the Equipment Reliability Process and subjected to ER Classification. Certain component types however, are excluded from the scope of the Equipment Reliability Process and are not subjected to the ER Classification. These component types are identified in Appendix 2 of KGU-035.

The methodology used to develop and maintain PM Templates is described in the guide KGU-037, Rev 0, 'Integrated Equipment Reliability Process: Developing PM Templates'. This methodology is based on the recommendations in INPO AP-913, Equipment Reliability Process Description and aligned with the methodology employed by EDF. A PM Template is a pre-defined maintenance approach for a particular component type (or family of components) that lists significant failure modes, failure causes and recommended PM Tasks and task intervals. The PM Templates provide the foundation of the PM Programme and are used to develop the appropriate PM Tasks and support the component PM Strategies. As most of the recently developed Koeberg PM Templates are based on the associated EDF PM Template, the EDF PM Template forms the basis for the recommended PM Tasks and task intervals. For this reason, not all Koeberg PM Templates identify the relevant failure modes and causes.

The methodology used to develop and maintain PM Strategies is described in the guide KGU-039, Rev 0, 'Integrated Equipment Reliability Process: Developing PM Strategies'. This methodology is based on the recommendations in INPO AP-913, Equipment Reliability Process Description and aligned with the methodology employed by EDF. A PM Strategy identifies and justifies the PM Programme on a component level. It includes the required PM Tasks and details, their respective task intervals, implementation recommendations, a justification for PM Template deviations and selected tasks, and PM Basis supporting information (The association of the component ER Classification with the relevant PM Template, influenced by the component specific OE, results in the PM Strategy and collectively forms the PM Basis).

As the Integrated Equipment Reliability Process described above was only recently initiated, most of the current PM requirements that are implemented on SAP originate from the previous (legacy) process. In accordance with this process, Preventive Maintenance Programme requirements were established by analysis using Reliability Centred Maintenance (RCM) principles or by alignment to the EDF PM Programme, and the results were documented in controlled documents called Maintenance Bases. This process considers the consequences of failure and identifies appropriate PM Tasks (preventive, predictive or failure finding), where the consequences of failure are unacceptable. Where there are no Safety, Environmental, Operational or Economic consequences, the component is maintained on a corrective basis. The planned scope included all CSR and SR plant systems and components, and although most safety related systems and major components were completed, the full scope was not achieved prior to the project to align the Koeberg processes to INPO AP-913. Koeberg is currently in a transition period and the authorised Maintenance Basis documents are being replaced by approved PM Strategies over time (stored on the IQReview Equipment Reliability database). The Maintenance Basis documents will however remain valid until such time as their entire scope is superseded by the PM Strategies. The documents governing the previous process that have been superseded/withdrawn are:

- KSU-006, Rev 0, 'Maintenance Basis Determination, Documentation and Change Control'
- KAU-027, Rev 3, 'Maintenance Basis Determination and Change Control Process'
- KGU-027, Rev 0a, 'The Reliability Centred Maintenance (RCM) Analysis Process'
- KGU-022, Rev 0, 'Maintenance Basis Development by Alignment to the EDF Preventive Maintenance Programme

All Mandatory PM Task requirements resulting from the above process are documented in the list KLM-005, 'Mandatory Preventive Maintenance Listing'. The scope of this listing includes:

- Preventive Maintenance requirements on CSR and SR equipment prescribed by an authorised Maintenance Basis.
- Preventive Maintenance activities on CSR and SR equipment that were previously in KAM-005 Rev 9f and have not been superseded by an authorised Maintenance Basis or approved PM Strategy on IQReview (KAM-005 was the original PM Task requirements for safety related equipment for Koeberg).
- Preventive Maintenance requirements on equipment with an ER Classification of 'Critical', prescribed by an approved PM Strategy on IQReview.

Assessment:

- Although the plant Equipment Reliability processes have been updated and aligned with the INPO AP-913, 'Equipment Reliability Process Description' and with the EDF approach, the PM Strategies for components with an ER Classification of 'Critical' have not yet been implemented on SAP.
- Maintenance Bases were developed under the previous process for most safety related systems and major components, but not all CSR and SR components were completed.
- Certain components and degradation mechanisms are specifically excluded from the Equipment Reliability Process (& PM Programme) in favour of other plant programmes/materials reliability programmes and integrity cases. Typically these exclusions include passive components/structures.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	PM Strategies to be completed and implemented on SAP for components with an ER Classification of 'Critical'.	Reliability Engineering	Q4 2020
2	Confirm that components excluded from the scope of the Integrated Equipment Reliability Process (PM Programme) are adequately covered by other plant ageing management programmes. Refer to WBS 5.	Koeberg SALTO	Q3 2017

Functional Group Lead:	Ahmed Kamroodien	**B2.2**
Functional Group:	Plant Engineering	
Date Performed:	2015-08-17	

Item:

3.2.2.1.3 Bullets 2: *Whether actual and potential ageing mechanisms are taken into account in preventive and predictive maintenance programmes for SCs important to safety to determine a suitable maintenance method, e.g. overhaul maintenance and condition based maintenance, and interval frequency for the maintenance.*

Current status description and input document reference:

INPUT REFERENCE DOCUMENTS:

- KSM-LIC-001: Requirements for the Control of Maintenance
- KSA-913: Integrated Equipment Reliability Standard: Preventive Maintenance Basis
- KAA-913: Integrated Equipment Reliability Process
- KGU-022: Maintenance Basis Development by Alignment to the EDF Preventive Maintenance Programme *(Superseded/Withdrawn)*
- KGU-027: The Reliability Centred Maintenance (RCM) Analysis Process *(Superseded/Withdrawn)*
- KGU-037: Integrated Equipment Reliability Process: Developing PM Templates
- AP-913: INPO Equipment Reliability Process Description

CURRENT STATUS DESCRIPTION:

The plant process for developing the Preventive Maintenance requirements is currently in a transition phase. The pre-existing Maintenance Basis process (based on RCM principles & EDF alignment) has been replaced by the Integrated Equipment Reliability Process, which is aligned to the INPO AP-913, 'Equipment Reliability Process Description' and to the approach employed by EDF. As this process has only recently been initiated, most of the current PM requirements that are implemented on SAP originate from authorised Maintenance Basis documents. The Maintenance Basis documents are being replaced over time with PM Strategies, which are developed on the 'IQReview' Equipment Reliability Software database. The Integrated Equipment Reliability Process is described in **KSA-913, Rev 0, 'Integrated Equipment Reliability Standard: Preventive Maintenance Basis'** and **KAA-913, Rev 0, 'Integrated Equipment Reliability Process'.**

As part of the Integrated Equipment Reliability Process (KAA-913), a component PM Strategy identifies and justifies the preventive maintenance requirements on a component level. The appropriate PM requirements are developed in the PM Strategy through the application of the Koeberg PM Templates, while considering the specific component ER Classification. The methodology used to develop and maintain PM Templates is described in the guide **KGU-037, Rev 0, 'Integrated Equipment Reliability Process: Developing PM Templates'.**

The PM Templates define the proposed PM Tasks and periodicities for families of components, and are developed based upon established EDF PM Templates or using a Failure Mode Analysis (FMA) approach with input from the EPRI PM Templates or pre-existing Maintenance Bases. Past maintenance history, Operating Experience and vendor recommendations are required to be considered when developing PM Templates. Actual and potential ageing mechanisms taken into account will be reflected in the FMA. As most of the recently developed Koeberg PM Templates are based on the associated EDF PM Template, the EDF PM Template forms the basis for the recommended PM Tasks and task intervals. For this reason, not all Koeberg PM Templates identify the relevant failure modes and causes.

As the Integrated Equipment Reliability Process described above was only recently initiated, most of the current PM requirements that are implemented on SAP originate from the previous (legacy) Maintenance Basis process. In accordance with this process, Preventive Maintenance Programme requirements were established by analysis using Reliability Centred Maintenance (RCM) principles or by alignment to the EDF PM Programme, and the results were documented in controlled documents called Maintenance Bases. Where the analysis was based on RCM principles, a component FMA is included in the Maintenance Basis document. These FMAs were developed using a facilitated process with input from site technical staff knowledgeable on the equipment and included a review of the maintenance history. Actual and potential ageing mechanisms taken into account will be reflected in the component FMA contained in the Maintenance Basis document. The documents covering this approach that have been superseded/withdrawn are guide **KGU-027, Rev 0a, 'The Reliability Centred Maintenance (RCM) Analysis Process'** and guide **KGU-022, Rev 0, 'Maintenance Basis Development by Alignment to the EDF Preventive Maintenance Programme'.**

The Component Engineers perform component failure investigations, cause determination, extent of condition definition, corrective action identification and recommend changes to the PM Basis in order to optimise the PM Programme. Any actual ageing mechanisms identified in this manner are addressed by the process. The requirements for equipment failure investigation are established in **KSM-016, 'Equipment Failure Investigation and Evaluation of Experience',** while the process and responsibilities are described in **KAA-913, Rev 0, 'Integrated Equipment Reliability Process'.** Guidance on performing Failure investigations is contained in the **KGU-033, 'Failure Investigation of Plant Equipment and Evaluation of Experience'** and **KGU-023, 'Guide for Component Engineers'**.

A more detailed description of the process is provided in B2.1, under "Background".

Assessment:

- Not all the Koeberg PM Templates identify the relevant failure modes and failure causes that have been taken into account, as they are based on the associated EDF PM Template. This will also be necessary in order to confirm if a specific ageing mechanism has been considered.
- Maintenance Bases were developed under the previous process for most safety related systems and major components, but not all CSR and SR components were completed.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Koeberg PM Templates to be revised as required, to include a FMA to identify the relevant failure modes and failure causes, to support the PM Tasks identified.	Reliability Engineering	Q4 2020
2	PM Strategies to be completed and implemented on SAP for components with an ER Classification of 'Critical'. Linked to B2.1, Action 1.	Reliability Engineering	Q4 2020

Functional Group Lead:	Ahmed Kamroodien	**B2.3**
Functional Group:	Plant Engineering	
Date Performed:	13 August 2015	

Item:

<u>**3.2.2.1.3 Bullets 3**</u>*: Whether the plant has a systematic approach to maintenance addressing technical aspects such as development of acceptance criteria, reliability centred maintenance, condition based maintenance and risk informed methods.*

<u>INPUT REFERENCE DOCUMENTS:</u>

- 331-148 Programme Engineers Guide (Rev 0), 2013
- KAA-614 Control of Spares Assessments and New Stock Applications (Rev 8), 2013
- KAA-615 Control of Issuing of Stock Items from Stores (Rev 7), 2014
- KAA-617 Identification and Resolution of Spares Problems and Anomalies (Rev 5A), 2013
- KAA-647 Control of Non-Routine Testing and Infrequently Performed Activities (Rev 4d), 2015
- KAA-648 Administration and responsibilities for Requalification Testing (Rev 4), 2013
- KAA-840 Non-conformance Report (NCR) Process (Rev 1), 2014
- KAA-913 Integrated Equipment Reliability Process (Rev 0), 2014
- KGA-035 Processing of Experience Feedback received through the EDF co-operation agreement (Rev 3), 2012
- KGM-005 Infrared Thermographic Inspections (Rev 2), 2010
- KGU-002 Guide for System Engineers (Rev 11), 2014
- KGU-018 Guide for the Preparation of an Equivalency Study (Rev 1), 2007
- KGU-023 Guide for Component Engineers (Rev 5), 2014
- KGU-029 Monitoring and Trending in Plant Engineering (Rev 1), 2013
- KGU-033 Failure Investigation of Plant Equipment and Evaluation of Experience (Rev 2), 2013
- KGU-034 Guide for Reliability Engineers (Rev 1), 2014
- KSA-011 The Requirements for Controlled Documents (Rev 13), 2015
- KSA-017 Standard for performing an Equivalency Study (Rev 4), 2007
- KGU-035 Integrated Equipment Reliability Process: Scoping & Classification of Components (Rev 2), 2013
- KGU-037 Integrated Equipment Reliability Process: Developing PM Templates (Rev 0), 2012
- KGU-039 Integrated Equipment Reliability Process: Developing PM Strategies (Rev 0), 2013
- KSA-068 Supply Chain Management (Rev 3), 2010
- KSA-126 Control of Statutory and Non-Statutory Work Activities (Rev 1), 2011
- KSA-913 Integrated Equipment Reliability Standard (Rev 0), 2014
- KSM-001 Compilation, Use and Adherence to Maintenance Working Procedures (Rev 4), 2009
- KSM-006 Investigating, Compiling and Execution of Maintenance Work Packages (Rev 10), 2012
- KSM-015 Maintenance History Records (Rev 6), 2013
- KSM-016 Equipment Failure Investigation and Evaluation of Experience (Rev 2), 2005 [To

be superseded by KSA-913 rev 2 currently in draft]

- KSM-020 Post Maintenance Requalification Testing (Rev 6), 2013
- KSM-LIC-001 Requirements for the control of Maintenance (Rev 2), 2013
- KWM-RM-VIB-001 Condition Monitoring of Rotating Machinery (Rev 7), 2015

Current Status Description:

The Koeberg Maintenance programme is made up of 12 elements (see KSM-LIC-001), which can essentially be grouped into the following four areas:

- Programme Bases (Development)
- PM Task Planning and Scheduling (Implementation)
- Perform Preventive Maintenance (Execution)
- Feedback on PM Implementation (Control)

Programme Bases

The approach to developing the programme bases is currently based on AP-913 methodology including the determination of the scope, the tasks and task frequencies and developing a technical basis. The methodology is a structured approach comprising the development of PM Templates, the classification of equipment/components, associating the PM Template to the classified component, and developing a PM Strategy based on the PM Template recommendations and operating experience specific to the component. The scope for the Equipment Reliability Programme has been defined as all CSR, SR, AR and Beyond-Design-Basis Accident equipment and components. However, the change to AP-913 methodology is relatively recent, so while progress has been made on the development of the PM Bases, this has not yet been implemented. See background information (B2.1) and documents below for further details:

- KSA-913 Integrated Equipment Reliability Standard
- KAA-913 Integrated Equipment Reliability Process
- KGU-035 Integrated Equipment Reliability Process: Scoping & Classification of Components
- KGU-037 Integrated Equipment Reliability Process: Developing PM Templates
- KGU-039 Integrated Equipment Reliability Process: Developing PM Strategies

PM Task Planning & Scheduling

Once the PM Strategy has been developed, it is implemented into the computer work management system (SAP). At this stage, the service note is developed including working procedures/instructions, bills of materials, and permit requirements. One technical aspect of the PM Task Planning and Scheduling is the development and determination of acceptance criteria.

There are essentially three times where acceptance criteria would be applicable – the first would be during testing, the second would be during maintenance where parts/components must conform to certain requirements, and the third is during condition monitoring.

Acceptance Criteria

KSM-LIC-001 “Requirements for the control of Maintenance” defines acceptance criteria and states that “Working documentation shall include appropriate acceptance criteria for demonstrating that important activities have been accomplished satisfactorily”. It further states that Post-Maintenance Requalification Testing requirements and acceptance criteria shall be determined during the working documentation preparation phase.

In the format matrix for procedures, KSA-011 “The Requirements for Controlled Documents” shows that acceptance criteria are required to be included in the following documents:

- Working Level documents (other than operating & maintenance procedures) (KW*)
- Maintenance working Procedures except Service Notifications (KWM)
- Operating Working Procedures (KWB) [Only in KWB-PTs]

KSM-006 “Investigating and Compiling Maintenance Work Packages and Conducting Pre-job Briefs” only contains a short statement relating to the Supervisor verifying that acceptance criteria have been met.

The acceptance criteria related to Post-Maintenance Testing is covered in the standard **KSM-020** “Post Maintenance Requalification Testing”. This standard stipulates that test procedures must include details (as appropriate) such as initial conditions and prerequisites, hold points, precautions, personnel safety requirements, clear acceptance criteria and post-test restoration.

This requirement is further re-iterated in **KAA-647** “Control of Non-Routine Testing and Infrequently Performed Activities” where acceptance criteria must be clearly specified and these criteria should confirm that the objectives of the test were achieved and are linked to an appropriate level of authority for acceptance of the results.

In **KAA-648** “Administration and responsibilities for Requalification Testing” there are steps in the various process flows asking if the acceptance criteria have been met during the test or commissioning.

In the standard **KSA-126** “Control of Statutory and Non-Statutory Work Activities” the waiving of PM Programme work activities linked to CSR/SR and AR equipment is authorised by the Plant Engineering Manager. This includes the waiving of acceptance criteria for a limited time period. The National Nuclear Regulator must be informed of all CSR/SR PM deferrals.

Acceptance criteria for condition monitoring tasks are covered under the specific technology.

In the thermography guide **KGM-005** “Infrared Thermographic Inspections”, acceptance criteria are developed to evaluate survey results and guidance is divided between acceptance criteria for electrical equipment and mechanical equipment.

KWM-RM-VIB-001 “Condition Monitoring of Rotating Machinery” defines the condition monitoring programme for rotating machinery which includes the monitoring, trending and analysis of both vibration and temperature data. This document describes how to develop the acceptance criteria and alarm levels.

KAM-106 “Lubricant/Oil Sampling and Analysis” describes the process and responsibilities for filtering of oils prior to plant usage, draining and flushing of components, lifting and handling of 210 litre oil drums, initiating oil analysis, obtaining oil samples, local sampling of oils, submitting of oil samples, interpreting oil sample results and initiating corrective actions. This document refers to the Eskom Oil guide limits derived from the Generation procedure 36-53 ‘In-Service Monitoring of Lubricating Oils and Hydraulic Fluids’. The document also contains the acceptance criteria for diesel oil.

<u>Perform Preventive Maintenance</u> (Execution)

In terms of the execution of preventive maintenance three technical aspects have been highlighted – spare parts, post-maintenance testing and maintenance history. Although maintenance history in this situation is mainly the capture and documentation of history and as such may not be considered technical, it does impact on the feedback loops into the maintenance programme and will be used as basis for technical decisions.

Spare Parts

Spare parts are one of the technical aspects to the execution of preventive maintenance although it is not part of the maintenance programme as detailed in KSM-LIC-001. Having the correct spare of the correct quality level is vital to fulfilling the objectives of the maintenance programme.

KSA-068 "Supply Chain Management" requires an assessment for all components in the maintenance plan, all components that were defected and where spares/materials are being requested for plant maintenance, and for all strategic spares.

Spares assessment is defined in **KAA-614** "Control of Spares Assessments and New Stock Applications" as a disciplined analysis of a plant component to determine the information required that will enable maintenance management and material management based on an engineering bill of material. However no further mention is made of spares assessment except that assessment forms are kept as internal records.

Both **KAA-617** "Identification and Resolution of Spares Problems and Anomalies" and **KAA-615** "Control of Issuing of Stock Items from" describe a process where if a spare anomaly exists but the item is still required on the plant, the spare can be released under a non-conformance (NCR) – see **KAA-840** Non-Conformance Report (NCR) process.

KSA-017 "Standard for performing an equivalency study" provides the requirements for the use of alternative equipment at Koeberg Nuclear Power Station. **KGU-018** "Guide for the Preparation of an Equivalency Study" ensures a structured and consistent equivalency study.

Post Maintenance Testing

The second technical aspect of executing the maintenance programme is post-maintenance testing.

KSM-LIC-001 "Requirements for the control of Maintenance" prescribes that a process shall exist whereby equipment post-maintenance integrity is verified. Furthermore, Post-Maintenance Requalification Testing requirements and acceptance criteria shall be determined during the working documentation preparation phase.

Post Maintenance testing is governed by the following procedures:

KSM-020 "Post Maintenance Requalification Testing"

The key points of this standard are the purpose and the scope of the document:

- The purpose of this standard is to establish the requirements for Post Maintenance Re-Qualification Testing within the maintenance department. It applies to all Maintenance groups and Sections specifying post maintenance requalifying testing.
- The scope of Post Maintenance Requalification Testing shall be based on the extent of preventive and/or corrective maintenance performed.
- As a minimum all CSR, SR and AR plant equipment shall be requalified and tested following maintenance.

KAA-648 "Administration and responsibilities for Requalification Testing"

This procedure describes the process and responsibilities for controlling requalification or commissioning testing following intrusive work on or modifications to the plant.

Line groups are responsible for the requalification of components, however System Engineering concur with the requalification proposed to Operating, and Component Engineering are informed of the post-test review as required.

Maintenance History

Maintenance history is governed by the standard **KSM-015** "Maintenance History Records" which sets out the requirements for the generation of maintenance history records. The standard applies to both working procedure Equipment History Records (EHR) and History Summaries.

Equipment History Records (EHR) – A document or group of documents on SSCs, consisting of, but not limited to temporary procedures, drawings, diagrams or questions in which results of work activities such as measurements, answers to questions, results of calculations, graphs and plots are recorded. EHRs are required for complex work activities including as a minimum all statutory/mandatory preventive and testing activities, all CSR and SR preventive and corrective activities and all ASME XI repair/replacement activities.

History Summaries – A summary of the work activity or work performed, recorded on the work order and captured on SAP. History summaries include the As Found codes. Typically history summaries are required for CSR, SR and AR work activities although some activities (e.g. support activities such as scaffolding, etc.) are excluded.

Feedback on PM Implementation

Feedback on PM Implementation can be divided into four areas – As-Found Conditions; Operating Experience; Performance Monitoring; and Recommendations. This is captured in KSM-LIC-001 "Requirements for the control of Maintenance":

- **Industry operating experience, craft feedback, equipment as-found condition trends** and **equipment failure trends** shall be evaluated. These evaluations shall strive to assess the applicability, effectiveness and completeness of the existing PM Strategies and shall recommend improvements to the PM Basis, where necessary.
- Failure analysis shall be conducted following unexpected equipment functional failure/potential failure. The depth of the investigation shall be commensurate with the importance to plant safety and reliability, the complexity of the equipment, the likelihood of recurrence and the impact of the actual failure/potential failure.

As-found conditions

From KSM-015 "Maintenance History Records", it can be seen that as-found conditions of equipment/components are captured in History Summaries.

5.2.3.2 As Found Condition of Equipment / Components (F/C).

(1) Tick the required box for the condition found 1 - 2 - 3 - 4 or N/A. A detailed description for each condition is given, refer to Appendix 3. Give an added explanation if needed.

(2) Give details of level of wear, physical appearance and lubrication levels.

NOTE: Engineering requires this information to assist with prevention of failures.

KAA-913 "Integrated Equipment Reliability Process" states that Component Engineering is responsible for evaluating maintenance feedback (including as found condition results) and recommending changes to the PM Basis as required, in order to optimise the PM Programme.

KSM-016 "Equipment Failure Investigation and Evaluation of Experience" establishes the requirements for equipment failure investigation and the evaluation of preventive maintenance experience. However the evaluation of preventive maintenance experience is limited to Intrusive Task Evaluations.

- Intrusive task evaluations shall be conducted during planned intrusive preventive maintenance activities on CSR or SR equipment, as a minimum.
- In cases where the same preventive maintenance activity is carried out on a number of equipment items, a representative sample should be selected on which to perform intrusive task evaluations.
- The depth of a maintenance intrusive task evaluation shall be commensurate with the criticality and complexity of the equipment and impact of the actual failure / potential failure.

KGU-033 "Failure Investigation of Plant Equipment and Evaluation of Experience" only covers plant component failures.

KGU-034 "Guide for Reliability Engineers" indicates that the PM Living Programme elements are still under development.

Operating Experience

From **KAA-913** "Integrated Equipment Reliability Process" it is evident that operating experience is considered. In the procedure Component Engineering is responsible for evaluating plant and industry operating experience and recommending changes to the PM Basis as required, in order to optimise the PM Programme. They are also responsible for assessing relevant Operational Experience and taking any appropriate action, as required. Furthermore, Component Engineering shall identify and review the latest preventive and predictive maintenance techniques for the various equipment types on the plant, and make recommendations to optimise the techniques employed and resulting maintenance costs. System Engineering is responsible for assessing relevant Operational Experience and taking any appropriate action, as required. In the development of PM Templates operating experience is drawn from a number of sources such as EdF PM Templates and existing Maintenance Bases. During the development of PM Strategies, component specific operating experience is used to ensure that the resulting maintenance regime is the most appropriate.

The guides **KGU-034** "Guide for Reliability Engineers", **KGU-023** "Guide for Component Engineers" and **KGU-002** "Guide for System Engineers" all have a guideline on Operating Experience. The main sources of operating experience are considered to be EPRI (NMAC and PSE), Generation Greybeards, INPO/WANO Library of Learning and their websites, and EdF. The guide **KGA-035** "Processing of Experience Feedback received through the EDF co-operation agreement" provides guidance to the Koeberg Integrated Team on processing operating experience received from EDF to ensure that it is effectively and efficiently used.

Changes to the PM Basis are initiated from various quarters and are captured in the Corrective Action Programme software (DevonWay). These changes may arise from investigations of component failures or from reviews of INPO/WANO reports and are governed by the procedure **KAA-913** "Integrated Equipment Reliability Process".

In addition to the above input to processing operating experience, in **331-148** "Programme Engineers Guide" it can be seen that the Programme owner also has a responsibility to research and review operating experience to remain current and to update the programme as required.

Equipment Failures

KAA-913 "Integrated Equipment Reliability Process" states that Component Engineering is responsible for performing component failure investigations, including determining cause, defining extent of condition and identifying corrective actions and recommending changes to the PM Basis as required, in order to optimise the PM Programme.

KSM-016 "Equipment Failure Investigation and Evaluation of Experience" establishes the requirements for equipment failure investigation. It applies to all Equipment Failure investigations.

- As a minimum, formal failure investigation shall be conducted promptly following an unexpected functional failure of CSR or SR equipment.
- The depth of a failure investigation shall be commensurate with the criticality and complexity of the equipment and impact of the actual failure / potential failure.

The purpose of **KGU-033** "Failure Investigation of Plant Equipment and Evaluation of Experience" is to provide guidance for investigating plant component failures. The experience gained from these investigations is used to prevent recurrence, improve the PM basis and compile equipment failure statistics for trending purposes.

Performance Monitoring

Feedback on PM implementation from Performance Monitoring includes surveillance results and predictive maintenance results. Performance monitoring is included in **KAA-913** "Integrated Equipment Reliability Process" where the System Engineer is responsible for:

- Establishing appropriate performance criteria and monitoring parameters.
- Developing Performance Monitoring Plans for allocated systems and monitoring and trending system performance on a continuous basis.
- Performing system walk-downs in accordance with the walk-down schedule.
- Periodically compiling System Health Reports and communicating results. Where performance has degraded, developing System Health Action Plans.

In addition to the role that System Engineering plays in performance monitoring, Component Engineering is responsible for periodically compiling Component Health Reports and communicating results. Where performance has degraded, developing a Component Health Action Plan.

KGU-029 "Monitoring and Trending in Plant Engineering" gives guidance to plant engineers on monitoring and trending performance. One of the purposes of the document is to ensure that experience feedback is included in the Maintenance Basis. Although the guide is applicable to all plant engineers, the content is mainly aimed at System Engineers.

Recommendations/Craft Feedback

Recommendations are dealt with through the Equipment Reliability Change Requests (ERCR) which are captured and tracked through the DevonWay software. All changes to the PM Basis are governed by the procedure **KAA-913** "Integrated Equipment Reliability Process".

Assessment:

While many of the technical elements of the maintenance programme are covered by a process or procedure, not all have a structured or systematic approach and not all are fully integrated into the Equipment Reliability Process.

The definition of spares assessment contained in KAA-614 "Control of Spares Assessments and New Stock Applications" lacks clarity and the procedure gives very little guidance for a consistent approach to completing the spares assessment.

The processes covering acceptance criteria can also be improved. Although acceptance criteria are to be contained within working procedure, no direction is given in **KSM-001** "Compilation, Use and Adherence to Maintenance Working Procedures" for acceptance criteria.

The integration of the feedback on PM Implementation can be improved. Elements of the feedback are well defined and controlled but other areas are vague and the link to the PM Programme is tenuous. Consider developing an overall procedure governing the collating and processing of feedback and integrating all aspects of the feedback into the maintenance programme and the equipment reliability process.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1.	Update KAA-614 "Control of Spares Assessments and New Stock Applications" to clarify the definition of spares assessments to ensure a consistent approach.	Materials Management	Q4 2018
2.	Provide clear guidelines and/or requirements on the use of acceptance criteria in the applicable maintenance procedures	MEXM	2017/03/30
3.	Develop Koeberg specific guidance for an integrated living PM Programme on the various elements of feedback on PM Implementation (including as-found; operating experience; performance monitoring and recommendations). Linked to GC 83539-002 CA.	Reliability Engineering	Q4 2018

Functional Group Lead:	Ahmed Kamroodien	B2.4
Functional Group:	Plant Engineering	
Date Performed:	2015/08/20	

Item:

3.2.2.1.3 Bullets 4: *Whether preventive and predictive maintenance programmes are periodically evaluated based on past maintenance history and new knowledge and research findings.*

INPUT REFERENCE DOCUMENTS:

- KAA-638 Communication Process with EDF (Rev 3), 2010
- KAA-688 The Corrective Action Process (Rev 16), 2015
- KAA-913 Integrated Equipment Reliability Process (Rev 0), 2014
- KGA-035 Processing of Experience Feedback Received Through the EDF Co-operation Agreement (Rev 3), 2012
- KGA-051 Benchmarking Guide at Koeberg Nuclear Power Station (Rev 1), 2009
- KGA-053 Self-Assessment at Koeberg Nuclear Power Station (Rev 4), 2012
- KGA-076 Performing Trending & Trending Analysis (Rev 3a), 2013
- KSA-913 Integrated Equipment Reliability Standard (Rev 0), 2014
- KSM-015 Maintenance History Records (Rev 6), 2013
- KSM-LIC-001 Requirements for the Control of Maintenance (Rev 2), 2013

Current Process Description:

Periodic reviews of the Maintenance Programme are performed through feedback loops based on component performance and history and industry operating experience. The requirements for feedback on PM Implementation are captured in **KSM-LIC-001** “Requirements for the control of Maintenance”:

- Industry operating experience, craft feedback, equipment as-found condition trends and equipment failure trends shall be evaluated. These evaluations shall strive to assess the applicability, effectiveness and completeness of the existing PM Strategies and shall recommend improvements to the PM Basis, where necessary.
- Failure analysis shall be conducted following unexpected equipment functional failure/potential failure. The depth of the investigation shall be commensurate with the importance to plant safety and reliability, the complexity of the equipment, the likelihood of recurrence and the impact of the actual failure/potential failure.

Maintenance history includes Equipment history Records (EHR), as-found condition codes, failures, craft feedback, performance monitoring and trending, corrective action programme items.

Maintenance history capture starts with the standard KSM-015 “Maintenance History Records” which sets out the requirements for the generation of maintenance history records. The standard applies to both working procedure Equipment History Records (EHR) and History Summaries.

Equipment History Records (EHR) – A document or group of documents on SSCs, consisting of, but not limited to temporary procedures, drawings, diagrams or questions in which results of work activities such as measurements, answers to questions, results of calculations, graphs and plots are recorded. EHRs are required for complex work activities including as a minimum all statutory/mandatory preventive and testing activities, all CSR and SR preventive and corrective activities and all ASME XI repair/replacement activities.

History Summaries – A summary of the work activity or work performed, recorded on the work order and captured on SAP. History summaries include the As Found codes. Typically history summaries are required for CSR, SR and AR work activities although some activities (e.g. support activities such as scaffolding, etc.) are excluded.

As-found conditions – As-found conditions of equipment/components are captured in History Summaries, where one of four tick-boxes is checked for the condition found (1 – 2 – 3 – 4 – N/A). Details on the level of wear, physical appearance and lubrication levels are also captured.

KSM-016 "Equipment Failure Investigation and Evaluation of Experience" establishes the requirements for equipment failure investigation. It applies to all Equipment Failure investigations.

- As a minimum, formal failure investigation shall be conducted promptly following an unexpected functional failure of CSR or SR equipment.
- The depth of a failure investigation shall be commensurate with the criticality and complexity of the equipment and impact of the actual failure / potential failure.

The evaluation of preventive maintenance experience contained in the standard KSM-016 "Equipment Failure Investigation and Evaluation of Experience" is limited to Intrusive Task Evaluations.

- Intrusive task evaluations shall be conducted during planned intrusive preventive maintenance activities on CSR or SR equipment, as a minimum.
- In cases where the same preventive maintenance activity is carried out on a number of equipment items, a representative sample should be selected on which to perform intrusive task evaluations.
- The depth of a maintenance intrusive task evaluation shall be commensurate with the criticality and complexity of the equipment and impact of the actual failure / potential failure.

The purpose of KGU-033 "Failure Investigation of Plant Equipment and Evaluation of Experience" is to provide guidance for investigating plant component failures. The experience gained from these investigations is used to prevent recurrence, improve the PM basis and compile equipment failure statistics for trending purposes.

Performance monitoring is included in KAA-913 "Integrated Equipment Reliability Process" where the System Engineer is responsible for:

- Establishing appropriate performance criteria and monitoring parameters.
- Developing Performance Monitoring Plans for allocated systems and monitoring and trending system performance on a continuous basis.
- Performing system walk-downs in accordance with the walk-down schedule.
- Periodically compiling System Health Reports and communicating results. Where performance has degraded, developing System Health Action Plans.

In addition to the role that System Engineering plays in performance monitoring, Component Engineering is responsible for periodically compiling Component Health Reports and communicating results. Where performance has degraded, developing a Component Health Action Plan.

KGU-029 "Monitoring and Trending in Plant Engineering" gives guidance to plant engineers on monitoring and trending performance. One of the purposes of the document is to ensure that experience feedback is included in the Maintenance Basis. Although the guide is applicable to all plant engineers, the content is mainly aimed at System Engineers.

Through the procedure KAA-688 "The Corrective Action Process" the process and responsibilities are defined for identifying, reporting, investigating and trending occurrences, problems, events and near misses for Koeberg Nuclear Power Station. This procedure ensures that operating experience information is effectively identified, screened, classified, investigated, distributed and tracked to identify actions to improve nuclear safety, conventional safety, health and environment, prevent events from recurring and ensure continuous improvement.

KGA-076 “Performing Trending & Trending Analysis” provides guidance to the line CAP co-ordinators in performing event trending analysis.

New knowledge and research includes sources such as EDF, INPO OE and reports, EPRI, benchmarking, self-assessments, vendor, and Eskom Events. All these elements of operating experience are captured and tracked through the CAP programme software (DevonWay, previously EPMS).

Given the agreements in place between EDF and Koeberg Nuclear Power Station, a great deal of operating experience is shared. Some of this operating experience may relate to aspects of the preventive and predictive maintenance programme and may lead to changes in these programmes. These reviews are not periodic in nature but will occur as and when relevant operating experience is shared. KAA-638 “Communication Process with EDF” describes how information is obtained from and provided to EDF corporate departments and how subsequent actions should be addressed. The guide KGA-035 “Processing of Experience Feedback received through the EDF co-operation agreement” provides guidance to the Koeberg Integrated Team on processing operating experience received from EDF to ensure that it is effectively and efficiently used.

From KAA-913 “Integrated Equipment Reliability Process” it is evident that operating experience is considered. In the procedure Component Engineering is responsible for evaluating plant and industry operating experience and recommending changes to the PM Basis as required, in order to optimise the PM Programme. They are also responsible for assessing relevant Operational Experience and taking any appropriate action, as required. Furthermore, Component Engineering shall identify and review the latest preventive and predictive maintenance techniques for the various equipment types on the plant, and make recommendations to optimise the techniques employed and resulting maintenance costs. System Engineering is responsible for assessing relevant Operational Experience and taking any appropriate action, as required. In the development of PM Templates operating experience is drawn from a number of sources such as EdF PM Templates and existing Maintenance Bases. During the development of PM Strategies, component specific operating experience is used to ensure that the resulting maintenance regime is the most appropriate.

The guides KGU-034 “Guide for Reliability Engineers”, KGU-023 “Guide for Component Engineers” and KGU-002 “Guide for System Engineers” all have a guideline (module) on Operating Experience. The main sources of operating experience are considered to be EPRI (NMAC and PSE), Generation Greybeards, INPO/WANO Library of Learning and their websites, and EdF.

Benchmarking (KGA-051 “Benchmarking Guide at Koeberg Nuclear Power Station”) and self-assessments (KGA-053 “Self-Assessment at Koeberg Nuclear Power Station”) may be used for evaluating the preventive and predictive maintenance programmes but this would be on an ad hoc basis rather than periodic occurrence. These processes are more likely to be used for specific issues or problematic areas that may result in changes to maintenance programmes rather than on the subject of the maintenance programmes themselves.

Assessment:

The integration of the feedback on PM Implementation can be improved. Elements of the feedback are well defined and controlled but other areas are vague and the link to the PM Programme is tenuous. The reviews and evaluations on the preventive and predictive maintenance are also performed as and when information is received rather than periodically when information is sought out.

An overall procedure governing the collating and processing of feedback and integrating all aspects of the feedback into the maintenance programme and the equipment reliability process should be considered.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1.	Develop Koeberg specific guidance for an integrated living PM Programme on the various elements of feedback on PM Implementation (including as-found; operating experience; performance monitoring and recommendations). Linked to GC 83539-002 CA. Linked to B2.3, Action 3.	Reliability Engineering	Q4 2018

Functional Group Lead:	Ahmed Kamroodien	**B2.5**
Functional Group:	Plant Engineering	
Date Performed:	2015-08-17	

Item:

3.2.2.1.3 Bullets 5: *Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing preventive and predictive maintenance programmes.*

Current status description and input document reference:

The ageing management review and scoping and screening for LTO, has not yet been completed. This item cannot be assessed at this time.

INPUT REFERENCE DOCUMENTS:

- KSM-LIC-001: Requirements for the Control of Maintenance
- KSA-913: Integrated Equipment Reliability Standard: Preventive Maintenance Basis
- KAA-913: Integrated Equipment Reliability Process
- KGU-035: Integrated Equipment Reliability Process: Scoping & Classification of Components
- KGU-037: Integrated Equipment Reliability Process: Developing PM Templates
- KGU-039: Integrated Equipment Reliability Process: Developing PM Strategies
- 331-94: Importance Category Classification Listing
- KLM-005: Mandatory Preventive Maintenance Listing

Assessment:

- Verification that the results of the ageing management review and scoping and screening for LTO, are adequately reflected into the existing preventive and predictive maintenance programmes, can only be assessed once the work on the ageing management review has been completed.
- There is currently no formal link between the Maintenance Programme and the Ageing Management Programmes (Ageing Matrix).

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Once the ageing management review and scoping and screening for LTO has been completed, verify that the results are adequately reflected into the existing preventive and predictive maintenance programmes. Initiate any further actions required. Refer to WBS 6.	Koeberg SALTO	Q4 2020
2	Formalise the relationship between the Maintenance Programme and the Ageing Management Programmes (Ageing Matrix) in order to ensure the appropriate alignment to support the LTO initiative. Refer to WBS 4.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Ahmed Kamroodien	**B2.6**
Functional Group:	Plant Engineering	
Date Performed:	2015-08-20	

Item:

3.2.2.1.3 Bullets 6: *Whether the plant has a process to evaluate existing preventive and predictive maintenance programmes used to manage ageing of SCs within the scope of LTO against the nine attributes.*

Current status description and input document reference:

INPUT REFERENCE DOCUMENTS:

- 331-148: Programme Engineer's Guide

CURRENT STATUS DESCRIPTION:

Programme health reporting and oversight is performed in accordance with the guide 331-148, 'Programme Engineer's Guide'. The programme health report covers the following areas:

- Programme Scope
- Programme Requirements and Acceptance Criteria
- Programme Execution
- Programme Results Evaluation
- Overall Status

Assessment:

- The Maintenance Programme has not been evaluated against the nine attributes described in the IAEA documentation on Ageing Management and LTO.
- The current process for assessing programme health described in 331-148, 'Programme Engineer's Guide', does not include all nine IAEA attributes. The attributes are identified in chapter 3 of IAEA Safety Reports Series No. 57, 'Ageing Management for Nuclear Power Plants: International Generic Ageing Lessons Learned (IGALL)' and chapter 5.3 of IAEA Safety Reports Series No. 57, 'Safe Long Term Operation of Nuclear Power Plants' and other IAEA documents.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Evaluate the KOU Preventive Maintenance Programme against the nine attributes described in the IAEA documentation on Ageing Management and LTO and document the results. Refer to WBS 7.	Koeberg SALTO	Q1 2020
2	Incorporate the nine attributes described in the IAEA documentation on Ageing Management and LTO into the existing processes for programme oversight (331-148, Programme Engineer's Guide) or introduce a new process to meet this requirement. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Ahmed Kamroodien	**B2.7**
Functional Group:	**Plant Engineering**	
Date Performed:	**2015/08/27**	

Item:

3.2.2.1.3 Bullets 7: *Whether plant maintenance programmes consider regulatory requirements, suppliers' recommendations, feedback from related operational experience and research results and findings. Also investigate to what extent the programmes are supporting safe operation of NPPs in the current operating period as well as in the period of LTO.*

INPUT REFERENCE DOCUMENTS:

- KAA-688 The Corrective Action Process (Rev 16), 2015
- KAA-913 Integrated Equipment Reliability Process (Rev 0), 2014
- KAD-023 Quality Control Function, (Rev 6), 2010
- KAM-113 Classification of Maintenance Activities, (Rev 4), 2002
- KGU-029 Monitoring and Trending in Plant Engineering (Rev 1), 2013
- KGU-035 Integrated Equipment Reliability Process: Scoping and Classification of Components (Rev 2), 2013
- KGU-037 Integrated Equipment Reliability Process: Developing PM Templates (Rev 0), 2012
- KGU-039 Integrated Equipment Reliability Process: Developing PM Strategies (Rev 0), 2013
- KLM-005 Mandatory Preventive Maintenance Listing (Rev 18), 2014
- KSA-126 Control of Statutory and Non-Statutory Work Activities
- KSA-913 Integrated Equipment Reliability Standard (Rev 0), 2014
- KSM-006 Investigation, Compiling and Execution of Maintenance Work Packages (Rev 10), 2012
- KSM-006 Investigation, Compiling, and Execution of Maintenance Working Packages (Rev 10), 2012
- KSM-015 Maintenance History Records (Rev 6), 2013
- KSM-LIC-001 Requirements for the Control of Maintenance (Rev 2), 2013
- 239-QWR-013 Maintenance Basis Change / Update Request Process

Current Process Description:

Regulatory Requirements

Regulatory requirements are considered during the development of PM Templates, see **KGU-037** “Integrated Equipment Reliability Process: Developing PM Templates”, during the equipment reliability classification process, see **KGU-035** “Integrated Equipment Reliability Process: Scoping and Classification”, and in the development of PM strategies, see **KGU-039** “Integrated Equipment Reliability Process: Developing PM Strategies”. Regulatory tasks are captured as Commitment tasks (other commitment tasks include tasks required by the insurer) in the PM Template and/or in the PM Strategy. In the PM Strategy, commitment tasks are more stringently controlled than other tasks. For example, for any regulatory tasks the task interval may not exceed the task interval specified in the PM Template. In the equipment classification process, components having a functional failure leading to a regulatory violation are classified as a minimum as significant.

The licence at Koeberg Nuclear Power Station is process based and thus the maintenance programme is governed by the process elements contained in **KSM-LIC-001** “Requirements for the Control of Maintenance”. Currently there are no tasks included in the maintenance programme as a result of a regulatory requirement, however should a regulatory requirement arise, the process will accommodate that requirement.

Suppliers’ Recommendations

Vendor recommendations are also considered during the development of PM Templates, see **KGU-037** “Integrated Equipment Reliability Process: Developing PM Templates”. They are one of the sources of input into the development of the PM Template. Furthermore, during the development of Plant Monitoring Plans, plant engineers consider OEM guidance when determining the failure modes that require monitoring and when setting up the trending parameters such as the alert and action points, see **KGU-029** “Monitoring and Trending in Plant Engineering”. Suppliers’ recommendations may also be included in work packages, either from operating experience or through maintenance manuals, see **KSM-006** “Investigation, Compiling, and Execution of Maintenance Working Packages”.

OEM/Vendor recommendations are also taken into account when reviewing and revising PM Basis for design changes in accordance with **239-QWR-013** “Maintenance Basis Change / Update Request Process”.

Operating Experience

Operating experience is included throughout the maintenance programme, from the development of the PM basis (**KSA-913**: Integrated Equipment Reliability Standard), to the execution phase of maintenance (**KSM-006** “Investigation, Compiling, and Execution of Maintenance Working Packages”) where applicable operating experience is included in the work package template.

The procedure **KAA-688** “The Corrective Action Process” describes the process and responsibilities that are defined for identifying, reporting, investigating and trending occurrences, problems, events and near-misses for Koeberg Nuclear Power Station. This procedure ensures that operating experience information is effectively identified, screened, classified, investigated, distributed and tracked to identify actions to improve nuclear safety, conventional safety, health and environment, prevent events from recurring and ensure continuous improvement.

KGU-029 “Monitoring and Trending in Plant Engineering” gives guidance to plant engineers on monitoring and trending performance. One of the purposes of the document is to ensure that experience feedback is included in the Maintenance Basis. Although the guide is applicable to all plant engineers, the content is mainly aimed at System Engineers.

In the procedure **KAA-913** “Integrated Equipment Reliability Process” Component Engineering is responsible for evaluating plant and industry operating experience and recommending changes to the PM Basis as required, in order to optimise the PM Programme. They are also responsible for assessing relevant Operational Experience and taking any appropriate action, as required. Furthermore, Component Engineering shall identify and review the latest preventive and predictive maintenance techniques for the various equipment types on the plant, and make recommendations to optimise the techniques employed and resulting maintenance costs. System Engineering is responsible for assessing relevant Operational Experience and taking any appropriate action, as required. In the development of PM Templates operating experience is drawn from a number of sources such as EdF PM Templates and existing Maintenance Bases. During the development of PM Strategies, component specific operating experience is used to ensure that the resulting maintenance regime is the most appropriate.

The guides **KGU-034** “Guide for Reliability Engineers”, **KGU-023** “Guide for Component Engineers” and **KGU-002** “Guide for System Engineers” all have a guideline (module) on Operating Experience. The main sources of operating experience are considered to be EPRI (NMAC and PSE), Generation Greybeards, INPO/WANO Library of Learning and their websites, and EdF.

Support Safe Operation

As part of the Integrated Equipment Reliability Process, a component PM Strategy identifies and justifies the preventive maintenance requirements on a component level. The appropriate PM requirements are developed in the PM Strategy through the application of the Koeberg PM Templates, while considering the specific component ER Classification. Component ER Classification provides a structured approach to classify components in terms of their functional importance, duty cycle and service conditions. This is used to focus maintenance on components that support important functions including the safe operation of the plant.

The plant process for developing the Preventive Maintenance requirements is currently in a transition phase. The pre-existing Maintenance Basis process (based on RCM principles & EDF alignment) has been replaced by the Integrated Equipment Reliability Process, which is aligned to the INPO AP-913, ‘Equipment Reliability Process Description’ and to the approach employed by EDF. As this process has only recently been initiated, most of the current PM requirements that are implemented on SAP originate from authorised Maintenance Basis documents. The Maintenance Basis documents are being replaced over time with PM Strategies, which are developed on the ‘IQReview’ Equipment Reliability Software database.

The planned scope for the pre-existing Maintenance Basis process included all CSR and SR plant systems and components, and although most safety related systems and major components were completed, the full scope was not achieved prior to the project to align the Koeberg processes to INPO AP-913.

Currently all maintenance tasks on CSR and SR equipment are considered to be mandatory (see **KLM-005** Mandatory Preventive Maintenance Listing), however as the PM strategies under the new process are implemented (loaded onto SAP) this will change to all tasks on critical equipment being mandatory. The standard **KSA-126** Control of Statutory and Non-Statutory Work Activities establishes the administrative control requirements for the scheduling of statutory work activities which includes mandatory tasks, ensuring that these tasks are appropriately scheduled and changes to the schedule are controlled.

All work activities on the plant are classified into one of four categories - Critically Safety Related

Activities, Safety Related Activities, Availability Related Activities and Non Safety or Availability Related Activities, see procedure **KAM-113** ‘Classification of Maintenance Activities’ for details. This work activity classification is then used to ensure that the appropriate level of attention is given to the activity through the various elements of the maintenance programme. In **KSM-006** ‘Investigation, Compiling and Execution of Maintenance Work Packages’ the compiler ensures that the work package is prepared at a level of detail appropriate to the complexity of the anticipated activities. The work activity classification also influences quality control – Quality control inspectors are required to verify that maintenance activities conform to applicable quality criteria and selected technical specifications based on the work activity classifications (see **KSM-014** ‘Requirements of Maintenance Quality Control’). This is reiterated in procedure **KAD-023** ‘Quality Control Function’ where a formal quality control (QC) programme is required for all CSR and SR maintenance activities. The contents and extent of the History Summary must correspond in degree, amount and quality, with the work activity classification and complexity of the task - see standard **KSM-015** ‘Maintenance History Records’. The work activity classification also affects the retention time and storage medium of the maintenance history records. **KSM-LIC-001** ‘Requirements for the control of maintenance’ states that all maintenance personnel performing maintenance activities shall be suitably trained and authorised, commensurate with the importance of the equipment to safety and power generation, and the complexity of the maintenance activity. **KAA-668** ‘Authorisation of Staff to Perform Safety Related Functions’ describes how staff is authorised to perform safety related functions, including authorisations to work on safety related equipment for MMS (Mechanical Maintenance Services), IMS (Instrumentation Maintenance Services), EMS (Electrical Maintenance Services) and ME (Maintenance Engineering).

Assessment:

- Although the plant Equipment Reliability processes have been updated and aligned with the INPO AP-913, ‘Equipment Reliability Process Description’ and with the EDF approach, the PM Strategies for components with an ER Classification of ‘Critical’ have not yet been implemented on SAP.
- Maintenance Bases were developed under the previous process for most safety related systems and major components, but not all CSR and SR components were completed.
- The integration of the feedback on PM Implementation can be improved. Elements of the feedback are well defined and controlled but other areas are vague and the link to the PM Programme is tenuous. The reviews and evaluations on the preventive and predictive maintenance are also performed as and when information is received rather than periodically when information is sought out.
- An overall procedure governing the collating and processing of feedback and integrating all aspects of the feedback into the maintenance programme and the equipment reliability process should be considered.
- The links between the maintenance activity classifications and the training and authorisations of personnel and the preparation of work packages are unclear. The link may be inferred but is not explicitly stated.

Results: Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	PM Strategies to be completed and implemented on SAP for components with an ER Classification of 'Critical'. Linked to B2.1, Action 1.	Reliability Engineering	Q4 2020
2	Develop Koeberg specific guidance for an integrated living PM Programme on the various elements of feedback on PM Implementation (including as-found; operating experience; performance monitoring and recommendations). Linked to GC 83539-002 CA. Linked to B2.3, Action 3.	Reliability Engineering	Q4 2018
3	ACTION CANCELLED	N/A	N/A
4	Conduct a cross-functional investigation to establish the changes required to enable the application of the ER Classification in equipment reliability related plant processes, this could include for example, ER Classification to prioritise Work Control notification scheduling, for prioritising QC actions, for a graded approach to work package preparation, for spares processes, etc.	Reliability Engineering	2018/12/31

Functional Group Lead:	Ahmed Kamroodien	**B2.8**
Functional Group:	Plant Engineering	
Date Performed:	2015-08-19	

Item:

3.2.2.1.3 Bullets 8: *Whether maintenance programmes for SSCs in the scope of LTO clearly identify the type of maintenance, the links with ageing management programmes, the frequency, tasks, records and storage.*

Current status description and input document reference:

INPUT REFERENCE DOCUMENTS:

- KSM-LIC-001: Requirements for the Control of Maintenance
- KSA-913: Integrated Equipment Reliability Standard: Preventive Maintenance Basis
- KSA-038: Requirements for Quality Records
- KSM-015: Maintenance History Records
- KAA-820: Updating the Work Management Planning Database
- KAA-830: Process for Management of Quality Records
- KAA-913: Integrated Equipment Reliability Process
- KGU-037: Integrated Equipment Reliability Process: Developing PM Templates
- KGU-039: Integrated Equipment Reliability Process: Developing PM Strategies
- KLM-005: Mandatory Preventive Maintenance Listing
- MBAP Project Clarification Note 1, Rev 4: Dealing with other "Koeberg Plant Condition Management Programmes" when developing the PM Programme using IQReview

CURRENT STATUS DESCRIPTION:

The plant process for developing the Preventive Maintenance requirements is currently in a transition phase. The pre-existing Maintenance Basis process (based on RCM principles & EDF alignment) has been replaced by the Integrated Equipment Reliability Process, which is aligned to the INPO AP-913, 'Equipment Reliability Process Description' and to the approach employed by EDF. This process is described in KAA-913, Rev 0, 'Integrated Equipment Reliability Process' and KSA-913, Rev 0, 'Integrated Equipment Reliability Standard: Preventive Maintenance Basis'.

As this process has only recently been initiated, most of the current PM requirements that are implemented on SAP originate from authorised Maintenance Basis documents. The Maintenance Basis documents are being replaced over time with PM Strategies, which are developed on the 'IQReview' Equipment Reliability Software database.

As part of the Integrated Equipment Reliability Process, the maintenance programme tasks in the Koeberg PM Templates (on the IQReview database) are grouped into the following main types:

- Periodic Maintenance – Routine
- Periodic Maintenance – Major
- Condition Monitoring – Unit On-line (includes Predictive Maintenance, Failure Finding, & Walk-down tasks)
- Condition Monitoring – Unit Outage (includes Predictive Maintenance, Failure Finding, & Walk-down tasks)
- Corrective Maintenance

This is described in the guide KGU-037, Rev 0, 'Integrated Equipment Reliability Process: Developing

PM Templates'.

The appropriate PM requirements are then developed in the PM Strategies through the application of the Koeberg PM Templates, while considering the specific component ER Classification and OE. The PM Strategy identifies and justifies the PM Programme on a component level. It includes the required PM Tasks and details, their respective task intervals (frequency), implementation recommendations, a justification for PM Template deviations and any additional PM Basis supporting information. The methodology used to develop and maintain PM Strategies is described in the guide KGU-039, Rev 0, 'Integrated Equipment Reliability Process: Developing PM Strategies'.

The requirements of the SRSM, ISI, IST and EQ programmes are considered when developing the Koeberg PM Templates and are reflected in the PM Template for reference purposes only. When developing the component PM Strategy requirements, credit is taken for the other Koeberg programme requirements. This is clarified in the MBAP Project – Clarification Note 1, Rev 4 (located on the IQReview home page). At a programme level, there are however no formal links between the Maintenance Programme and the other Koeberg programmes or ageing management programmes (Ageing Matrix).

As the Integrated Equipment Reliability Process described above was only recently initiated, most of the current PM requirements that are implemented on SAP originate from the previous (legacy) Maintenance Basis process. In accordance with this process, Preventive Maintenance Programme requirements were established by analysis using Reliability Centred Maintenance (RCM) principles or by alignment to the EDF PM Programme, and the results were documented in controlled documents called Maintenance Bases. Where the analysis was based on RCM principles, the process considers the consequences of failure and identifies appropriate PM Tasks and periodicities, where the consequences of failure are unacceptable. The planned scope included all CSR and SR plant systems and components, and although most safety related systems and major components were completed, the full scope was not achieved prior to the project to align the Koeberg processes to INPO AP-913.

The documents governing the Maintenance Basis process that have been superseded/withdrawn are:

- KSU-006, Rev 0, 'Maintenance Basis Determination, Documentation and Change Control'
- KAU-027, Rev 3, 'Maintenance Basis Determination and Change Control Process'
- KGU-027, Rev 0a, 'The Reliability Centred Maintenance (RCM) Analysis Process'
- KGU-022, Rev 0, 'Maintenance Basis Development by Alignment to the EDF Preventive Maintenance Programme

At a programme implementation level, the 'SAP Change Control Forms' used to update tasks on SAP are reviewed by the relevant programme owners for ISI, IST, OHSA, SRSM/OTS and Mandatory Maintenance (KLM-005). This process is described in KAA-820, 'Updating the Work Management Planning Database'.

All Mandatory PM Task requirements, resulting from the above processes to determine the Maintenance Programme requirements, are documented in the list KLM-005, 'Mandatory Preventive Maintenance Listing'.

KSM-015, 'Maintenance History Records' sets out the requirements for the generation of maintenance history records and identifies the retention times and storage medium. It covers the requirements for both 'Equipment History Records (EHR)' for intrusive or complex tasks and 'History Summaries' recorded on the work order and captured on SAP. The capturing of 'As Found Condition' codes is also covered. The control and management of Quality Records at Koeberg is further governed by KSA-038, 'Requirements for Quality Records', and KAA-830, 'Process for Management of Quality Records'.

A more detailed description of the relevant processes is provided in B2.1, under “Background”.

Assessment:

- There are currently no formal links between the Maintenance Programme and the Ageing Management Programmes (Ageing Matrix).
- Although the plant Equipment Reliability processes have been updated and aligned with the INPO AP-913, ‘Equipment Reliability Process Description’ and with the EDF approach, the PM Strategies for components with an ER Classification of ‘Critical’ have not yet been implemented on SAP.
- Maintenance Bases were developed under the previous process for most safety related systems and major components, but not all CSR and SR components were completed.

Results:	Meet		Don’t Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	Formalise the links between the Maintenance Programme and the Ageing Management Programmes (Ageing Matrix) in order to ensure the appropriate alignment to support the LTO initiative. Refer to WBS 4	Koeberg SALTO	Q4 2020
2	PM Strategies to be completed and implemented on SAP for components with an ER Classification of ‘Critical’. Linked to B2.1, Action 1.	Reliability Engineering	Q4 2020

Functional Group Lead:	Ahmed Kamroodien	**B2.9**
Functional Group:	Plant Engineering	
Date Performed:	2015-08-27	

Item:

3.2.2.1.3 Bullets 9: *Whether the evaluation of the collected data also includes trend analysis.*

Current status description and input document reference:

INPUT REFERENCE DOCUMENTS:

- KAA-852: Equipment Reliability Index
- KAA-913: Integrated Equipment Reliability Process
- KAM-106: Lubricant/Oil Sampling and Analysis
- KGM-005: Infrared Thermographic Inspections
- KGU-023: Guide for Component Engineers
- KGU-029: Monitoring and Trending in Plant Engineering
- KGU-031: System Health Reporting Guide
- KSM-015: Maintenance History Records
- KWM-RM-EDG-001: Diesel Testing with Doctor Diesel System
- KWM-RM-VIB-001: Condition Monitoring of Rotating Equipment

CURRENT STATUS DESCRIPTION:

KSM-015, ‘Maintenance History Records’ sets out the requirements for the generation of maintenance history records and identifies the retention times and storage medium. It covers the requirements for both ‘Equipment History Records (EHR)’ for intrusive or complex tasks and ‘History Summaries’ recorded on the work order and captured on SAP. The capturing of ‘As Found Condition’ codes is also covered. The ‘As-Found Condition’ of equipment is captured in History Summaries, where one of four tick-boxes is checked for the condition found (1 – 2 – 3 – 4 – N/A). This is however not currently trended.

The PAM Manager module of the Equipment Reliability software database is a tool used for pro-active PM review and craft feedback review (including evaluation of As-Found Condition Code trends). This module can however only be implemented following its inclusion into the Work Management Process.

Predictive Maintenance

The various predictive maintenance techniques that are employed at Koeberg are governed by their respective controlling procedures. For example, KWM-RM-VIB-001, ‘Condition Monitoring of Rotating Machinery’ describes the condition monitoring of rotating machinery, which includes the monitoring, trending and analysis of both vibration and temperature data. Other examples include oil sampling and analysis covered in KAM-106, ‘Lubricant/Oil Sampling and Analysis’, Infrared Thermography covered in KGM-005, ‘Infrared Thermographic Inspections’, and diesel engine testing covered in KWM-RM-EDG-001, ‘Diesel Testing with Doctor Diesel System’. Not all predictive maintenance techniques, however, have clear guidance on the evaluation and trend analysis of the collected data.

A summary of predictive maintenance results can be loaded onto the PlantIQ module of the Equipment Reliability software database, however, only the results of selected techniques on a limited number of components are being captured at this point in time. The results that are currently being captured include Vibration and Temperature Monitoring, Oil Analysis and Thermography.

Performance Monitoring

Performance monitoring responsibilities are described in KAA-913, 'Integrated Equipment Reliability Process' where the System Engineer is responsible for:

- Establishing appropriate performance criteria and monitoring parameters.
- Developing Performance Monitoring Plans for allocated systems and monitoring and trending system performance on a continuous basis.
- Performing system walk-downs in accordance with the walk-down schedule.
- Periodically compiling System Health Reports and communicating results. Where performance has degraded, developing System Health Action Plans.

KGU-029, 'Monitoring and Trending in Plant Engineering' gives guidance to plant engineers on system monitoring and trending. One of the purposes of the document is to ensure that experience feedback is included in the Maintenance Basis.

System Health Reporting is further described in guide KGU-031, 'System Health Reporting Guide'. Monitoring and trending of the system performance enables the System Engineer to identify problems before they adversely affect the functionality of the system.

In addition to System Health reports, the Component Engineer is responsible for periodically evaluating and compiling Component Health Reports and communicating results. Where performance has degraded, the development of a Component Health Action Plan is required. Component Health Reporting is further described in guide KGU-023, 'Guide for Component Engineers', Guideline 16 – 'Component Monitoring and Component Health Reporting'.

A Koeberg Equipment Reliability Index (ERI) report is also compiled on a monthly basis on the ERI database. The ERI trend is shown in the database. The ERI process is described in KAA-852, 'Equipment Reliability Index'. The objectives of this index are to measure performance in terms of safety and availability, and to measure the overall status of the equipment reliability process.

Assessment:

- Not all predictive maintenance techniques employed at Koeberg have clear documented guidance on the evaluation and trend analysis of the collected data.
- As-Found Condition Codes are required to be captured, but no formal process is in place for analysis and trending of the captured data.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Develop uniform guidance on the requirements for data evaluation, acceptance criteria and trend analysis, to be included in predictive maintenance procedures and review all relevant procedures against the requirements. Initiate procedure updates as required.	Reliability Engineering	Q4 2018
2	Consider implementing the PlantIQ module of the Equipment Reliability software, for all significant predictive techniques on components with an ER Classification of Critical.	Reliability Engineering	Q4 2018
3	Consider including the functionality of the PAM Manager module of the Equipment Reliability software into the Work Management process, to assist with the evaluation and continuing improvement of the effectiveness of the maintenance programme. Linked to RC 21753.	Reliability Engineering	Q4 2018

Functional Group Lead:	Ahmed Kamroodien	**B2.10**
Functional Group:	Plant Engineering	
Date Performed:	2015-08-20	

Item:

3.2.2.1.3 Bullets 10: *Whether maintenance programmes also addresses obsolescence of SSCs including the proposed period of LTO.*

Current status description and input document reference:

INPUT REFERENCE DOCUMENTS:

- KBA 0022 N NEPO NEPP 115, Rev 2: Obsolescence Management at Koeberg Operating Unit (KOU)
- 331-146, Rev 0: The Obsolescence Process

CURRENT STATUS DESCRIPTION:

The programme to address obsolescence at Koeberg does not form part of the normal plant Maintenance Programme. Obsolescence is managed as a separate process and is described in KBA 0022 N NEPO NEPP 115, ‘Obsolescence Management at Koeberg Operating Unit (KOU)’ and 331-146, ‘The Obsolescence Process’.

Assessment:

As the management of obsolescence at Koeberg does not form part of the normal plant Maintenance Programme, refer to Area D, Sub-section 3.3.4, Obsolescence Management Programme.

Results: Meet [ ] Don’t Meet [ ] Partially Met [ ] N/A [X]

No	Action Description	Lead	Due Date

Functional Group Lead:	Ahmed Kamroodien	**B2.11**
Functional Group:	Plant Engineering	
Date Performed:	2015-08-26	

Item:

3.2.2.1.3 Bullets 11: *Whether a process and a database exist that support the evaluation of effectiveness of maintenance programmes in detecting and characterizing degradation mechanisms, and provide technical references to support findings and conclusions. The documentation should include records of maintenance activities of components.*

Current status description and input document reference:

INPUT REFERENCE DOCUMENTS:

- 331-148: Programme Engineers Guide
- KAA-830: Process for Management of Quality Records
- KAA-852: Equipment Reliability Index
- KAA-913: Integrated Equipment Reliability Process
- KGU-023: Guide for Component Engineers
- KGU-029: Monitoring and Trending in Plant Engineering
- KGU-031: System Health Reporting Guide
- KGU-033: Failure Investigation of Plant Equipment and evaluation of Experience
- KSA-038: Requirements for Quality Records
- KSM-LIC-001: Requirements for the Control of Maintenance
- KSM-015: Maintenance History Records
- KSM-016: Equipment Failure Investigation and Evaluation of Experience
- KWM-RM-VIB-001: Condition Monitoring of Rotating Equipment

CURRENT STATUS DESCRIPTION:

KSM-LIC-001, 'Requirements for the control of Maintenance' includes inter alia requirements on:

- Failure Analysis and the Integration of Operating Experience
- Maintenance Effectiveness and Performance Monitoring

The requirements in these sections include inter alia the following:

- Industry operating experience, craft feedback, equipment as-found condition trends and equipment failure trends shall be evaluated. These evaluations shall strive to assess the applicability, effectiveness and completeness of the existing PM Strategies and shall recommend improvements to the PM Basis, where necessary.
- Failure analysis shall be conducted following unexpected equipment functional failure/potential failure. The depth of the investigation shall be commensurate with the importance to plant safety and reliability, the complexity of the equipment, the likelihood of recurrence and the impact of the actual failure/potential failure.
- A maintenance effectiveness monitoring programme shall be established to demonstrate the effectiveness of the Preventive Maintenance Programme.

Equipment Failures

Component Engineers perform component failure investigations, cause determination, extent of condition definition, corrective action identification and recommend changes to the PM Basis in order to optimise the PM Programme. The equipment failure process and responsibilities are described in

KAA-913, Rev 0, 'Integrated Equipment Reliability Process'.

The requirements for equipment failure investigation are established in KSM-016, 'Equipment Failure Investigation and Evaluation of Experience'. This standard requires that, as a minimum, formal failure investigation shall be conducted promptly following an unexpected functional failure of CSR or SR equipment.

Guidance on performing failure investigations is contained in the KGU-033, 'Failure Investigation of Plant Equipment and Evaluation of Experience' and KGU-023, 'Guide for Component Engineers'. The experience gained from these investigations is used to prevent recurrence, improve the PM basis and compile equipment failure statistics for trending purposes. Component failure investigation information is codified and captured on the EPMS database (replaced by Devon Way) using the WANO cause categories. This is to allow trending of component failure information.

Performance Monitoring

Performance monitoring responsibilities are described in KAA-913, 'Integrated Equipment Reliability Process' where the System Engineer is responsible for:

- Establishing appropriate performance criteria and monitoring parameters.
- Developing Performance Monitoring Plans for allocated systems and monitoring and trending system performance on a continuous basis.
- Performing system walk-downs in accordance with the walk-down schedule.
- Periodically compiling System Health Reports and communicating results. Where performance has degraded, developing System Health Action Plans.

KGU-029, 'Monitoring and Trending in Plant Engineering' gives guidance to plant engineers on system monitoring and trending. One of the purposes of the document is to ensure that experience feedback is included in the Maintenance Basis.

System Health Reporting is further described in guide **KGU-031, 'System Health Reporting Guide'**. Monitoring and trending of the system performance enables the System Engineer to identify problems before they adversely affect the functionality of the system.

In addition to System Health reports, the Component Engineer is responsible for periodically compiling Component Health Reports and communicating results. Where performance has degraded, the development of a Component Health Action Plan is required. Component Health Reporting is further described in guide **KGU-023, 'Guide for Component Engineers', Guideline 16 – 'Component Monitoring and Component Health Reporting'**.

A Koeberg Equipment Reliability Index (ERI) report is also compiled on a monthly basis on the ERI database. The ERI process is described in **KAA-852, 'Equipment Reliability Index'**. The objectives of this index are to measure performance in terms of safety and availability, and to measure the overall status of the equipment reliability process.

Maintenance History

KSM-015, 'Maintenance History Records' sets out the requirements for the generation of maintenance history records and identifies the retention times and storage medium. It covers the requirements for both 'Equipment History Records (EHR)' for intrusive or complex tasks and 'History Summaries' recorded on the work order and captured on SAP. The capturing of 'As Found Condition' codes is also covered. The 'As-Found Condition' of equipment is captured in History Summaries, where one of four tick-boxes is checked for the condition found (1 – 2 – 3 – 4 – N/A). The control and management of Quality Records at Koeberg is further governed by **KSA-038, 'Requirements for**

Quality Records', and **KAA-830, 'Process for Management of Quality Records'.**

The PAM Manager module of the Equipment Reliability software database is a tool used for pro-active PM review and craft feedback review (including As-Found Condition Codes). This module can however only be implemented following its inclusion into the Work Management Process.

Predictive Maintenance

The various predictive maintenance techniques that are employed at Koeberg are governed by their respective controlling procedures. For example, **KWM-RM-VIB-001, 'Condition Monitoring of Rotating Machinery'** describes the condition monitoring of rotating machinery, which includes the monitoring, trending and analysis of both vibration and temperature data. A summary of the results can be loaded onto the PlantIQ module of the Equipment Reliability software database, however, only the results of selected techniques on a limited number of components are being captured at this point in time. The results that are currently being captured include Vibration and Temperature Monitoring, Oil Analysis and Thermography.

PM Basis Changes

Recommendations to revise any PM Programme requirements are processed by means of Equipment Reliability Change Requests (ERCR), which are captured and tracked through the DevonWay software. This process for updating to the PM Basis is described in procedure **KAA-913, 'Integrated Equipment Reliability Process'**.

Programme Health

Preventive Maintenance Programme health reporting and oversight is performed in accordance with the guide **331-148, 'Programme Engineer's Guide'**. The programme health report covers the following areas:

- Programme Scope
- Programme Requirements and Acceptance Criteria
- Programme Execution
- Programme Results Evaluation
- Overall Status

Assessment:

- Although a number of elements that support the evaluation of the effectiveness of the maintenance programme in detecting and characterising degradation mechanisms are present, no comprehensive and integrated process and database are currently in place.
- The integration of the feedback from PM Implementation and programme effectiveness measures can be improved. Although some elements are well defined and controlled, others are less formal and tenuous.
- As-Found Condition Codes are required to be captured, but no formal process is in place for analysis and trending of the captured data.
- Some of the Equipment Reliability software modules that could potentially assist with the evaluation and continuing improvement of the effectiveness of the maintenance programme are not currently implemented (not included in the MBAP project scope).
- KSM-016, 'Equipment Failure Investigation and Evaluation of Experience' is planned to be incorporated into KSA-913, Rev 1, 'Integrated Equipment Reliability Standard', in order to improve the alignment of the Koeberg equipment failure process with INPO AP-913, 'Equipment Reliability Process Description'.

Results:	Meet	[ ]	Don't Meet	[ ]	Partially Met	X	N/A	[ ]

No	Action Description	Lead	Due Date
1	Develop, document and implement an integrated process with specific guidance to support the evaluation of the effectiveness of the maintenance programme in detecting and characterising degradation mechanisms.	Reliability Engineering	Q4 2020
2	Revise KSA-913, 'Integrated Equipment Reliability Standard' to incorporate the requirement for equipment failure investigation and supersede KSM-016.	Reliability Engineering	Q4 2017
3	Consider including the functionality of the PAM Manager module of the Equipment Reliability software into the Work Management process, to assist with the evaluation and continuing improvement of the effectiveness of the maintenance programme. Linked to B2.9, Action 2.	Reliability Engineering	Q4 2018
4	Consider implementing the PlantIQ module of the Equipment Reliability software, for all significant predictive techniques on components with an ER Classification of Critical. Linked to B2.9, Action 2.	Reliability Engineering	Q4 2018

AREA B: SCOPING AND SCREENING AND PLANT PROGRAMMES RELEVANT TO LTO

Subsection 3.2.3: Plant Programmes Relevant for LTO/Equipment qualification.

Functional Group: Engineering Programmes **Functional Group Lead:** Kabelo Moroka

Date Performed: 2015-08-20

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.2.2.2.1	Plant should have programme for maintaining qualified status of SCs within the scope of LTO. Equipment qualification establishes that equipment, while being subject to environmental conditions, is capable of performing its intended safety function or that it will be replaced or repaired so that its intended design functions will not be compromised during the planned period of LTO. The environmental and seismic qualification of equipment should be reviewed with respect to the expected period of LTO. Equipment designed according to earlier standards should be reviewed, and, if necessary, re-qualified under a comprehensive programme, or replaced. The equipment qualification should be adequately documented.	• Documentation on EQ; • Programme for monitoring the environmental conditions; • Programme for monitoring and maintaining the equipment conditions; • Re-qualification programme; • Scheduled equipment replacement programme; • Report on PSR (if it exists).	331-86 – Design Changes to Plant Structures or Operating Parameters
			331-144 (KSA-017) - Standard for the preparation of an equivalency study”.
			331-148, “Programme Engineers Guide”
			331-186 – Environmental Qualification Programme
			331-187 - Environmental Qualification Process and Responsibilities
			331-496 - Environmental Qualification Specifications Template
			331-219 - Environmental Qualification Maintenance Manual
			10 CFR 50.49 – Environmental Qualification of electric equipment important to safety for nuclear power plant
			IEEE 323-1971 / 1974
			IEEE 323-1974 - IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations IEEE 443 19-71 - Guide for Seismic Qualification of Class 1E Electric Equipment for Nuclear Power Generating Station
			IEEE 323-1974 - IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations
			IEEE 443 19-71 - Guide for Seismic Qualification of Class 1E Electric Equipment for Nuclear Power Generating Station
			KAA 501: Project Management Process for Koeberg Nuclear Power Station

			Modifications
			KBA1222E02038 – General Specification for Qualification To DBA conditions
			KBA1216J10256 – General Electric Installations – Studies and Supply
			KBA022 E0 2021 – List of Equipment to be Qualified to Post-Accident Containment Conditions
			KBA 1217 INS 2002 - Analogue Transmitters - Flow, Level and Pressure
			KBA 1217 INS 2008 - Vibration, Speed and Displacement Sensors
			KBA 1217 INS 2009 - Pneumatic Instruments
			SAR II-1.11 - Environmental Qualification of Electrical Equipment for Accident Conditions in Containment
			RG 1.89 - Environmental Qualification of electric equipment important to safety for nuclear power plant
			EQ modifications, 02261, 02253, 02262 and 91105
			AccessDatabase: G:\Nuclear Engineering\Design Eng\Design_Eng\Access Databases\Cables.
			Pericles: This is the electronic cable listing.
			Equivalency Studies as per 331-144 (KSA-017) - Standard for the preparation of an equivalency study.
			Modification Documents as per 331-86 – Design Changes to Plant Structures or Operating Parameters
			Dames & Moore (1981), Revised draft report, seismic design requirements, Koeberg Nuclear Power Station. Job No. 9629-041-45, Johannesburg, South Africa.
			CGS (2004), Eskom's Coastal Nuclear Sites: Site-Specific Seismic Design Baselines. CGS Report No. 2004-0188, Council for Geoscience, Pretoria, October

			2004.
			CGS (2005). Justification for utilizing the median peak ground acceleration in the seismic design of the PBMR facility at Koeberg site for the purpose of licensing the PBMR safety analysis report. CGS Report no. 2005-0292, Rev 0, Council for Geoscience, Pretoria.
			CGS (2006), Response of the Council for Geoscience to the comments of the NNR Reviewers. CGS Report no. 2006-0184, NSIPSHA-01817#P1-149.
			NNR (2006), PBMR: NNR Position on Seismic Design Substation. Letter to Eskom Nuclear Licensing, 1st August 2006, Ref. P-0656-C, National Nuclear Regulator, Centurion.
			Rizzo Associates (2008), Definition of design ground motion for the PBMR demonstration power plant: PBMR Project PBMR003224, Koeberg, South Africa. Report no. 07-3835-01 (Rev. 0), Paul C. Rizzo Associates, Pennsylvania, USA.
			Eskom (2015) NSIP03229 - Eskom’s approach to the Seismic Hazard Assessment of the Koeberg Site in support of the safety reassessment of the Koeberg Nuclear Power Station
			Eskom (2015) NSIP03262 - Analysis of Options for the Update of the Koeberg Nuclear Power Station Seismic Design Basis
			Eskom, 2011a, External Events Safety Re-assessment Interim Report, Reference No. EERT-11-013, Rev 1, Koeberg Nuclear Power Station, December 2011.
			Eskom, 2011b, Interim Safety re-assessment: Seismic Hazard Report, Reference No. EERT-11-015, Rev 0, Koeberg Nuclear Power Station, December 2011.
			Eskom, 2012, External Hazard Screening Assessment Reference EERT-12-021-RPT
			KAU-029, Basis and Scope for Non-Licence Binding Civil Surveillances at Koeberg Nuclear Power Station

			KAU-030, Basis and Scope for Licence Binding Civil Surveillances at Koeberg Nuclear Power Station

Functional Group Lead:	Kabelo Moroka	**B3.1**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-20	

Item:

3.2.2.2.3 Bullets 1: *Verify that the results of the ageing management review, scoping and screening and TLAA revalidations for LTO are adequately used to update EQ programmes.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The purpose of the Environmental Qualification (EQ) Programme is to ensure performance of the safety functions of classified equipment throughout its life period considering all postulated initiating events. The EQ programme as per 331-186 has been developed in accordance with the 10 CFR 50.49 with additional guidance from Regulatory Guide 1.89. The qualification test reports and QADPs demonstrating the capability of the equipment to perform the safety functions in normal operating conditions, abnormal operating and accident conditions of the equipment environment throughout the qualified life have been reviewed and requirements EQ established.

The scope the EQ Programme includes the following electrical and I&C equipment (including electrical and I&C cables) required to remain operable during and/or after a design basis event.

- Class 1E electrical equipment and systems located in harsh environment are essential for emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or which are otherwise essential in preventing significant release of radioactive material to the environment. This Class 1E equipment and systems are designed to meet their functional requirements under the design basis accident conditions such as LOCA and HELB.
- Non-safety related equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions specified by the safety-related equipment.
- Certain Post accident monitoring equipment

As indicated in 331-219, based on the qualification test reports, each EQ item has a qualified life and the current practice is to replace the equipment before the end of its qualified life. 331-219 also stipulates maintenance requirements such as inspection and monitoring to preserve of qualification throughout the component life.

INPUT REFERENCE DOCUMENTS:

- 331-219 - Environmental Qualification Maintenance Manual
- 10CFR 50.49 - Environmental Qualification of electric equipment important to safety for nuclear power plant
- RG 1.89 - Environmental Qualification of electric equipment important to safety for nuclear power plant

Assessment:

For qualified equipment, the EQ programme provides the requirements for qualification, installation and maintenance requirements. Currently the ageing management review, scoping and screening and TLAA revalidations are not used to update the EQ programme.

Additional programmes such as on-going qualification programmes, re-qualification programme and conditional monitoring programme needs to be developed to enable review of qualified lives and to ensure the environmental condition remain within the qualification test envelope.

For condition monitoring, additional measuring devices needs to be installed inside containment to measure and trend the service temperature and radiation conditions at the location of EQ equipment.

The 331-219 must be updated to once the revalidation of TLAA is complete.

Results:	Meet		Don't Meet		Partially Met	x	N/A	

No	Action Description	Lead	Due Date
1	Perform TLAA revalidations for all EQ equipment and update the EQ programme Refer to WBS 10.	Koeberg SALTO	Q4 2020
2	Install measuring devices inside containment to measure and trend the service temperature and radiation conditions at the location of EQ equipment. Refer to WBS 19.	Koeberg SALTO	Q1 2020
3	Develop an on-going qualification programme based on the IGALL AMP Refer to WBS 7.	Koeberg SALTO	Q4 2020
4	Perform ageing management review for EQ equipment listed in the KOU Ageing Management matrix and updated the EQ programme accordingly. Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Kabelo Moroka	**B3.2**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-20	

Item:

3.2.2.2.3 Bullets 2: *Verify that all environmentally qualified equipment to be addressed in the frame of LTO is included in the existing plant EQ programme.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All qualified equipment and components as stated in the SAR Part II-1.11.2,"Eelctrical Equipment to be qualified" and KBA022 E0 2021, "List of Equipment to be Qualified to Post-Accident Containment Conditions" are part of the existing Environmental Qualification Programme. The EQ Master List in 331-219 provides a list of all equipment within the scope of the EQ programme. The Koeberg EQ Programme has been developed in line with 10 CFR 50.49, "Environmental Qualification of electric equipment important to safety for nuclear power plant".

The following are safety-related electrical equipment and components located in harsh environment that are required to function during and subsequent to any of the design basis events:

- Class 1E electrical equipment and systems essential for emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or which are otherwise essential in preventing significant release of radioactive material to the environment. This Class 1E equipment and systems are designed to meet their functional requirements under the design basis accident conditions such as LOCA and HELB.
- Non-safety (NSF) related equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions specified by the safety-related equipment.
- Certain post-accident monitoring equipment

The qualification of equipment needed for beyond design basis accidents and qualification of mechanical components is not part of the current EQ Programme as this falls outside the scope of 10CFR 50.49.

INPUT REFERENCE DOCUMENTS:

- 331-219, " Environmental Qualification Maintenance Manual";
- KBA022 E0 2021, "List of Equipment to be Qualified to Post-Accident Containment Conditions";
- SAR Part II-1.11 - Environmental Qualification of Electrical Equipment for accident conditions in the containment;
- 10CFR 50.49 - Environmental Qualification of electric equipment important to safety for nuclear power plant.

Assessment:

All environmentally qualified equipment and components listed in the EQMM, 331-219 will be considered for LTO. The qualification of equipment needed to ensure the beyond design basis accidents and qualification of mechanical components is not part of the current EQ Programme.

Results: Meet [ ] Don't Meet [ ] Partially Met [x] N/A [ ]

No	Action Description	Lead	Due Date
1	Review the scoping and need to include equipment needed to ensure the beyond design basis accidents as part of the current EQ Programme. Refer to WBS 19.	Koeberg SALTO	Q1 2020
2	Review the scoping and need to include the qualification of equipment mechanical components in the current EQ Programme. Refer to WBS 19.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Kabelo Moroka	**B3.3**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-20	

Item:

3.2.2.2.3 Bullets 3: *Whether the plant has evaluated the EQ programme for LTO for consistency with the nine attributes.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The existing EQ Programme is in line with the five elements as per of 331-148, "Programme Engineers Guide", Appendix 1. These are:

- Scope
- Requirements and Acceptance Criteria
- Execution
- Results Evaluation
- Programme Oversight

INPUT REFERENCE DOCUMENTS:

- 331-148, "Programme Engineers Guide".

Assessment:

No verification has been done for the EQ Programme against the IAEA nine attributes of IGALL AMP. EPG is currently conducting a Self-Assessment, SE 88540, to review and evaluate the attributes of the current Programmes scoped in the Programme Guide, 331-148, with the intent to align with the nine attributes of the IGALL Ageing Management Programmes (AMPs).

Results:	Meet		Don't Meet		Partially Met	x	N/A	

No	Action Description	Lead	Due Date
1	Evaluate the 331-148, "Programme Engineers Guide", for consistency with the nine attributes of the IGALL AMP. Self-Assessment, SA 88540. Refer to WBS 7.	Koeberg SALTO	Q1 2020
2	Evaluated the EQ programme for LTO for consistency with the nine attributes. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	**Kabelo Moroka**	**B3.4**
Functional Group:	**Engineering Programmes**	
Date Performed:	**2015-08-20**	

Item:

3.2.2.2.3 Bullets 4: *Whether environmental and seismic qualification will remain valid over the expected period of LTO or whether corrective measures have been developed and implemented. The conclusion should support the technical justification that the material degradation ageing effects will be managed effectively.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The intent of qualification process is to demonstrate the functional capability of safety-important equipment, takes place throughout the equipment life. The environmentally qualified electrical equipment originally installed at Koeberg Power Station meets the requirements of IEEE 323-1971. An analysis was performed to evaluate the level of the Koeberg EQ for the list of equipment to be qualified against the EDF EQ requirements of the CP1 units. The objective of the analysis was to verify that the Koeberg EQ is adequate form a design point of view and has no significant safety impact. As a result most of the original qualified equipment and components have subsequently been replaced in accordance with the CP1 Modifications. For CP1 alignment modifications, IEEE 323-1974, “IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations” and IEEE 344-1971, “Guide for Seismic Qualification of Class 1E Electric Equipment for Nuclear Power Generating Station” or later versions were used. The qualification results as well as qualification documentation are maintained throughout the plant life or component life. In accordance with 331-219, the qualification is maintained through replacement of equipment before end of its qualified life, replacement of parts, inspection, and condition assessments. This is to ensure that the performance of the safety functions of qualified equipment is maintained throughout its life period considering all postulated initiating events.

INPUT REFERENCE DOCUMENTS:

- 331-219 - Environmental Qualification Maintenance Manual
- IEEE 323-1974 - IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations IEEE 443 19-71 - Guide for Seismic Qualification of Class 1E Electric Equipment for Nuclear Power Generating Station

Assessment:

An analysis was performed to evaluate the level of the Koeberg EQ for the list of equipment to be qualified against the EDF EQ requirements of the CP1 units. The objective of the analysis was to verify that the Koeberg EQ is adequate form a design point of view and has no significant safety impact. As a result most of the original qualified equipment and components have subsequently been replaced in accordance with the CP1 Modifications.

As part of the EDF analysis for CP1 alignment, it was recognised that IEEE 323-1971 was inadequate in least two areas, ageing and margin. That means all equipment qualified in accordance with IEEE 323-1971 will have to be identified and additional ageing or margin assessment to be done. Concerns were also raised about the seismic qualification standards IEEE 344-9171.

On the basis of the above:

- The validity of the environmental and seismic qualification over the expected period of LTO needs to be evaluated.
- Perform ageing and margin assessment to supplement the EQ retirements for those items qualified in accordance with IEEE-323-9171.
- Qualified equipment will need to be reviewed to confirm qualified life for 60 years.
- Replace the items if the above cannot be achieved.

Results:	Meet		Don't Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	Validate, for LTO, the environmental and seismic qualification and ensure they remain valid over the expected period of LTO Refer to WBS 10.	Koeberg SALTO	Q4 2020
2	Perform ageing and margin assessment to supplement the EQ retirements for those items qualified in accordance with IEEE-323-9171. Refer to WBS 19.	Koeberg SALTO	Q1 2020
3	Qualified equipment will need to be reviewed to confirm qualified life for 60 years Refer to WBS 6.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Kabelo Moroka	**B3.5**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-11	

Item:

3.2.2.2.3 Bullets 5: *Verify if EQ status is preserved and updated through surveillance, maintenance, modifications and replacement, environment and equipment condition monitoring and configuration management and that adequate interfaces with related programmes are in place.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-219, "Environmental Qualification Maintenance Manual" (EQMM) prescribes the minimum preventive maintenance requirements required to preserve the environmental qualification of equipment. The EQMM document further presents the results of the analysis conducted to establish the requirements for, and forms the basis of, the Environmental Qualification Programme. EQ activities include the monitoring, inspections, replacement of non-metallic parts and replacement of the entire component based on qualified life to ensure they retain sufficient margin to support functional requirements through the projected end of component life. EQ programme also includes necessary procedures which enable maintaining the qualified state of the component during the operating lifetime. All EQ maintenance tasks are loaded on SAP for implementation. The current practice is to replace the EQ item before the end of its qualified life stipulated in 331-219.

In addition to the EQ requirements set out in 331-219, Maintenance Basis, KBA 1217 INS 2002, KBA 1217 INS 2008 and KBA 1217 INS 2009 stipulates the calibrations and function checks requirements.

An equivalency study is performed for replacement of obsolete equipment before of end of life or due to component failure in accordance with 331-144 (KSA-017) or through a design modification process 331-186 (KAA-815) and 331-83.

INPUT REFERENCE DOCUMENTS:

- 331-219 - Environmental Qualification Maintenance Manual"
- Maintenance Procedures
- 331-144 (KSA-017) - Standard for the preparation of an equivalency study".
- KBA 1217 INS 2002 - Analogue Transmitters - Flow, Level and Pressure
- KBA 1217 INS 2008 - Vibration, Speed and Displacement Sensors
- KBA 1217 INS 2009 - Pneumatic Instruments
- 331-86 – Design Changes to Plant Structures or Operating Parameters
- 331-86 – Standard for Plant Changes affecting the Design of Koeberg Nuclear Power Station

Assessment:

Periodic maintenance and replacement of non-metallic parts is performed as per 331-219 to ensure the qualification is maintained. For LTO, revalidation of qualified life (TLAAs) is required for items where qualified life is less than the LTO period. In addition a condition monitoring programme needs to be implemented to monitor and trend the service condition on location where EQ equipment are installed.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of qualified life of those equipment less than the LTO period in accordance with IGALL TLAA 209 Refer to WBS 10.	Koeberg SALTO	Q4 2020
2	Implement the condition monitoring programme to monitor and trend the service condition on location where EQ equipment are installed. Refer to WBS 19.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Alan Lawrence	**B3.6**
Functional Group:	IPD-K	
Date Performed:	24 August 2015	

Item:

3.2.2.2.3 Bullets 6: *Check that the re-qualification programme for equipment within the scope of LTO, which was designed to earlier standards is focused on ensuring that the equipment can perform its function under current design basis condition.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Changes to the KNPS plant design base are performed using the plant modification procedure KAA 501, Project Management Process for Koeberg Nuclear Power Station Modifications, in conjunction with various other referenced procedures including 331-86, Design Changes To Plant, Plant Structures Or Operating Parameters.

The EQ master list, contained in 331-219, includes original equipment qualified in accordance with IEEE 323-1971 as well as the equipment as implemented under the CP1 modifications qualified in accordance with IEEE 323-1974 standard and the requirements of Eskom procedure 331-219, Environmental Qualification Programme Maintenance Manual. The qualified life for this equipment is for the 40 year plant life. Additionally this list currently only contains electrical and I&C equipment, not mechanical equipment in accordance with 10 CFR 50.49. The intent of the CP1 modifications was to upgrade the design and the qualification of safety related equipment following the SRA-1 recommendations. Equipment selected for the CP1 modifications were qualified in accordance with IEEE 323-1974 which was endorsed by the NRC.. To ensure that EQ equipment can perform its function under design basis condition, 331-219, , provides specific requirements aimed at preserving the qualification of EQ equipment. This includes replacements of equipment, or parts, before the end of qualified life.

INPUT REFERENCE DOCUMENTS:

- KAA 501 Project Management Process for Koeberg Nuclear Power Station Modifications
- 331-86 (KAA-815) - Design Changes To Plant, Plant Structures Or Operating Parameters
- 331-219 Environmental Qualification Programme Maintenance Manual
- 331-144 (KSA-017) - Standard for the preparation of an equivalency study
- EQ modifications, 02261, 02253, 02262 and 91105

Assessment:

Changes to the KNPS plant design base are managed in accordance with the plant modification procedure KAA 501, Project Management Process for Koeberg Nuclear Power Station Modifications.

There is still currently equipment on the plant that was not addressed:

- under the CP1 mods that need to be requalified against the updated EQ standard, IEEE 323-1974.
- 2. An EQ programme for mechanical equipment.

Some of this list of equipment can be identified as the delta between the equipment listed in the EQ programme and all the items addressed under CP1 mods. (ref: EDF expanded analysis & EDF Tricistan NPP & SRA II)

Corrective action, GA 35086-001, has been raised to initiate the mechanical EQ programme

There is currently no consolidated design requirements and codes document for Koeberg.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Consolidate and create a design requirements and codes document for Koeberg, including the in-use EQ standard IEEE 323 1974. Refer to WBS 19.	Koeberg SALTO	Q1 2020
2	Update the SAR to align to the design requirements & codes document. Refer to WBS 19.	Koeberg SALTO	Q1 2020
3	Replace/requalify items qualified in accordance with IEEE 323-1971. Refer to WBS 6.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Alan Lawrence	**B3.7**
Functional Group:	**IPD-K**	
Date Performed:	**24 August 2015**	

Item:

3.2.2.2.3 Bullets 7: *Verify if timely replacement of equipment that cannot be qualified for the planned period of LTO is adequately considered. Verify if a specific programme for replacement of mechanical, electrical and I&C equipment with qualified or stated lifetimes less than the planned LTO period has been developed and is implemented.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Environmental Qualification Programme (EQ) Maintenance Manual (EQMM), 331-219, includes a list of the EQ electrical and I&C equipment and a qualified life determined for the equipment. The equipment qualified life is generally provided by the OEM as part of the initial qualification or calculated using Arrhenius Methodology as described in 331-219. The practice at Koeberg is to replace the equipment or parts before the end of its qualified life. All maintenance activities including replacement of equipment based on qualified life are done in accordance with 331-219 and results captured as per KSM-060. The EQ programme provides the basis for replacement of electrical and I&C equipment with qualified including those equipment with qualified life less than the intended period of plant operation.

Where equipment to be replaced is obsolete, an equivalency study is performed in accordance with 331-144 (KSA-017) or an item is replaced through a design modification process 331-86 (KAA-815) and 331-83.

INPUT REFERENCE DOCUMENTS:

- 331-219 - Environmental Qualification Programme Maintenance Manual
- 331-144 (KSA-017) - Standard for the preparation of an equivalency study
- 331-86 (KAA-815) - Design Changes to Plant Structures or Operating Parameters
- 331-83 (KSA-113) - Standard or Plant Changes affecting the Design of Koeberg Nuclear Power Station
- KSM-060 - Preparation of Maintenance Work Packages

Assessment:

The current practice at Koeberg is to replace the equipment or parts before the end of its qualified life through direct replacements with the same equipment, equivalency study or modification process.

For LTO, a specific approach or programmes such as on-going qualification programme, condition monitoring programme, re-qualification process or revalidation of TLAA must be performed for mechanical, electrical and I&C equipment with qualified or stated lifetimes less than the planned LTO period. For some equipment, a qualified life has not been established due to lack of qualification test information and the qualified lives needs to be established.

A review must be performed to establish the requirements for qualification of mechanical components.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	For LTO equipment, review the need to develop the EQ Programme for mechanical equipment and for service life of non-metallic parts Refer to WBS 6.	Koeberg SALTO	Q4 2020
2	For LTO, perform the revalidation of TLAA or re-calculate the qualified lives of electrical and I&C equipment with qualified or stated lifetimes less than the planned LTO period. Specific programmes such as on-going qualification programme, condition monitoring programme, re-qualification may need to be developed. Refer to WBS 10.	Koeberg SALTO	Q4 2020
3	Established a qualified life for or replace those equipment's where qualified life has not been established due to lack of qualification test information and this needs to be established. Refer to WBS 6.	Koeberg SALTO	Q4 2020
4	Integrate TLAA equipment within the scope of LTO into the relevant LOPPs and maintenance programmes. Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Lumkile Jibiliza	**B3.8**
Functional Group:	NE-SPS	
Date Performed:	2015-08-28	

Item:

3.2.2.2.3 Bullets 8: *Check that the availability of qualified manufacturers and products needed for plant modifications for LTO has been considered.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

KNPS is a similar station to EdF CPY fleet of power stations, designed and constructed at the same time by the same constructor and the equipment manufacturers are the same. Most of the qualified equipment used at KOU is imported from France; whereby the quality requirements, maintaining "the model" equipment qualification and manufacturing standards are mainly those of the EdF/European. The fleet effect that EdF carries ensures the sustainability of supply of spare parts when required and therefore minimizing the effects of obsolescence and thus ensures the availability of qualified manufacturers in the market. The collaboration agreement between KOU and EdF sensitise KOU of qualified manufacturer's market movements.

Similarly the contractual agreements for the supply of spare parts between the KOU and the OEM/S necessitate the latter to inform KOU of qualified manufacturer's market movements as well as propose alternate equivalent qualified equipment where necessary.

KOU has engaged and diversified its supply chain options by incorporating into the Approved Supplier Listing database (ASL) organisations like Curtis Wright, RRCN, Westinghouse that specialise in supplying, qualifying, reverse engineering as well as commercial grade dedication of equipment.

Assessment:

By the well-defined collaboration and alignment between KOU (Eskom) and EdF in both the fields of engineering and plant operation; the usage of the same vendor as EdF for LTO is a highly feasible scenario.

The original designers and constructors of the KNPS have been embedded into the KOU and in South Africa via long term contractual agreements.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Kabelo Moroka	**B3.9**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-20	

Item:

3.2.2.2.3 Bullets 9: *Qualification results on safety related electric and I&C equipment located in the containment should be verified. The qualification results should specify whether the equipment has been qualified to perform its safety functions in environmental conditions equivalent to DBA conditions for the planned period of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The original EQ Test report and summary of Qualification Reports have been reviewed and the requirements to preserve the qualification of the equipment incorporated into the 331-219, "Environmental Qualification Programme Maintenance Manual (EQMM)". The EQ requirements ensure that the equipment is capable to perform its safety functions in environmental conditions equivalent to DBA conditions and to maintain qualification throughout the equipment life.

As part of the last Safety Re-assessment (SRA 2), most of the initial qualification test reports for EQ equipment could be located with very few qualification test reports missing. The OEMs were subsequently contacted and some reports obtained to verify that testing was performed in accordance with IEEE 323 and 344. The EQMM document further presents the results of the analysis conducted as part of the qualification tests to establish the requirements which form the basis Environmental Qualification Programme. EQMM provides monitoring, inspections, replacement of non-metallic parts and replacement of the entire component based on qualified life to ensure they retain sufficient margin to support functional requirements through the projected end of component life.

INPUT REFERENCE DOCUMENTS:

- 331-219, "Environmental Qualification Programme Maintenance Manual";
- Original Qualification Test Reports;
- QADPs.

Assessment:

Qualification reports for the 6.6kv Motors (RRA Motors) and Bundy Connectors used inside the MV electrical penetration could not be located during SRA II. Effort must be made to located or purchase these documents form the OEM, if available. Without the OEM documents, it is impossible to prove which tests have been performed by the manufacturer on the equipment in order to be 1E qualified in accordance with IEEE 323 and 344.

The life of the qualified equipment has not been verified for the extended plant life of 60 years.

Results:	Meet		Don't Meet		Partially Met	x	N/A	

No	Action Description	Lead	Due Date
1	Located the missing EQ Test reports for RRA Motors and Bundy connectors or replace the equipment Refer to WBS 19.	Koeberg SALTO	Q1 2020
2	Verify the qualified life of the qualified equipment is valid for LTO. Refer to WBS 6.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Nozipho Bongelo	**B3.10**
Functional Group:	Engineering Programmes	
Date Performed:	2015 August 19	

Item:

3.2.2.2.3 Bullets 10: *A plant specific list that specifies environmentally qualified cables and connectors on safety related equipment, as well as cables and connectors on non-safety related equipment that has an impact on performance of safety related systems, should be updated regularly.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Current status description:

All environmentally qualified cables and connectors on safety related equipment, as well as cables and connectors on non-safety related equipment is specified in 331-219, "Environmental Qualification Maintenance Manual". The list was verified through plant walk-downs. An electronic cable listing called "Pericles" existing which lists mainly cables installed since commissioning. For all cable installed as part of the modification, an Access Database was created which includes the environmentally qualified cables.

INPUT REFERENCE DOCUMENTS:

- 331-219: Environmental Qualification Maintenance Manual.
- Access Database: G:\Nuclear Engineering\Design Eng\Design_Eng\Access Databases\Cables.
- Pericles: This is the electronic cable listing.

Assessment:

The assessment revealed that although environmentally qualified cables and cables connectors are listed in 331-219, Pericles, and Design Access Database, it cannot be concluded that the lists are consistent.

The listing on 331-219, "Environmental Qualification Maintenance Manual" was developed with cable data through plant walk downs.

Pericles is an electronic cable Database that was used by the power station during the station construction. This electronic data source is perceived to be outdated due to the additional cables in the plant that resulted from modifications for example.

The Access data base mostly consists of the cables that are newly installed as the results of the modifications. Some cable numbers in this list (Access Database) are confirmed to be listed on Pericles and some are confirmed not to be listed.

Based on the above, it can be concluded that a consolidated list of all cables (safety related, non-safety related) that supply environmentally qualified equipment and non-environmentally qualified equipment in the power station be established, either by:

- Update Pericles, consolidate the Access Database list and Pericles and have one complete current list, or

- Evaluate the feasibility of buying a new technology and transfer all cables from Pericles and Access Database.

Results: Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Update Pericles and then consolidate the Access Database list and Pericles and have one complete current list. Refer to WBS 3.	Koeberg SALTO	Q4 2020
2	Evaluate the feasibility of buying a new technology and transfer all cables from Pericles and Access Database. Refer to WBS 3.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Maxwell Msabala	**B3.11**
Functional Group:	Process Support	
Date Performed:	2015-08-31	

Item:

3.2.2.2.3 Bullets 11: *Verify the availability and retrieving ability of the EQ documentation, which should be ensured for the whole period of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Most of the original EQ documentation, mainly the original Environmental Qualification and Seismic Qualification Test Report or summary reports, are stored in the Vault section of the Doc centre, in the General Files (Gen Files). The files are configured such that it is easy to retrieve documentation, if available. During SRA II, some SSCs have been noted as missing original qualification documentation. RC 15792 was raised to locate the missing EQ Files. Subsequently, the missing EQ Files for the Barton Pressure Transmitters and EGS connectors have been obtained from the OEM and filed for archiving (i.e. KBA 1222 E021009, KBA 1222 E021010, KBA 1222 E201011, KBA 1222 E021012 and KBA 1222 E021013).

For new equipment, EQ Test Reports are obtained from the vendors as per the design and procurement specifications and DDRs raised for them to be stored in TD&RM. The requirement for EQ Test reports is included into the design and procurement specifications. PIGO is used to capture location of the documents in the vault for easy retrieve-ability, but the actual documents are not digitised.

INPUT REFERENCE DOCUMENTS:

:

- 331-186 - EQ Standard
- 331-219 - EQ Maintenance Manual
- 331-496- EQ Specification Template
- QADPs
- EQ Test Reports
- Design and Procurement Specifications
- Maintenance History Records
- Maintenance Procedures
- Equivalency Studies as per 331-144 (KSA-017) - Standard for the preparation of an equivalency study.
- Modification Documents as per 331-86 – Design Changes to Plant Structures or Operating Parameters

Assessment:

There have been instances where EQ documents were not retrievable from the filing system. To ensure the EQ documentation is available when needed and is easily retrievable, these EQ documents must be stored in an electronic system. For this reason the EQ design documents must be stored in SPO once fully deployed.

The qualification documents (EQ Files) for the Burndy Connectors (used in MV penetrations) and Jeumont Schneider motors (RRA motors) could not be obtained.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Environmental Qualification (EQ) design documents to be migrated into SPO.	NE-PS-CMG	Q4 2018
2	Disposition (justification) or recreate (dedication) the missing EQ documentation or replace (modification) the impacted equipment. Refer to WBS 19.	Koeberg SALTO	Q1 2020

Functional Group Lead:	André Nel	**B3.12**
Functional Group:	Nuclear Sites	
Date Performed:	1 September 2015	

Item:

3.2.2.2.3 Bullets 12: *As to the seismic qualification, whether the plant uses appropriate seismic motions based on the latest knowledge, operational experience and research findings. Verify that possible ageing effects are taken into account in the seismic qualification.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

The seismic design basis for the Koeberg Nuclear Power Station (KNPS) is based on seismic studies conducted by the US consultancy firm, Dames and Moore in the 1970s. These studies culminated in a report in 1981 that used a deterministic seismic hazard assessment of the Koeberg site and established a standard US design spectrum shape anchored to a peak ground acceleration (PGA) of 0.3g (Reference 1).

Since the 1981 Dames and Moore report, additional seismic hazard assessment (SHA) studies at the Koeberg/Duynefontein site have been conducted by the Council for Geoscience (CGS) and by Paul C Rizzo Associates. These were in support of the construction of new nuclear installations at the site, including the PBMR demonstration plant. Among the milestones was the publication by the CGS (2004) of the SRAFA (Summary Report and Final Assessment) Report, which defined the seismic baselines for Eskom's nuclear sites, including Koeberg/Duynefontein (Reference 2). Subsequent work included a site-specific SHA study in support of the PBMR project (Reference 3). This study was reviewed in detail by the National Nuclear Regulator (NNR), to which the CGS responded (Reference 4). The final assessment by the NNR was expressed in a letter to Eskom (Reference 5), which made positive assessments of the CGS work:

"The NNR accepts that the CGS scope of supply has been independently reviewed and found to fulfil its objectives and the NNR are also content that the CGS reports provide valuable input for justification of the required conservative PBMR seismic design basis."

However, the intent of this study was never to serve as a full seismic licence submission, hence Rizzo Associates was appointed to perform a SHA in line with the requirements of US NRC Regulatory Guide 1.208. The work of Rizzo Associates (Reference 6) was meant to replace the earlier studies and to establish a new and updated seismic hazard characterisation of the site based on current best practice. This report was submitted and received comment from the NNR..

Eskom is in the process of evaluating available options on how to handle the seismic hazard associated with the Koeberg/Duynefontein site (Reference 7 & 8). The adopted approach will be justified to the NNR prior to its commencement. In the interim, the Dames and Moore study (1981) continues to define the seismic design basis for the Koeberg/Duynefontein site.

Koeberg's Second Safety Reassessment (SRA-II) highlighted the need for an update to the Koeberg seismic design basis. During the same period KNPS initiated a number of initiatives, in response to the Fukushima event, including plant walk downs that identified opportunities for plant resilience strengthening and the development of a "Design Extension Conditions" (DEC) position for coping with beyond design basis seismic (and other) events.

The recommendation of the SRA-II and the actions taken to date by KNPS with respect to strengthening plant resilience to cope with beyond design basis events is consistent with current international best practice.

For the seismic qualification of the plant ageing effects are taken into account by a monitoring programme (Nuclear Licensing requirement) which addresses inspection and testing of the nuclear island soil cement foundation, aseismic bearings and aseismic raft. The programme verifies that critical component ageing is of limited extent so as to maintain the plant within its seismic design parameters. Civil surveillances are performed in accordance with procedure KAU-029 and KAU-030

INPUT REFERENCE DOCUMENTS:

1. Dames & Moore (1981), Revised draft report, seismic design requirements, Koeberg Nuclear Power Station. Job No. 9629-041-45, Johannesburg, South Africa.
2. CGS (2004), Eskom's Coastal Nuclear Sites: Site-Specific Seismic Design Baselines. CGS Report No. 2004-0188, Council for Geoscience, Pretoria, October 2004.
3. CGS (2005). Justification for utilizing the median peak ground acceleration in the seismic design of the PBMR facility at Koeberg site for the purpose of licensing the PBMR safety analysis report. CGS Report no. 2005-0292, Rev 0, Council for Geoscience, Pretoria.
4. CGS (2006), Response of the Council for Geoscience to the comments of the NNR Reviewers. CGS Report no. 2006-0184, NSIPSHA-01817#P1-149.
5. NNR (2006), PBMR: NNR Position on Seismic Design Substation. Letter to Eskom Nuclear Licensing, 1st August 2006, Ref. P-0656-C, National Nuclear Regulator, Centurion.
6. Rizzo Associates (2008), Definition of design ground motion for the PBMR demonstration power plant: PBMR Project PBMR003224, Koeberg, South Africa. Report no. 07-3835-01 (Rev. 0), Paul C. Rizzo Associates, Pennsylvania, USA.
7. Eskom (2015) NSIP03229 - Eskom's approach to the Seismic Hazard Assessment of the Koeberg Site in support of the safety reassessment of the Koeberg Nuclear Power Station
8. Eskom (2015) NSIP03262 - Analysis of Options for the Update of the Koeberg Nuclear Power Station Seismic Design Basis
9. Eskom, 2011a, External Events Safety Re-assessment Interim Report, Reference No. EERT-11-013, Rev 1, Koeberg Nuclear Power Station, December 2011.
10. Eskom, 2011b, Interim Safety re-assessment: Seismic Hazard Report, Reference No. EERT-11-015, Rev 0, Koeberg Nuclear Power Station, December 2011.
11. Eskom, 2012, External Hazard Screening Assessment Reference EERT-12-021-RPT
12. KAU-029, Basis and Scope for Non-Licence Binding Civil Surveillances at Koeberg Nuclear Power Station
13. KAU-030, Basis and Scope for Licence Binding Civil Surveillances at Koeberg Nuclear Power Station

Assessment:

In the US plant owners were instructed to follow the "SSHAC" approach to assess the seismic hazard (US NRC, 2012), while in Canada no particular approach is specified. Similarly in South Africa the National Nuclear Regulator (NNR) does not specify the seismic hazard assessment approach to be followed.

However, the NNR's position with respect to the assessment of seismic hazard at KNPS is revealed by their response to Eskom's EERI post Fukushima stress test submission. In their response (letter k20990N) the NNR expressed their concern at the lack of an up to date seismic hazard study for KNPS. Some of the reasons given area as follows:

- The design basis event for the KNPS needs to be reassessed by applying locally validated Ground Motion Prediction Equations, including the process for an update of fault behaviour in the site vicinity and near region.
- The currently available information may noticeably impact the presently used values.
- Eskom must reassess the design basis seismic hazard or justify why it is not necessary to do this.
- It is considered good practice that the seismic hazard is reassessed as frequent as necessary in order to account for new findings and the advance of science.

In its assessment of the SRA-II, the NNR commented that:

The last revision, Revision 2, is out-dated, and the latest revision is in progress and therefore the SRA could not review any SSR document for any hazards that are not identified in the SAR. Since a valid and up-to-date SSR is a pre-requisite for a meaningful hazard analysis, the absence of a valid and up-to-date SSR compromises the legal standing of the material presented in this chapter. Due to this, the validity of the conclusions drawn for the entire document may also be questionable.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1.	Analysis of options for updating Seismic Hazard for KNPS.	Nuclear Sites	Q3 2016
2.	Optimised seismic strategy presented to ESRM.	Nuclear Sites	Q3 2016
3.	Update Seismic Hazard assessment for KNPS in line with ESRM decision.	Nuclear Sites	Q2 2020

AREA B: SCOPING AND SCREENING AND PLANT PROGRAMMES RELEVANT TO LTO

Subsection 3.2.4: Plant Programmes Relevant for LTO/In-Service Inspection

Functional Group: **SPS Engineering Programmes** **Functional Group Lead:** **Andrew Ceto**

Date Performed: **01 September 2015**

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.2.2.3.1	Over the plant's operating lifetime, the operating organization should examine SSCs for possible deterioration so as to determine whether they are acceptable for continued safe operation or whether remedial measures are necessary. ISI programme should be available and properly implemented for applicable SSCs in the scope of LTO (including SCs not important to safety within the scope of LTO). SCs of the plant should be examined for possible ageing effects so as to assess whether they are acceptable for LTO or whether remedial measures should be taken. ISI programmes should be reviewed for effectiveness in detecting degradations for each SC in the scope of LTO. The methodology, equipment and personnel that are part of the ISI process should be qualified according to national standards, regulatory requirements and IAEA recommendations where applicable. ISI results should be correctly documented, e.g. in a database, starting from the baseline data from pre-service inspection. The database should provide the technical basis to support findings and conclusions necessary for LTO (evaluation of effectiveness, trending, etc.)	• ISI programmes as they exists at a given plant; • AMPs connected to ISI; • Report on PSR (if it exists).	ISIPRM – KBA 0028 NES MA ISI 02
			ASME Section XI, 2001 Edition and 2003 Addenda
			KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
			331-177–Process and Responsibilities for the Development and Implementation of the In-Service Inspection Programme
			331-147 –Administration of the Engineering Requirements for the Koeberg In-Service Inspection Programme
			331-275 – Process for the development and control of ageing matrix at KOU
			KAA 709 – Process for performing safety screenings, safety evaluations, safety justification and safety cases
			KAA 501–Project Management Process for Koeberg Nuclear Power Station Modifications
			KAA 688 – The Corrective Action Process
			331-148 – Programme Engineers Guide
			KSA-038 Requirements for Quality Records
			KWR-202 –Administrative Implementation of the In-Service Inspection Programme during the 3rd Interval at Koeberg Nuclear

			Power Station
			ISIPRM – KBA 0028 NES MA ISI 02
			ISIPRM – KBA 0028 NES MA ISI 02 Module E-RA
			ASME Code Case N-578-1
			EPRI Topical Report TR-112657 and TR-1006837
			Risk-Informed In-Service Inspection Final Report, July 2005
			NNR letter k19973N

Functional Group Lead:	Andrew Ceto	**B4.1**
Functional Group:	Engineering Programmes	
Date Performed:	01 September 2015	

Item:

3.2.2.3.3 Bullets 1: Check if the plant has a process to ensure that ageing mechanisms identified from operating experience and research findings are considered to determine a suitable ISI method in the ISI programmes for SCs important to safety.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The ISI programme consist of effectively two parts that can be identified as Basic scope and Augmented scope. The Basic scope is those requirements that originate from and are based on ASME Section XI as modified by 10CFR50.55a. These follow the requirements from Section XI as it relates to scope, frequency, methodology, acceptance criteria and flaw evaluation etc. The Augmented portion of the ISI programme is additional examinations over and above the Section XI requirements. They are derived from:

- Regulatory Guides, Orders, NUREG's and Generic Letters
- Manufacturer's Recommendations, Operational Experience or Plant Specific Integrity Concerns
- Engineered bases for SSC's for which added assurance of structural reliability is needed
- Engineered bases for alignment with reference plant (EDF)
- Regulatory Authority imposed requirements

Sixteen augmented programmes currently form part of the ISI Programme. The NDE methods used for the interrogation of the integrity concerns described in the augmented modules is based on industry best practise as it relates to the probability of the NDE method to detect the relevant degradation mechanism.

Procedure 331-275 defines the process for the development and control of the Koeberg Ageing Matrix. The ageing mechanisms and the SSCs combinations (commodity groups) that are considered in the KOU ageing management matrix are based on EDF's ageing management matrix that was adapted and populated with KOU specific reference documentation addressing the ageing commodity groups (combination of degradation mechanism and SSC. Due to the EDF reference plant and fleet experience, an assumption was made that for the initial matrix, the ageing concerns of EDF and KOU are similar enough to adopt the EDF matrix and allow for KOU adaptation. The components ageing information is only recorded in the ageing management matrix, listing the ageing couple and the KOU specific reference document addressing the ageing mechanism which in most instances form part of the ISI Programme.

Additionally procedure 331-275 defines the requirement for update and review of the Koeberg Ageing Matrix on a yearly basis to incorporate Koeberg operating experience and taking into account EDF's update of their matrix based on their operating experience. The Koeberg Ageing Matrix is hence considered a living process. The process to ensure that ageing mechanisms are identified from operating experience is established and clear requirements for the update/review frequency of the Koeberg Ageing Matrix is described in procedure 331-275. Review of component failures identified through the Corrective Action Programme is largely complete and additionally strategic plans are in place to ensure close links with EDF is maintained to enable ease of access to EDF operating experience as it relates to Ageing through the secondment of senior engineering staff to be based at EDF.

INPUT REFERENCE DOCUMENTS:

- KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
- ISIPRM – KBA 0028 NES MA ISI 02
- ASME Section XI, 2001 Edition through 2003 Addenda
- 331-275 – Process for the development and control of ageing matrix at KOU
- KAA 688 – The Corrective Action Process

Assessment:

Currently no clear link is documented between the ISIPRM and the Ageing Matrix although the ageing Matrix refers to and credits certain ISIPRM modules as the method to mitigate or manage the degradation mechanism. There is a need for an Ageing Management standard to define the approach taken for Ageing i.e. EDF approach as well as how it links with other Koeberg programmes. There is no clear evidence that ageing mechanisms from research findings are considered in the Koeberg Ageing Matrix which is based on the EDF Ageing matrix. Although procedure 331-275 provides the requirement for annual review of operating experience both internal and external there is a need for an administrative document to define how this requirement is to be met. In fact the stated requirement for annual review of OE should probably not reside in 331-275 but in a higher level document like a standard. 331-275 refers to external OE of EDF only.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Create authorise and publish a Koeberg Ageing Management Standard Refer to WBS 4.	Koeberg SALTO	Q4 2020
2	Create authorise and publish a Koeberg Ageing Management administrative procedure that details responsibilities for implementation of the Ageing Management Standard Refer to WBS 4.	Koeberg SALTO	Q4 2020
3	Evaluate whether the EDF Ageing Management Programme considers ageing mechanisms resulting from research findings and whether these are incorporated in the Koeberg Ageing Matrix Refer to WBS 14.	Koeberg SALTO	Q4 2020
4	Establish the interface between the ageing matrix and the ISI programme. Refer to WBS 4.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Andrew Ceto	**B4.2**
Functional Group:	Engineering Programmes	
Date Performed:	01 September 2015	

Item:

3.2.2.3.3 Bullets 2: Check if ISI programmes are periodically evaluated based on past ISI results, operating experience, new knowledge and research findings

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

As detailed in the Engineering Programme Guide 331-148, responsibility resides with the programme engineers to consider operating experience and research and findings within his/ her programme. Currently Koeberg processes are established to ensure that external operating experience both for EDF reference plant as well as other utilities are made available for review of impact on the ISI programme.

Additionally through the ISI reporting requirements defined in KSA-021 two specific iterations are created whereby the programme engineers periodically review ISI results. These are the Outage Start-up Report which reports on relevant conditions and engineering evaluations performed specific to each outage and the 90 day Outage Summary Report which reports on all ISI related examination results for the relevant fuel cycle.

Additionally the ISI programme engineers through responsibilities defined in 331-148 has established links with industry experts (EDF counterparts, ISI Programme Owners Group etc.) as well as regulatory related subscriptions (NRC Federal Register, NNR etc.) which ensures that industry experience, developments or prescription are timeously reviewed for programme impact.

Internally at Koeberg, the Corrective Action Process (KAA 688) affords the programme engineer an opportunity to review relevant operating experience for programme impact. Similarly, a cross functional review is performed during the modification process for programme impact assessment.

<u>INPUT REFERENCE DOCUMENTS:</u>

- 331-148 – Programme Engineers Guide
- KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
- 331-177 Process and Responsibilities for the Development and Implementation of the In-Service Inspection Programme
- KAA 688 – The Corrective Action Process

Assessment:

Sufficient processes are in place to ensure periodic evaluation of ISI results. For those ISI related requirements considered to be Basic Section XI requirements, strong links as it relates to US implementation of ASME Section XI have been established and changes to code editions, NRC prescription, Reg Guides issue etc. are timeously reviewed for programme impact.

For augmented ISI, the review of previous results forms an essential part of ongoing inspection requirements. Strategic alignment with EDF ensures that available EDF OE is considered for programme impact.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	Andrew Ceto	**B4.3**
Functional Group:	Engineering Programmes	
Date Performed:	01 September 2015	

Item:

3.2.2.3.3 Bullets 3: Verify that the results of the scoping and screening and review of ageing management for LTO are adequately reflected into the existing ISI programmes.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The existing ISI programme is based on two parts i.e. a Basic portion which is based on requirements defined in ASME Section XI and an Augmented portion which is based on additional requirements over and above Section XI. The Augmented portion id typically derived from the following:

- Regulatory Guides, Orders, NUREG's and Generic Letters
- Manufacturer's Recommendations, Operational Experience or Plant Specific Integrity Concerns
- Engineered bases for SSC's for which added assurance of structural reliability is needed
- Engineered bases for alignment with reference plant (EDF)
- Regulatory Authority imposed requirements

The design of the Koeberg Ageing Matrix is based on the EDF Ageing Matrix since the assumption made is that EDF plant as a reference plant and given the large nuclear fleet operating experience allows for good adoption to Koeberg. The components ageing information is recorded in the ageing management matrix, listing the ageing couple and the KOU specific reference document addressing the ageing mechanism.

The ageing management matrix captures all applicable and potential degradation linked to the grouped equipment (called a couple/commodity group).

INPUT REFERENCE DOCUMENTS:

- KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
- ISIPRM – KBA 0028 NES MA ISI 02
- 331-275 – Process for the development and control of ageing matrix at KOU

Assessment:

For this element to be adequately addressed the strategy for LTO Scoping and Screening must be defined. This would give effect to the generation of a Scoping list for LTO. This Scoping list should then be compared to and linked with the Koeberg Ageing Matrix degradation couples. Once this is achieved a review is to be completed to verify whether all Scoping results are adequately reflected or addressed in the existing ISI Programme.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Define the strategy for Scoping and Screening Refer to WBS 1.	Koeberg SALTO	Q3 2016
2	Generate the LTO Scoping list Refer to WBS 3.	Koeberg SALTO	Q1 2017
3	Link Scoping list with existing Ageing Matrix couples Refer to WBS 5.	Koeberg SALTO	Q3 2017
4	Review if all Scoping components are adequately addressed in ISI Programmes Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Andrew Ceto	**B4.4**
Functional Group:	Engineering Programmes	
Date Performed:	01 September 2015	

Item:

3.2.2.3.3 Bullets 4: Whether the plant has evaluated the existing ISI programme for LTO for consistency with the nine attributes.

Current status description and input document reference:

The ISI Programme is developed and maintained based on inputs from the following documents:

KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station, 331-177 Process and Responsibilities for the Development and Implementation of the In-Service Inspection Programme, 331-147 Administration of the Engineering Requirements for the Koeberg In-Service Inspection Programme, ASME Section XI, 2001 Edition through 2003 Addenda.

The programme health monitoring is achieved through implementation of procedure 331-148 – Programme Engineers Guide.

As per the programme guide 331-148, there are five (5) attributes which are incorporated in the programme health report namely, Programme Scope, Programme Requirements and acceptance criteria, Programme Execution, Programme Results Evaluation and Overall Status

INPUT REFERENCE DOCUMENTS:

- 331-148 – Programme Engineers Guide
- KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
- 331-177 Process and Responsibilities for the Development and Implementation of the In-Service Inspection Programme

Assessment:

It is expected that for licensed programmes like ISI that the 9 programme attributes are typically accounted for. It is clear though that the Engineering Programme Guide does not specifically address all the attributes. The programme guide will have to be reviewed and updated to address any shortcomings or improvements in order to align with the nine attributes. This will be addressed under SE 85540 (SE 35189). Additionally for those programmes that do not meet the 9 attributes a decision must be reached whether update of the affected programmes are warranted.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Perform and complete SE 85540 (SE 35189) to sanction the existing programmes against the IAEA 9 programme attributes Refer to WBS 7.	Koeberg SALTO	Q1 2020
2	Update of impacted engineering programmes, if it is decided to improve all programmes to align with the 9 attributes Refer to WBS 7.	Koeberg SALTO	Q1 2020
3	Develop a standardised guide for the development of engineering programmes at KOU	NE-EPG	Q4 2018

Functional Group Lead:	Andrew Ceto	**B4.5**
Functional Group:	Engineering Programmes	
Date Performed:	02 September 2015	

Item:

3.2.2.3.3 Bullets 5: Whether the ISI results are correctly documented (e.g. in a properly maintained database) and provide the technical bases to support the justification for LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Procedure KSA-021, Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station provides the requirements ISI records generation and maintenance. Specifically it states that:

Records of ISI / IST examinations and tests, applicable procedures applied and Reports shall be retained as permanent records for the life of the plant. Such records shall be retained in a manner that allows access by the Regulatory Authority and shall be stored under conditions that will preserve their quality for the life of the plant.

Implementation of this requirement is the responsibility of the line implementation group (I&T). Procedures that control the implementation of this requirement exist and processes for measuring the quality of records generated and retrievability exist. Records are stored in the ISI vault.

INPUT REFERENCE DOCUMENTS:

- KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
- KSA-038 Requirements for Quality Records
- KWR-202 Administrative Implementation of the In-Service Inspection Programme during the 3rd Interval at Koeberg Nuclear Power Station

Assessment:

This element is well managed and meets the assessment criteria

Results:	Meet	x	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Andrew Ceto	**B4.6**
Functional Group:	Engineering Programmes	
Date Performed:	02 September 2015	

Item:

3.2.2.3.3 Bullets 6: Check that ISI programme for SSCs in the scope of LTO clearly identifies the inspection method, the links with ageing management programmes, the frequency, tasks, records and storage

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The existing ISI programme is based on two parts i.e. a Basic portion which is based on requirements defined in ASME Section XI and an Augmented portion which is based on additional requirements over and above Section XI. The Augmented portion id typically derived from the following:

- Regulatory Guides, Orders, NUREG's and Generic Letters
- Manufacturer's Recommendations, Operational Experience or Plant Specific Integrity Concerns
- Engineered bases for SSC's for which added assurance of structural reliability is needed
- Engineered bases for alignment with reference plant (EDF)
- Regulatory Authority imposed requirements

The current ISI Programme clearly defines the applicable inspection method, frequency, tasks, and records and storage.

The design of the Koeberg Ageing Matrix is based on the EDF Ageing Matrix since the assumption made is that EDF plant as a reference plant and given the large nuclear fleet operating experience allows for good adoption to Koeberg. The SSC ageing information is recorded in the ageing management matrix, listing the ageing couple and the KOU specific reference document addressing the ageing mechanism.

The ageing management matrix captures all applicable and potential degradation linked to the SSC grouped equipment (called a couple/commodity group).

INPUT REFERENCE DOCUMENTS:

- KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
- ISIPRM – KBA 0028 NES MA ISI 02
- 331-275 – Process for the development and control of ageing matrix at KOU

Assessment:

Duplication of B4.3

This assessment element assumes that the Scoping is completed and the link between the Ageing Matrix and the ISI Programme is well documented which would allow assessment whether the SSC's in the scope of LTO has clear implementation requirements as it relates to frequency, inspection method etc.

I'm not going to duplicate the assessment or actions from B4.3 but will add a requirement to review the LTO SCC's identified on the Ageing Matrix against the ISI programme to ensure that the implementation requirements i.e. inspection method, frequency, task, etc. is all addressed. Note that the review of programmes against the 9 attributes and specific recovery for those items which lack the 9 attributes will probably also result in the desired outcome.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Perform a review of the ISI programme for the SSCs in the scope of LTO to verify whether the ISI programme clearly identifies the inspection method, the links with ageing management programmes, the frequency, tasks, records and storage Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Andrew Ceto	**B4.7**
Functional Group:	Engineering Programmes	
Date Performed:	02 September 2015	

Item:

3.2.2.3.3 Bullets 7: Verify that the ISI programme has been reviewed and evaluated for effectiveness in detecting and characterizing the degradation mechanisms for SSCs within the scope of LTO. The evaluation should provide a technical basis to justify that the ageing phenomena will be detected in a timely manner with the proposed inspection.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The existing ISI programme is based on two parts i.e. a Basic portion which is based on requirements defined in ASME Section XI and an Augmented portion which is based on additional requirements over and above Section XI. The Augmented portion id typically derived from the following:

- Regulatory Guides, Orders, NUREG's and Generic Letters
- Manufacturer's Recommendations, Operational Experience or Plant Specific Integrity Concerns
- Engineered bases for SSC's for which added assurance of structural reliability is needed
- Engineered bases for alignment with reference plant (EDF)
- Regulatory Authority imposed requirements

The current ISI Programme clearly defines the applicable inspection method, frequency, tasks, and records and storage.

The design of the Koeberg Ageing Matrix is based on the EDF Ageing Matrix since the assumption made is that EDF plant as a reference plant and given the large nuclear fleet operating experience allows for good adoption to Koeberg. The SSC ageing information is recorded in the ageing management matrix, listing the ageing couple and the KOU specific reference document addressing the ageing mechanism.

The ageing management matrix captures all applicable and potential degradation linked to the SSC grouped equipment (called a couple/commodity group).

<u>INPUT REFERENCE DOCUMENTS:</u>

- KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
- ISIPRM – KBA 0028 NES MA ISI 02
- 331-275 – Process for the development and control of ageing matrix at KOU

Assessment:

This assessment element talks to the screening and completion of ageing analysis sheets (EDF). This evaluation must still be performed and will follow the linking of LTO SSC to the Ageing commodity groups or couples. Note EDF Ageing Analysis Sheet applies and Strategic direction is needed on whether this is the manner in which Koeberg will achieve this assessment element.

This is a significant task as all SSC's will have to be assessed to ensure that the degradation mechanism applies and is being effectively managed by the ISI Programme. This action follows actions described in B4.1, B4.3 and B4.6

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Complete an Ageing Analysis sheet for each Ageing Matrix commodity group. Refer to WBS 4.	Koeberg SALTO	Q3 2016
2	Include a customised Ageing Analysis Sheet Template into 331-275 process. Refer to WBS 4.	Koeberg SALTO	Q3 2016

Functional Group Lead:	Andrew Ceto	**B4.8**
Functional Group:	Engineering Programmes	
Date Performed:	02 September 2015	

Item:

3.2.2.3.3 Bullets 8: Verify that the methodology, equipment, and personnel, which are part of the ISI process, have been qualified according to national standards, regulatory requirements, and IAEA recommendations where applicable.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The ISI programme follows ASME for basic scope and Engineered bases for Augmented scope. Additional examinations are also provided for in the augmented scope based on South African regulatory requirements, NRC requirements etc.

Clear standards for methodology, equipment and personnel exist for the ISI Programme as identified in the Reference section of KSA-021.

INPUT REFERENCE DOCUMENTS:

KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
ISIPRM – KBA 0028 NES MA ISI 02

Assessment:

This assessment element is met.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Andrew Ceto	**B4.9**
Functional Group:	Engineering Programmes	
Date Performed:	03 September 2015	

Item:

3.2.2.3.3 Bullets 9 If the plant is using risk informed ISI, verify the related justification. Check if the effectiveness of risk informed ISI has been evaluated, considering limited operational experience of risk informed ISI programmes, and the limitations of the underlying probabilistic analyses of risk informed ISI.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Koeberg implemented at the start of the 3rd Interval a RI-ISI programme for safety class 1 (Cat B-J) and safety class 2 (Cat C-F) welds. The Risk Informed programme is based on ASME Code Case N-578-1 and EPRI Topical Report TR-112657 and TR-1006837, ASME Nonmandatory Appendix R. The Koeberg Risk Informed study is captured in the Risk-Informed In-Service Inspection Final Report, July 2005.

ISIPRM Module E-RA provides the Koeberg specific examination requirements for the RI-ISI programme. Approval for the implementation of the Koeberg RI-ISI programme was achieved through the NNR acceptance of ISI deviation DV-3-ISI-19 as documented in NNR letter k19973N.

INPUT REFERENCE DOCUMENTS:

- KSA-021 Standard for In-Service Inspection Programme at Koeberg Nuclear Power Station
- ISIPRM – KBA 0028 NES MA ISI 02 Module E-RA
- ASME Code Case N-578-1
- EPRI Topical Report TR-112657 and TR-1006837
- Risk-Informed In-Service Inspection Final Report, July 2005
- NNR letter k19973N

Assessment:

This assessment element is met.

Note that this is the NRC Risk Informed (RISI) & not the IAEA version.

Results:	Meet	x	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

AREA B: SCOPING AND SCREENING AND PLANT PROGRAMMES RELEVANT TO LTO

Subsection 3.2.5: Plant Programmes Relevant for LTO/Surveillance and Monitoring.

Functional Group: SPS (Engineering Programmes) **Functional Group Lead:** GM Mdluli

Date Performed: 2015/08/11

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.2.2.4.1	The surveillance and monitoring programmes should be available and properly implemented for the applicable SSCs in the scope of LTO. Surveillance programmes using representative material samples should address degradation mechanisms relevant for LTO. The surveillance programme should confirm the provisions for safe operation that were considered in design. The programme should continue to supply data to be used for assessing the service life of SCs for the planned period of LTO, e.g. through existing or newly installed diagnostic systems. The programme should detect ageing and degradation trends. The programme should also verify that the expected safety margins are maintained during the LTO period. Surveillance programmes using representative material samples addressing degradation mechanisms should be extended or supplemented for LTO, if necessary.	• Surveillance and monitoring programmes as they exist at a given plant; ☐AMPs connected to surveillance and monitoring; • Report on PSR (if it exists).	ISTPRM – KBA 0028 NES MA IST 01 Rev 1c
			ASME OM Code 2001- Code for Operations and Maintenance of Nuclear Power Plants
			SAR - Safety Analysis Report
			OTS - Operating Technical Specifications
			KAA 709 – Process for performing safety screenings, safety evaluations, safety justification and safety cases
			KAA 501 - Project Management Process for Koeberg Nuclear Power Station Modifications
			Nureg 1482 - Guidelines for Inservice Testing at Nuclear Power Plants
			KAA 688 – The Corrective Action Process
			KAA 501 - Project Management Process for Koeberg Nuclear Power Station Modifications
			NRC website, Appendix J database, ISTOG database
			SRSM – KBA-0022-SRSM-000-00- Safety

			Related Surveillance Manual
			331-148 – Programme Engineers Guide
			331-289– Ageing of Electrical Cables
			331-127– Cable Ageing Management Programme at Koeberg Operating Unit
			331-249– Reactor Vessel Surveillance Programme
			331-252– Pressurised Thermal Shock
			KAA-671– Management of License Binding Civil Surveillances at Koeberg Nuclear Power Station
			KWU-DE-021– Structural Integrity Of Containment Structures Procedure
			KWU-DE-020– Long-Term Monitoring Of Aseismic Bearings
			KWU-DE-016– Long Term Monitoring Of The Soil Cement Sub-Foundation
			KWU-DE-015– Load Monitoring Of Aseismic Sample Bearings

Functional Group Lead:	GM Mdluli	B5.1
Functional Group:	EPG	
Date Performed:	2015/08/14	

Item:

3.2.2.4.3 Bullets 1: *Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing surveillance and monitoring programmes.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The components within the scope of the ISTPRM are pumps and valves which are classified as ASME Code Class 1, 2, 3, and MC. The scope must meet the in-service test requirements as set forth in the ASME OM Code.

Because the ISTPRM is continuously revised every 120 months throughout the operating license period, the entire scope remains monitored over the operating license period. The results are trended to proactively identify degradation prior to failure occurring, or applied to assess the current condition of a component and facilitate future predictions such as refurbishment. The captured results are then documented and saved in the IST database.

The Safety Related Surveillance Manual (SRSM) defines the objective of the periodic test programme and specifies the scope and validity of the periodic test requirements. It further describes the principles for periodic testing and defines the form and manner in which periodic testing is performed. SSCs that perform safety functions are subject to the periodic test programme.

To ensure that the designed level of safety is maintained, the periodic test programme provides

assurance that:

- there have been no adverse changes to the reference design;
- the plant remains compliant with the assumptions made for the SAR accident studies;
- the operability (performance and reliability criteria) for protection and safeguard SSCs are
- verified;
- the availability and operability (performance and reliability criteria) of safety significant
- SSCs required by the incident and accident procedures are verified.

<u>INPUT REFERENCE DOCUMENTS:</u>

- ISTPRM – KBA 0028 NES MA IST 01 Rev 1c.
- ASME OM Code 2001- Code for Operations and Maintenance of Nuclear Power Plants
- 331-148 – Programme Engineers Guide
- SRSM – KBA-0022-SRSM-000-00- Safety Related Surveillance Manual

Assessment:

The ISTPRM provides continued monitoring of the selected scope regardless of an LTO. There is no link between the aging matrix & IST. This is a shortfall, which will be addressed through the SE 85540 (SE 35189).

Not all the fire systems meet the IST selection criteria. However, fire systems are covered under SRSM

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Formalise the link between ageing matrix and IST. Refer to WBS 4.	Koeberg SALTO	Q3 2016
2	Review of the Engineering Programmes architecture to align to the LTO initiative. Refer to WBS 4.	Koeberg SALTO	Q3 2016
3	Review the IST selection criteria for fire systems to ensure that the required fire systems are catered for under the IST programme. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	GM Mdluli	**B5.2**
Functional Group:	EPG	
Date Performed:	2015/08/13	

Item:

3.2.2.3.3 Bullets 2: *Whether the plant has evaluated the existing surveillance and monitoring programme for LTO for consistency with the nine attributes.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

As per the programme guide 331-148, there are five (5) attributes which are incorporated into the programme health report namely, Programme Scope, Programme Requirements and acceptance criteria, Programme Execution, Programme Results Evaluation and Overall Status.

INPUT REFERENCE DOCUMENTS:

- 331-148 – Programme Engineers Guide
- SRSM – Safety Related Surveillance Manual

Assessment:

The programme guide will have to be reviewed and address any shortcomings or improvements in order to align with the nine attributes. This will be addressed under Self Evaluation (SE) 85540 (SE 35189).

Following the completion of SE 85540 (SE 35189), list the attributes that need to be incorporated

Evaluate SRSM for consistency with the nine attributes.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Review of the Engineering Programmes architecture to align to the LTO initiative (List the attributes that need to be incorporated.) Refer to WBS 7.	Koeberg SALTO	Q1 2020
2	Evaluate SRSM for consistency with the nine attributes. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	GM Mdluli	**B5.3**
Functional Group:	EPG	
Date Performed:	2015/08/11	

Item:

3.2.2.4.3 Bullets 3: *Whether the programmes confirm the provisions for safe operation that were considered in design.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The intent of the ISTPRM is to establish assurance on the operability readiness of safety related components under all design basis conditions. This assurance is established by means of a variety of periodic surveillances. The operability readiness statement confirms that the design basis safety functions of IST components remain within acceptable limits.

The acceptance limits established for IST components are based on OM code provisions or limits specified in Technical Specifications, SAR, protection files, or other licensing bases, whichever are more conservative. Acceptance limits are derived from ranges or multiples of reference values in the OM code to ensure limits specified in the licensing basis are not exceeded. When results do not meet the acceptance limits, an evaluation is performed to identify the cause of the unacceptable performance and appropriate corrective actions are taken. Actions include corrective maintenance measures such as adjustment, repair or replacement of defective items to prevent recurrence.

The In-Service Testing Programme Requirements Manual (ISTPRM) establishes testing and examination requirements to assess the operational readiness of certain components important to nuclear safety. These requirements apply to:

- pumps and valves required to perform a specific function in shutting down the reactor to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident;
- pressure relief devices that protect systems or portions of systems that perform one or more of these three functions;
- dynamic restraints (snubbers) used in systems that perform one or more of these three functions or to ensure the integrity of the reactor coolant pressure boundary.

Generally, components within the scope of this ISTPRM are ASME Code Class 1, 2, 3, and MC. Other components whose function is credited in the Safety Analysis Report (SAR) or Operating Technical Specifications (OTS) are also included in the scope.

The Safety Related Surveillance Manual (SRSM) defines the objective of the periodic test programme and specifies the scope and validity of the periodic test requirements. It further describes the principles for periodic testing and defines the form and manner in which periodic testing is performed. SSCs that perform safety functions are subject to the periodic test programme.

To ensure that the designed level of safety is maintained, the periodic test programme provides assurance that:

- there have been no adverse changes to the reference design;
- the plant remains compliant with the assumptions made for the SAR accident studies;

- the operability (performance and reliability criteria) for protection and safeguard SSCs are
- verified;
- the availability and operability (performance and reliability criteria) of safety significant
- SSCs required by the incident and accident procedures are verified.

INPUT REFERENCE DOCUMENTS:

- ISTPRM – KBA 0028 NES MA IST 01 .
- ASME OM Code 2001- Code for Operations and Maintenance of Nuclear Power Plants
- SAR - Safety Analysis Report
- OTS - Operating Technical Specifications
- KAA 709 – Process for performing safety screenings, safety evaluations, safety justification and safety cases
- KAA 501 - Project Management Process for Koeberg Nuclear Power Station Modifications
- SRSM – Safety Related Surveillance Manual

Assessment:

Meet.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	GM Mdluli	**B5.4**
Functional Group:	EPG	
Date Performed:	2015/08/11	

Item:

3.2.2.4.3 Bullets 4: *Whether the surveillance and monitoring programmes remain effective for assessing the service life of SSCs and supporting safe LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The intent of the ISTPRM is to establish assurance on the operability readiness of safety related components under all design basis conditions. This assurance is established by means of a variety of periodic surveillances. The operability readiness statement confirms that the design basis safety functions of IST components remain within acceptable limits.

The acceptance limits established for IST components are based on OM code provisions or limits specified in Technical Specifications, SAR, protection files, or other licensing bases, whichever are more conservative. Acceptance limits are derived from ranges or multiples of reference values in the OM code to ensure limits specified in the licensing basis are not exceeded. When results do not meet the acceptance limits, an evaluation is performed to identify the cause of the unacceptable performance and appropriate corrective actions are taken. Actions include corrective maintenance measures such as adjustment, repair or replacement of defective items to prevent recurrence.

General principles for SRSM are applied in testing to ensure that safety related surveillance remain effective for assessing the service life of SSCs. (See SRSM- KBA-0022-SRSM-000-00 - Safety Related Surveillance Manual)

INPUT REFERENCE DOCUMENTS:

- ISTPRM – KBA 0028 NES MA IST 01 Rev 1c.
- ASME OM Code 2001 – Code for Operations and Maintenance of Nuclear Power Plants
- SAR - Safety Analysis Report
- OTS - Operating Technical Specifications
- Nureg 1482 - Guidelines for Inservice Testing at Nuclear Power Plants
- 331-148 – Programme Engineers Guide
- SRSM- KBA-0022-SRSM-000-00 - Safety Related Surveillance Manual

Assessment:

Continued monitoring is performed using different periodic testing procedures. IST related sections have a specific paragraph with a heading ‘Corrective action’ which specifies the requirements to demonstrate component operability. The process is initiated if the acceptance criteria are not met or when a deviation is noted. A component shall be evaluated to determine its ability to perform its intended function until the next testing interval or maintenance opportunity. Additionally, trending is performed to provide an indication for possible degradation prior to component failure. Even though the requirements are driven by the ISTPRM, the evaluation process resides with Plant Engineering as referenced in 331-148.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	GM Mdluli	**B5.5**
Functional Group:	EPG	
Date Performed:	2015/08/11	

Item:
3.2.2.4.3 Bullets 5: *Review if plant surveillance and monitoring programmes consider feedback on operating experience and research results and findings.*

Current status description and input document reference:
(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

As detailed in the Programme Guide 331-148, it is the programme engineer's responsibility to consider operating experience and research and findings within his/ her programme. Currently Koeberg (IST) is a member of the in-service testing owners group (ISTOG) and Appendix J platforms whereby information is exchanged on Code interpretations, and utility benchmarking, etc. In addition, the NRC website is also used for review of approved code cases and any further developments for ASME Code editions.

Internally at Koeberg, the Corrective Action Process (KAA 688) is followed whereby the programme engineer is given an opportunity to review the operating experience and if applicable programme will be updated accordingly. Similarly, a cross functional review is performed during the modification process for programme impact assessment.

Continued monitoring is also used to identify failures, malfunctions of components or timing of maintenance activities, etc.

INPUT REFERENCE DOCUMENTS:

- *331-148* – Programme Engineers Guide
- *ASME OM Code 2001* – Code for Operations and Maintenance of Nuclear Power Plants
- *ISTPRM* – KBA 0028 NES MA IST 01 Rev 1c
- *Nureg 1482* - Guidelines for Inservice Testing at Nuclear Power Plants
- KAA 688 – The Corrective Action Process
- KAA 501 - Project Management Process for Koeberg Nuclear Power Station Modifications
- NRC website, Appendix J database, ISTOG – database
- SRSM – KBA-0022-SRSM-000-00- Safety Related Surveillance Manual

Assessment:

The use of operating experience is utilised within the IST to ensure that issues such as degradation, design deficiencies are adequately addressed and will result in programme update.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Andrew Ceto	**B5.6**
Functional Group:	**Engineering Programmes**	
Date Performed:	**05 September 2015**	

Item:

3.2.2.4.3 Bullets 6: *Whether the plant implemented supplementary LTO related surveillance programme, such as reactor pressure vessel supplementary surveillance programme, controlled ageing management programmes for cables, surveillance programme of concrete etc.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Various surveillance programmes are in existence or have been created not specifically through LTO initiatives but through Koeberg review of industry operating experience or licensing commitments etc. These programmes can however be considered related to LTO as they are not limited to 40 years.

Examples are:

- Cable Ageing Management Programme
- Reactor Vessel Surveillance Programme
- Civil Monitoring Surveillance Programme

INPUT REFERENCE DOCUMENTS:

- 331-289 Ageing of Electrical Cables
- 331-127 Cable Ageing Management Programme at Koeberg Operating Unit
- 331-249 Reactor Vessel Surveillance Programme
- 331-252 Pressurised Thermal Shock
- KAA-671 Management of License Binding Civil Surveillances at Koeberg Nuclear Power Station
- KWU-DE-021 Structural Integrity Of Containment Structures Procedure
- KWU-DE-020 Long-Term Monitoring Of Aseismic Bearings
- KWU-DE-016 Long Term Monitoring Of The Soil Cement Sub-Foundation
- KWU-DE-015 Load Monitoring Of Aseismic Sample Bearings

Assessment:

This area can be considered a partial meet as the AMR review has yet to be conducted to identify supplementary amps.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Review IGALL AMRs to identify supplementary LTO amps. Refer to WBS 7.	Koeberg SALTO	Q1 2020

AREA B: SCOPING AND SCREENING AND PLANT PROGRAMMES RELEVANT TO LTO

Subsection 3.2.6: Plant Programmes Relevant for LTO/Monitoring of Chemical regimes.

Functional Group: Nuclear Support / Engineering

Functional Group Lead: Nestor van Eeden

Date Performed: 2015-09-01

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.2.2.5.1	Controlling chemistry is important and should be used to minimize the harmful effects of chemicals, chemical impurities and corrosion on plant systems for LTO. The operating organization should review its water chemistry programme to ensure that it is effective in maintaining water quality as required by technical specifications and is consistent with the nine attributes. The chemistry programme should specify scheduling, analytic methods used to monitor chemistry and verification of the effectiveness of the chemistry programme. The chemistry programme should also provide the necessary chemical and radiochemical assistance to ensure safe operation, the integrity of SCs during the original design lifetime and planned period of LTO, and control and reduction of radiation levels in working areas.	• The water chemistry programme at the plant; ☐ AMPs connected to water chemistry; • Report on PSR (if it exists).	KSC-003-The Chemistry Programme Koeberg Power Station Chemistry FROG WG Report Koeberg Power Station Chemistry EPRI TSG Report KBA0022CHEMSPEC00-Koeberg Chemistry Specifications KNC-001-Chemistry Operating Specifications for Safety Related Systems KNC-002-Chemistry Operating Specifications for Availability Related Systems KSC-006-Chemistry Standards and Expectations KGT-054-Chemistry Training Programme KAC-029-Reporting of Chemistry Results NPC Paper: Optimisation of Ethanolamine Treatment of a PWR Secondary System

Functional Group Lead:	Nestor van Eeden	**B6.1**
Functional Group:	Nuclear Support / Engineering	
Date Performed:	2015-09-01	

Item:

3.2.2.5.3 Bullets 1: *Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing chemistry programme.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The chemistry programme is described in KSC-003. The chemistry programme covers chemical control, monitoring, quality assurance, administration and training. The procedures associated with each of these aspects are listed in this document.

Primary plant chemistry control is supported by the EPRI Pressurised Water Reactor Primary Water Guidelines Revision 7. A modified elevated pH programme has been established and implemented since 2010 (Cycles 119 and 218), aimed at a target pH of 7.25 (at operating temperature) while also respecting the fuel vendor limit on lithium concentration at the beginning of cycle. This regime supports long-term-plant-health since elevated pH reduces corrosion and corrosion product transport. Corrosion initiating impurities (e.g. chloride and fluoride) are maintained within target limits in the reactor coolant, spent fuel pool system and make-up water systems. A hydrogen overpressure is maintained on the primary system to ensure reducing conditions during power operations. Since 2014/2015 (Cycles 121 / 221) depleted zinc acetate has been added to the reactor coolant to reduce out-of-core radiation fields and this modern technology also is mitigation for primary water stress corrosion cracking initiation. The technical specification control parameters are listed in KBA0022CHEMSPEC00 with limit values, action levels, surveillance frequencies and the document also contains the actions to take when a parameter limit value is exceeded. The diagnostic parameters with limit values, target values and analysis frequencies are listed in KNC-001.

Secondary plant chemistry is controlled by adding volatile alkalising agents to prevent general corrosion of the carbon steel feedtrain and by maintaining low dissolved oxygen to protect the steam generator nickel-alloy tubing material. During 2000 both units began advanced amine treatment by injecting ethanolamine into the feedwater to reduce flow accelerated corrosion in the two phase regions such as the moisture separator reheaters and the bled steam lines. In 2013 this regime was optimised based on Koeberg operating experience and taking into account international practices (Optimisation Ethanolamine Treatment of a PWR Secondary System, Nuclear Power Chemistry Conference, Paris, 2012). Steam generator secondary chemistry technical specification controls include monitoring of cation conductivity and sodium. Actions to take when these limit vales are exceeded are listed in KBA0022CHEMSPEC00. Diagnostic parameters are listed in KNC-001. The condensate polishing plant is always available to clean-up the secondary water and protect the SGs from impurity ingress should this occur. The Station complies with the WANO Chemistry Performance Indicator limit values and the INPO Chemistry Effectiveness Indicator values.

Plant chemistry is strictly controlled during all operating domains including startup and shutdown of units and for periods on non-operation (e.g. outage). These controls are documented in: KWC-CH-001 chemistry control of a unit during startup from normal cold shutdown to full power operation, KWC-CH-

002 preparation of the feedwater plant for staring up a unit after shutdown, KWC-CH-003 steam generator hide-out return sampling and analysis, KWC-CH-004 chemical control of a unit during shutdown, KWC-CH-005 secondary system and steam generator conservation, KWC-CH-006 chemistry procedure for degassing and oxygenation of the primary circuit, KWC-CH-007 feedwater pump flushing, KWC-CH-008 chemistry control from hot shutdown conditions to full power operation.

All chemistry specifications of plant systems are documented and there is a process to manage specification non-compliance (KAA-688, The Corrective Action Process). Chemistry results from plant-installed on-line-analysers and laboratory grab sampling are recoded in the laboratory information management system (LIMS) database. The system provides indications for out of specification parameters. All analysis methods are trended by statistical process control which is documented in the analytical chemistry quality control programme (KCS-004)

The ageing management review, scoping and screening for LTO have not been completed.

INPUT DOCUMENT REFERENCE:

- - KSC-003: The Chemistry Programme (and documents listed therein)

Assessment:

The chemistry strategy is focussed on extending component and system operational life for as long as possible, however, an ageing management review, scoping and screening for LTO has not been completed. Only after that can the review of the chemistry programme be done.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Ageing management review and scoping and screening for LTO Refer to WBS 6.	Koeberg SALTO	Q1 2020
2	Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing chemistry programme. Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Nestor van Eeden	**B6.2**
Functional Group:	Nuclear Support / Engineering	
Date Performed:	2015-09-01	

Item:

3.2.2.5.3 Bullets 2: *Whether the plant has evaluated the chemistry programme for LTO for consistency with the nine attributes.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The plant has not yet evaluated the chemistry programme for consistency with the nine attributes.

(a) A defined programme scope. The scope of the programme is the specific SCs subject to an ageing management review.

There is a defined scope. As mentioned previously, the aging management review is not yet completed; however, the primary plant chemistry regime is targeted at protecting the steam generator tube material, Inconel 600. The secondary regime protects the feedtrain, SGs (shell), turbine, moisture separator reheaters, bled-steam lines and condenser.

(b) Identification of preventive and mitigatory actions and of parameters to be monitored or inspected. Actions to prevent or mitigate ageing degradation and parameters to be monitored or inspected for the intended functions of the particular structure or component are identified.

Mitigation actions and parameters to be monitored are identified and applied. For example, advanced amine treatment with ethanolamine (ETA) is specifically applied to mitigate the aging effects of flow accelerated corrosion (FAC) of secondary plant SCs. ETA concentration, pH, conductivity and corrosion product transport are monitored under a specific documented surveillance programme.

(c) Detection of ageing degradation/effects. Ageing effects need to be detected before there is a loss of the intended functions of a structure or component. The method or technique (i.e. visual, volumetric, surface inspection), frequency, sample size, data collection and timing of new/one time inspections need to be addressed to ensure timely detection of ageing effects.

This item is met since the on-line and analytical chemistry routine surveillance is intended to detect any change in plant chemistry that could cause accelerated aging degradations/effects and to provide early indications of deteriorating conditions. Analysis methods, analysis frequency, sampling methods, sampling locations and data collection are defined

(d) Monitoring and trending, including frequency and methodologies. Monitoring and trending provide predictability of the extent of degradation, and make possible timely corrective or mitigatory actions.

Plant chemistry conditions are monitored by continuous on-line analysis and a laboratory grab-sampling routine which are trended by the personnel at the production meeting by analysis of the LIMS graphs. Indications of deteriorating conditions are noted and the corrective action process is applied. The frequency and methodologies are defined.

(e) Acceptance criteria. The need for corrective action evaluated against acceptance criteria, to ensure that the intended functions of a structure or component are maintained under all CLB conditions throughout the planned period of LTO.

All chemical analysis parameters have limit values (acceptance criteria) to ensure that the SCs chemical regime is maintained within the limits and to take action when the limit values are exceeded. In addition, there are conservative target values applied which provides a margin from the limit values to allow corrective action pre-emptively thereby preventing exceeding the system limit values where possible. The chemical programme caters for all plant operation and non-operational modes.

(f) Corrective actions if a component fails to meet the acceptance criteria. Corrective actions, including root cause determination and prevention of recurrences, need to be timely.

When a chemical analysis parameter exceeds the limit values (acceptance criteria), the corrective action process is applied and the condition is investigated and corrected as soon as practical. Where deemed necessary, a formal root cause determination and corrective actions to prevent recurrences are applied as part of the process.

(g) Confirmation that required actions have been taken. A confirmation process ensures that preventive actions are adequate and that appropriate corrective actions have been completed and are effective.

Chemistry corrective actions are reviewed for effectiveness.

(h) Administrative controls that document the programme's implementation and actions taken. Administrative controls provide a formal review and approval process.

Actions taken are recorded in the investigation reports and on LIMS.

(i) Operating experience feedback. Operating experience of the ageing management programme, including past corrective actions resulting in programme enhancements or additional programmes, provides objective evidence to support the conclusion that the effects of ageing will be managed adequately so that the intended functions of a structure or component will be maintained throughout the planned period of LTO.

Plant chemical conditions are optimised by using operating experience feedback this is included into the chemistry programme. E.g., the previously mentioned optimisation of ETA control and the secondary plant. Also international best practices are applied, e.g. elevated pHT and zinc application on the primary system. These are all examples of programme enhancements.

The chemistry programme is explained in KSC-003. The chemistry programme covers chemical control, monitoring, quality assurance, administration and training. The procedures associated with each of these aspects are listed in this document.

INPUT REFERENCE DOCUMENTS:

- - KSC-003: The Chemistry Programme (and documents listed therein)

Assessment:

The chemistry programme has not been evaluated for consistency with the nine attributes.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Evaluate the chemistry programme for consistency with the nine attributes. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Nestor van Eeden	**B6.3**
Functional Group:	Nuclear Support / Engineering	
Date Performed:	2015-09-01	

Item:

3.2.2.5.3 Bullets 3: *Whether feedback of operational experience and research results / findings justifies the chemistry programme.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

KNPS is a member of the EPRI Chemistry PWR Technical Strategy Group and the Framatome Owners Group (FROG) for Chemistry. Through participation in these memberships it can be accurately judged that the primary and secondary chemistry specifications and practices are aligned to international norms. Benchmarking is noted and actions to implement are described in the workgroup reports. Actions are presented to the plant chemistry technical review committee for consideration and implementation. Chemistry mandatory technical specifications are in KBA0022CHEMSPEC00.

INPUT DOCUMENT REFERENCE:

- Koeberg Power Station Chemistry FROG WG Report;
- Koeberg Power Station Chemistry EPRI Technical Strategy Group Report;
- KBA0022CHEMSPEC00: Koeberg Chemistry Specifications

Assessment:

The Station participates in the international chemistry workgroups which allows comparison and alignment to industry practices taking into account research and operating experience.

Results:	Meet	X	Don’t Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Nestor van Eeden	**B6.4**
Functional Group:	Nuclear Support / Engineering	
Date Performed:	2015-09-01	

Item:

3.2.2.5.3 Bullets 4: *Check if the plant chemistry programme has been reviewed with respect to LTO and modified if applicable.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Primary and secondary plant chemistry strategy has been modified in-line with industry practice to respect extended operation. The parameters target values and limit values and surveillance frequencies are described in the plant chemistry specification documents KNC-001 and KNC-002.

Primary chemistry: Modified elevated pH has been implemented to reduce corrosion and zinc injection has been implemented to reduce build-up of radiocobalt source term.

Secondary chemistry: Has been optimised with advanced amine treatment agent to condition both the water and steam.

INPUT REFERENCE DOCUMENTS:

- KNC-001: Chemistry Operating Specifications for Safety Related Systems;
- KNC-002: Chemistry Operating Specifications for Availability Related Systems

Assessment:

The longer term focus of the chemistry programme is reflected in the specification documents but has not been documented as a strategy / strategic plan.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	The chemistry programme is to be reviewed for LTO and modified, where applicable. Refer to WBS 7.	Koeberg SALTO	Q1 2020
2	Document the chemistry strategies in a Strategic Plan	Nuclear Support	

Functional Group Lead:	Nestor van Eeden	**B6.5**
Functional Group:	Nuclear Support / Engineering	
Date Performed:	2015-09-01	

Item:

3.2.2.5.3 Bullets 5: *Verify that chemistry staff is aware of implications of chemistry parameters on known aspects which could adversely impact safety during LTO (such as corrosion, erosion, inter-granular stress corrosion cracking, primary water stress corrosion cracking of SCs within the scope of LTO).*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Chemistry staff is trained according to the training curricular and are at various levels of knowledge related to their role and experience. Therefore the relevant staff is aware of the implications which could adversely impact safety during extended operation. Chemistry standards and expectations are in KSC-006 and the training curricula and continuing training is described in KGT-054. KSC-006 describes the standards and expectations for the Chemistry Group, to ensure that activities are conducted in an effective, consistent and professional manner. KGT-054 provides chemistry personnel with an integrated view of the programme's related initial and continuing training components and requirements.

INPUT REFERENCE DOCUMENTS:

- KSC-006: Chemistry Standards and Expectations;
- KGT-054: Chemistry Training Programme

Assessment:

Relevant staff is aware of the implications which could adversely impact safety during extended operation.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	Nestor van Eeden	**B6.6**
Functional Group:	Nuclear Support / Engineering	
Date Performed:	2015-09-01	

Item:

3.2.2.5.3 Bullets 6: *Whether new findings and conclusions coming from e.g. surveillance and ageing management are being considered in updating plant chemistry programme and appropriate interface is established.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The current chemistry strategy is aligned to extended operation. New findings and conclusions coming from e.g. surveillance and ageing management are considered in updating plant chemistry practices. The secondary chemistry was optimised for ethanolamine treatment based on operating experience and the work was presented as a paper at the Nuclear Power Plant Chemistry Conference.

INPUT REFERENCE DOCUMENTS:

- NPC Paper: Optimisation of Ethanolamine Treatment of a PWR Secondary System

Assessment:

New findings are considered in updating the plant chemistry practices. Interface between Engineering and Chemistry exists but can be improved. Interface is ad-hoc rather than a formal arrangement.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Formalise interface between Engineering and Chemistry Refer to WBS 4.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Nestor van Eeden	**B6.7**
Functional Group:	Nuclear Support / Engineering	
Date Performed:	2015-09-01	

Item:

<u>3.2.2.5.3 Bullets 7</u>: *Whether the chemistry practices are in compliance with technical specifications, consistent with international good practices and take into account the materials concept appropriately.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

There is a document that stipulates the mandatory Chemistry and Radiochemistry specifications, their limiting values, surveillance frequencies, as well as the actions to take when a parameter is exceeded (KBA0022CHEMSPEC00). This document defines the regulatory Chemistry and Radiochemistry specifications and surveillance requirements of plant systems at KNPS to provide assurance that nuclear safety is not compromised by adverse chemical conditions. These chemistry technical specifications are documented and complied with.

<u>INPUT REFERENCE DOCUMENTS:</u>

- KBA0022CHEMSPEC00: Koeberg Chemistry Specifications

Assessment:

Chemistry technical specifications are documented and complied with.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

<u>No</u>	<u>Action Description</u>	<u>Lead</u>	<u>Due Date</u>

Functional Group Lead:	Nestor van Eeden	**B6.8**
Functional Group:	Nuclear Support / Engineering	
Date Performed:	2015-09-01	

Item:

3.2.2.5.3 Bullets 8: *Confirm that the chemistry programme includes the diagnostic parameters that provide useful information for determining and preventing the cause of unexpected ageing.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Plant chemistry specification documents include diagnostic parameters that provide useful information for determining the cause of unexpected problems. Diagnostic parameters are described in the specification documents (KNC-001 and KNC-002) and the reporting of chemistry results is described in KAC-029. KNC are the plant working documents which provide the target ranges for the conditioning chemicals and limit values for impurities. KAC-029 explains the process to be followed and the responsibilities of personnel for reporting results.

INPUT REFERENCE DOCUMENTS:

- KNC-001: Chemistry Operating Specifications for Safety Related Systems;
- KNC-002: Chemistry Operating Specifications for Availability Related Systems;
- KAC-029: Reporting of Chemistry Results

Assessment:

Diagnostic parameters with action levels and limit values are well described in the chemistry documents. A condition report is raised if non-compliance is found and the situation is investigated and corrected.

Results: Meet [×] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
	None		

AREA C: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR MECHANICAL COMPONENTS

Subsection 3.3.1: Area-specific scoping and screening of SSCs for LTO.

Functional Group: Engineering Programmes

Functional Group Lead: Andrew Ceto

Date Performed: 31 August 2015

Ref	Expectations	Input Data Required	Documentation Reference
\\SPRG P3.3.1.1	A systematic process should be used to determine which SCs are to be included in the scope of evaluation for LTO. SCs determined to be within the scope of LTO should be subject to a screening process to determine which SCs are subject to revalidation of time limited ageing analyses and which SC's are subject to ageing management review. The plant should establish specific screening methods for mechanical components, electrical and I&C components and civil structures. A complete list of SCs in the scope of LTO should exist and determine boundaries between mechanical, electrical, I&C components and civil structures. The insights from deterministic safety analyses and the plant specific PSA results (if available) should be used to determine SSCs not important to safety failure of which may impact safety functions. Other methods used to identify those SSCs include plant walk downs and identification of compartments that house safety and non-safety related equipment.	• Plant procedures on methodology of SCs scoping and screening; • Plant procedure to identify SCs not important to safety within the scope; • List of SCs classification; • List/ database of SCs within the scope of LTO; • List/ table / database of SCs which shows the result of the screening; • Drawings which show boundaries of the scope (normally piping and instrument diagrams (P&IDs) with colour identifications).	331-123 (KSA 010) - Nuclear Safety, Seismic, Environmental, Quality And Importance Classification. 331-94 (KLA-001) – Importance Category Classification Listing 331-275 – Process for the development and control of ageing matrix at KOU

Functional Group Lead:	J Venter		**C1.1**
Functional Group:	SDE		
Date Performed:	August 2015		

Item:

3.3.1.3 Bullets 1: *Verify if the master list of plant SCs is available and identify all items in scope of LTO and out of scope of LTO.*

Current status description and input data document reference:

In accordance with the LTO methodology, SAP equipment listing is the master list & items for the scope of LTO which have an importance classification of SR & CSR and a seismic classification of ND.

INPUT REFERENCE DOCUMENTS:

- 331-94 (KLA-001) Importance listing

Assessment:

The matrix and importance listing does include all SCs.

Importance listing classifies all cranes as NSA, but certain cranes require evaluation.

IAEA pub. 1340 requires all SSCs that are not routinely replaced, are subject to evaluation.

SALTO scope of SCs not clearly defined or methodology documented. Currently in progress.

Results:	Meet		Don't Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	LTO methodology document to be compiled. Refer to WBS 1.	Koeberg SALTO	Q3 2016
2	KLA-001 to be updated to incorporate seismic study & flooding study items to "SR", making KLA-001 the full scoping list. Refer to WBS 3.	Koeberg SALTO	Q1 2017
3	Verify the historical importance classifications in KLA-001 (older than 10 years) align to the requirements in current KSA-010. Refer to WBS 3.	Koeberg SALTO	Q1 2017

Functional Group Lead:	K Lukusa	**C1.2**
Functional Group:	System Design Engineering	
Date Performed:	2015-08-27	

Item:

3.3.1.3 Bullets 2: *Verify if the scope of SCs for LTO is complete, documented and fulfilling scoping criteria.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

The importance category of SCs is determined by 331-94 Importance Category Classification Listing (KLA 001). This importance classification was later added by the nuclear power plant operator. The safety related systems are defined in the SAR and their importance categories are defined in KLA 001.

INPUT REFERENCE DOCUMENTS:

- 331-94 Importance Category Classification Listing (KLA 001)
- SAR Safety Analysis Report
- KSA-010 Rev 0a Nuclear Safety, Seismic, Environmental, Quality And Importance Classification
- KBA 1222E10004 Koeberg Equipment List For BNI Mechanical Equipment
- KBA 1222E10002 Koeberg Equipment Classification (Mechanical)
- KBA 0022D02204 Classification Of Nuclear and Non-Nuclear Safety Related Equipment in CGEE Alsthom Scope of Supply

Assessment:

Koeberg has not documented the strategy of SCs scope for LTO. However, Koeberg is in possession of most documents required to perform such exercise.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Document the scope of mechanical SCs for LTO. Refer to WBS 3.	Koeberg SALTO	Q1 2017

Functional Group Lead:	Alan Lawrence	**C1.3**
Functional Group:	IPD-K	
Date Performed:	24 August 2015	

Item:

3.3.1.3 Bullet 3: *Verify if SCs to prevent / mitigate design extension conditions are within the scope of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

For all plant functions, systems, structures, services, processes, software, components and parts at Koeberg Nuclear Power Station a classification process is used to determine their respective:

Importance category

Nuclear safety class

Seismic class

Environmental category

Quality level

Safety level

Importance Category defines the importance of functions, systems, processes, components, structures, services and software, pertaining to nuclear safety and plant availability.

Safety Class defines the impact on nuclear safety of functions, systems, components, structures, parts and software in accordance with the criteria defined in ANSI/ANS N18.2-1973 and IEEE 308-1971 for mechanical and electrical requirements respectively.

Seismic Class defines the functional or structural integrity required in the event of a Design Base Earthquake.

Environmental Category defines the nuclear environment in which components, structures and their parts are required to operate.

Quality Level defines the level of oversight required by Eskom during the design, manufacturing and procurement phases due to nuclear and/or technical requirements.

Safety Level defines the management system and other requirements of organisations providing products to KNPS in accordance with the requirements of RD-0034.

As governed by KSA-010, the document KLA-001 is a listing of the SSCs and their respective importance category.

INPUT REFERENCE DOCUMENTS:

- 331-94 (KLA-001) – Importance Category Classification Listing
- KSA-010 - Nuclear Safety, Seismic, Environmental, Quality And Importance Classification
- 331-93 (KGA-003) – Guide For Classification of Plant Components, Structures and Parts
- 331-275 – Process for the Development and Control of Ageing Management Matrix at KOU
- RD-0034 – Quality and Safety Management Requirements for Nuclear Installations

Assessment:

The importance category listing, 331-94, does not identify SSCs required to prevent / mitigate design extension conditions.

The KOU classifications standard and guide, KSA-010 and 331-93 respectively, do not define a methodology to determine / identify SSCs required to prevent / mitigate design extension conditions.

The SSCs required to prevent / mitigate design extension conditions have not been identified and are consequently not confirmed to be in the LTO scope.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Revise KSA-010 and 331-93 to include the necessary classification changes to ensure that SSCs required to prevent / mitigate design extension conditions are identified. Refer to WBS 3.	Koeberg SALTO	Q1 2017
2	Revise 331-94 (KLA-001) to include all SSCs identified to prevent / mitigate design extension conditions. Refer to WBS 3.	Koeberg SALTO	Q1 2017
3	Ensure that the SSCs identified to prevent / mitigate design extension conditions are within the scope of LTO. Refer to WBS 1.	Koeberg SALTO	Q3 2016

Functional Group Lead:	Andrew Ceto (L Uys)	C1.4
Functional Group:	SDE	
Date Performed:	2015-08-20	

Item:

3.3.1.3 Bullets 4: *If scoping and screening data is distributed into more than one database, check that the data consistency is assured.*

Current status description and input document reference:

LTO scoping is obtained from 331-94 Importance Category Classification Listing (KLA 001). In addition SAP and IQReview contains equipment importance classification data. For screening, use is to be made of 331-275 Ageing Management Matrix where all degradation/ageing is to be identified and listed.

IQReview utilises the importance categories from SAP and KLA-001 and determines equipment reliability classifications.

Screening of mechanical equipment has not been completed yet.

A revision process for assurance of consistency between the various data sets does not exist.

INPUT REFERENCE DOCUMENTS:

- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032 System Listing
- SAP
- IQReview
- 331-275 Ageing Management Matrix

Assessment:

Scoping data is considered comprehensive, however the listing from SAP is not considered accurate and complete (it is not in a state that SDE considers it appropriate to use for a reliable source of accurate information). IQReview database contains equipment data that can be utilised for scoping and screening.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Review databases for consistency and applicability Refer to WBS 3.	Koeberg SALTO	Q1 2017
2	Establish integrated revision process to assure data consistency (including updates to KAA-560). Refer to WBS 3.	Koeberg SALTO	Q1 2017
3	Consider creating or utilising a single database. Refer to WBS 3.	Koeberg SALTO	Q1 2017

Functional Group Lead:	Raymond Maapola	**C1.5**
Functional Group:	SDE	
Date Performed:	2015-08-28	

Item:

<u>3.3.1.3 Bullets 5:</u> *Whether SCs not important to safety which may impact on safety functions are in the scope.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-94(KLA-001) is a list of all SSCs classified for importance. It is compiled using deterministic and PSA analysis – the more conservative importance category is used. KSA-010 provides the rules for classification of components and 331-93 provides further guidance on how to apply these rules. It classifies SSCs as Critically Safety Related (CSR), Safety Related (SR), Availability Related (AR) and No Safety or Availability Function (NSA). Our definition of SR encompasses what the IAEA defines as should be in scope. In addition the following is included in the scope for LTO.

- Items that are only important because they must be Non-Destruct (ND) in an earthquake (some of those might currently be NSA, but ND).
- There are some items that might currently be classified NSA, but that are mentioned in either the seismic study or flooding study done for the plant
- Items such as cable trays, cables, pipe supports are not uniquely identified in our standard (SAP) component list

A listing of SSCs with more classification detail than 331-94(KLA-001) can be drawn from SAP, a business software package designed to integrate all areas of a business.

<u>INPUT REFERENCE DOCUMENTS:</u>

- KSA-010: Nuclear Safety, Seismic, Environmental Quality and Importance Category
- 331-93: Guide for Classification of Plant Components, Structures & Parts
- 331-94 (KLA-001): Importance Category Classification Listing
- SAP functional location listing

Assessment:

SSCs whose failure may impact upon the safety functions are within the scope of LTO. However, a Plant Policy document on SALTO scope does not exist but the scoping policy will be stated into the LTO methodology document.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	Andrew Ceto	**C1.6**
Functional Group:	Engineering Programmes	
Date Performed:	31 August 2015	

Item:

<u>3.3.1.3 Bullets 6:</u> *Whether and how the SCs commodity groups (group of components and structures which have similar functions and similar materials) have been defined.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-275 - Process for the development and control of ageing management matrix at KOU describes the development of an ageing management programme. The ageing mechanisms and the SSCs combinations (commodity groups) that are considered in the KOU ageing management matrix are based on EDF's ageing management matrix that was adapted and populated with KOU specific reference documentation addressing the ageing commodity groups (combination of degradation mechanism and SSC).

The matrix intends to ensure that all equipment monitoring programmes are comprehensive and cater for all known potential degradation.

An assumption was made that for the initial matrix, the ageing concerns of EDF and KOU are similar enough to adopt and allow for the adaptation of the KOU specifics. The document describes the process for including SSCs into the scope of the ageing matrix, which are presented at Engineering Technical Management Meeting (ETMM) as gaps.

<u>INPUT REFERENCE DOCUMENTS:</u>

- 331-94 (KLA-001) – Importance Category Classification Listing
- 331-275 - Process for the development and control of ageing management matrix at KOU.

Assessment:

The ageing management matrix groups KOU SSCs based on the EDF couple groupings. Any gaps will be identified and presented to ETMM for inclusion into ageing matrix which would include the LTO scope.

An evaluation of SSCs in the LTO scope is required in order to classify what SSCs form part of which commodity group as defined in the matrix. Any SSCs in the list that cannot be grouped as part of the commodity groups described above will be assigned a specific "K" commodity group number and the subsequent ageing analysis will be performed for these.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Screen Master SSCs list for LTO to match defined matrix commodity groups. Refer to WBS 5.	Koeberg SALTO	Q3 2017
2	Identify gaps and create additional Koeberg specific commodity group, if required. Refer to WBS 5.	Koeberg SALTO	Q3 2017
3	Perform analyses (AMR) for SSCs requiring AMR. Refer to WBS 6.	Koeberg SALTO	Q1 2020
4	Perform TLAA Revalidation. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Andrew Ceto	**C1.7**
Functional Group:	Engineering Programmes	
Date Performed:	31 August 2015	

Item:

3.3.1.3 Bullets 7*:* *Verify if SCs within the scope of LTO are subjected to an appropriate ageing management review and evaluation of time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

SAP listing is used as the master list for scoping SSCs for LTO and includes both SSCs that require an AMR as well as those requiring a revalidation of a TLAA.

INPUT REFERENCE DOCUMENTS:

- 331-94 (KLA-001) – Importance Category Classification Listing;
- 331-186 (KSA-125) – Environmental Qualification at Koeberg Operation Unit;
- 331-219 (KBA 1222 E02 1002) – Environmental Qualification Maintenance Manual;
- 331-275 - Process for the development and control of ageing management matrix at KOU.

Assessment:

The KOU Ageing Management Matrix as well as the SSCs list in the Scope for LTO (SAP list) does not specifically differentiate between the SSCs requiring an AMR or those requiring a TLAA. The SSCs in the list need to be screened using the processes described in IAEA Safety Series Report No. 57 and IAEA Technical Report Series No.338 to determine whether they require an AMR or a revalidation of a TLAA.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Screen the Master LTO Scope List to identify which SSCs require a TLAA or an AMR based on the screening process described in the IAEA TRS 338 and IAEA SRS 57 or the new KOU LTO policy/procedure. Refer to WBS 5.	Koeberg SALTO	Q3 2017

Functional Group Lead:	Andrew Ceto	**C1.8**
Functional Group:	Engineering Programmes	
Date Performed:	31 August 2015	

Item:

3.3.1.3 Bullets 8: *Whether there is a documented and verifiable methodology for the screening of SCs for ageing management review.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

At KOU, the ageing management approach is to use the EDF ageing matrix to derive a matrix that contains a list of components and the ageing mechanisms applicable to these components.

An assumption was made that for the initial matrix, the ageing concerns of EDF and KOU are similar enough to adopt the EDF matrix and allow for KOU adaptation. The components ageing information is only recorded in the ageing management matrix, listing the ageing couple and the KOU specific reference document addressing the ageing mechanism.

331-275 describes the EDF Ageing Management process and documentation. The process within EDF comprises of the procedure that describes the approach adopted. The ageing management matrix captures all applicable and potential degradation linked to the grouped equipment (called a couple/commodity group).

INPUT REFERENCE DOCUMENTS:

- 331-275 - Process for the development and control of ageing management matrix at KOU;
- 331-148 – Programme Engineers Guide;
- 331-102 – ETMM TOR;
- KGU-031 – System Health Reporting;
- KGU-011 – Life of Plant Plans.

Assessment:

The following logic diagram is extracted from IAEA Safety Report Series No.57. It describes the screening process to identify which SSCs from the master LTO list (KLA-001) will require an ageing management review (AMR) or a revalidation of the time limited ageing analysis (TLAA).

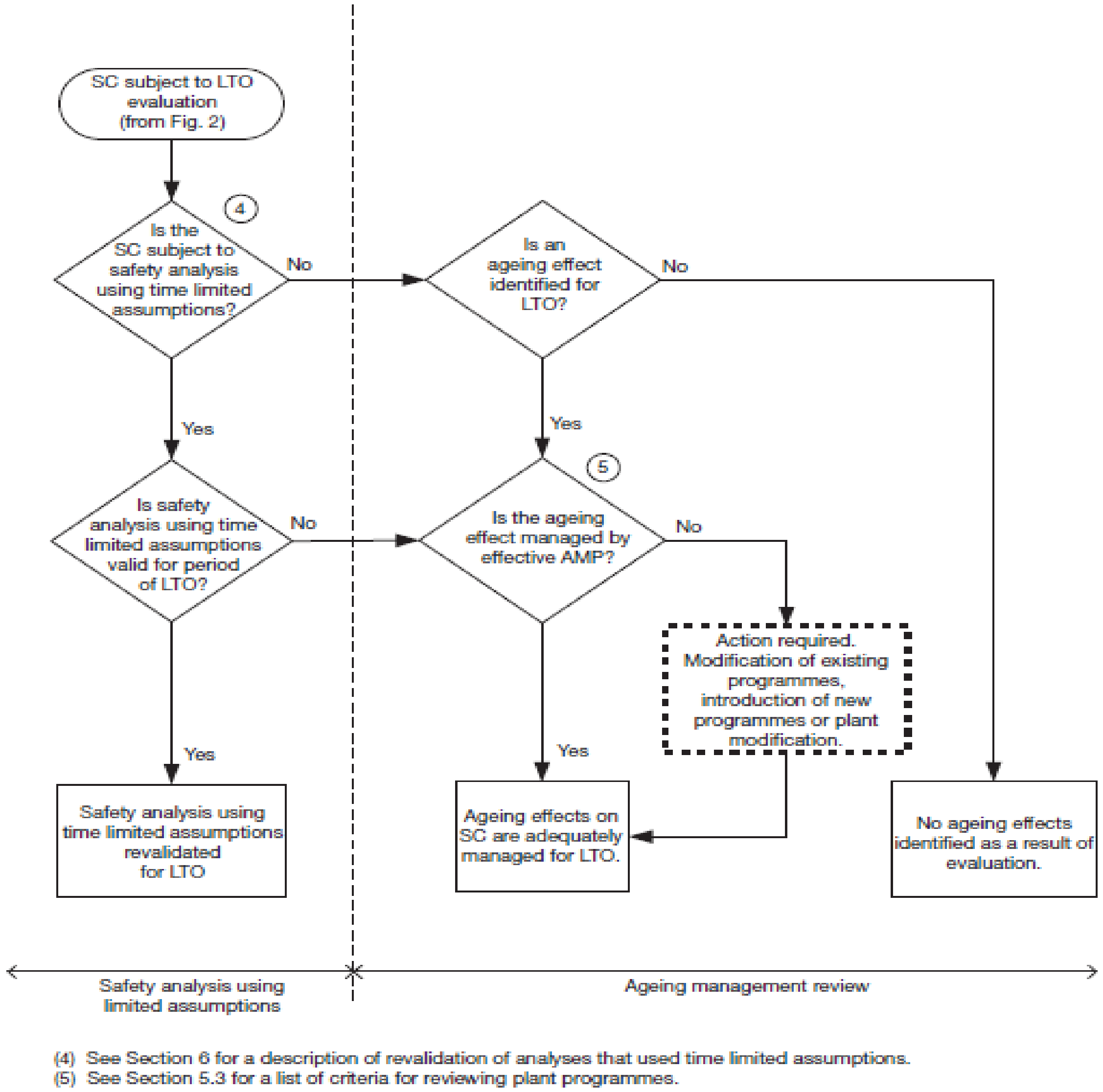


Figure 1: Screening Process for LTO (extracted from IAEA Safety Report Series No.57)

The intent of the KOU ageing matrix is to achieve the process of what Figure 1 describes, however, as it currently stands, there are gaps in the ageing matrix as it does not specify which couple groups or SSCs will require an AMR or revalidation of a TLAA.

The methodology for screening SSCs in the LTO scope for an AMR or revalidation of a TLAA has not formally been documented in KOU documentation.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Develop the methodologies for scoping and screening SSCs for LTO based on IAEA guidelines in the IAEA TRS 338 and IAEA SRS 57 and updated 331-275 with the screening methodology. Refer to WBS 4.	Koeberg SALTO	Q3 2016
2	Verify that all SSCs in the scope of LTO (according to the Master list [SAP list]) are represented in the ageing matrix. Refer to WBS 5.	Koeberg SALTO	Q3 2017
3	Register and provide a unique number and revision to the ageing matrix. Refer to WBS 4.	Koeberg SALTO	Q3 2016

AREA C: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR MECHANICAL COMPONENTS

Subsection 3.3.2: Ageing management review.

Functional Group: SPS/SDE

Functional Group Lead: A Kotze

Date Performed: 2015/08/24

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.2.1	The physical status of SCs in scope of LTO should be assessed. For SCs determined to be within the scope of LTO, the plant should have adequate programmes for managing the effects of ageing degradation for the period of LTO. The plant ageing management review should identify for each SC in scope of LTO possible ageing effects and degradation mechanisms, critical locations/ parts, material, environment and ageing management programmes, see also IGALL AMR tables [6]. The plant should maintain documentation of LTO evaluations and demonstration that the effects of ageing are managed during the planned period of LTO. The plant should demonstrate that ageing effects and degradation of all SCs within the scope of LTO are covered by appropriate plant programmes, newly established ageing management programmes and revalidation of time limited ageing analyses, if applicable. If some SSCs cannot be inspected (e.g. due to inaccessibility) or assessed, justification for such SSCs to continue in service is necessary.	• Programmes for managing the effects of ageing; • Report on PSR (if it exists); • Past corrective actions resulting in enhancement of AMPs; • Existing plant programmes listed in Section 3.2.2 (these are reviewed as preconditions).	331-275 - Ageing Management Matrix SRA II report – chapter 4 Ageing 331-148 - Programme Engineer guide 331-102 - ETMM TOR KGU 011 – Life of Plant Plans NEPP 001 – Concept of position papers KGU 031 - System Health reporting KAA 826 - Plant Health committee KGA 035 – OE from EDF 238 022 - CURA integrated risk reporting 331-64 Qualitative Risk Assessment

Functional Group Lead:	A Kotze	**C2.1**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

<u>3.3.2.3 Bullets 1.1:</u> *Assessment of the current physical status of the plant* - Confirm that appropriate ageing management reviews and condition assessments have been performed for SCs subject to ageing management review.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Comprehensive reviews of ageing and degradation phenomena are being performed and managed via many various programmes such as the EQ programmes, Cable Ageing Management Programme for MV cables and Maintenance Basis processes. These are crosschecked by the Ageing Management Matrix as per 331-275, "Ageing Management Matrix". A Programme Health report is issued on every six month on the health of SCs within the scope of the EQ and CAMP Programmes as per 331-148.

The monitoring and trending of the system performance to identify problems and age related concerns before they adversely affect the functionality of the system in accordance with the System health reporting guide, KGU-031. Trending results are documented in the System Health Report Action Plans, where they can receive increased visibility in order to promote overall system performance. In addition a Component Health Report is compiled by the Component Engineers on a 6-montly basis to document the system performance and condition and to determine the component health.

Plant Health Committee (PHC) reviews the quarterly System Health Report and six-monthly Component Health report before final issue and monitors the effectiveness of plant initiatives and operational forums and strategically determines the way forward for plant health.

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- 331-148 - Programme Engineer guide
- 331- 102 - ETMM TOR
- KGU 011 – Life of Plant Plans
- KGU-029 – Monitoring and Trending in Plant Engineering
- NEPP 001 – Concept of position papers
- KGU 031 - System Health Reporting Guide
- KAA 826 - Plant Health committee
- KGA 035 – OE from EDF
- 238-22 - CURA integrated risk reporting
- 331-64 Qualitative Risk Assessment

Assessment:

Ongoing task, and all of the above mentioned activities are in place.

Results: Meet X Don't Meet ☐ Partially Met ☐ N/A ☐

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**C2.2**
Functional Group:	SDE	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 1.2: *Assessment of the current physical status of the plant.* - Determine if all the important input design data such as design description, design basis including loads and other parameters necessary for evaluation of safety are available or accessible for the plant.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Koeberg Safety Analysis Report (SAR) contains information of a general nature related to the nuclear power plant layout, the major systems and buildings, the engineered safeguard systems that prevent or mitigate the release of radioactivity, and the location of major equipment. The SAR also contains a review of the regulations, which apply to Koeberg for the design, construction and normal operation and for the prevention of accidents and mitigation of their consequences. Information on structures, systems, equipment and components necessary to maintain Koeberg Units 1 and 2 in a safe condition during all operational states is described in the SAR. Classification of civil, mechanical and electrical structures and equipment, and protection against climatic loads, missiles, the industrial environment and the dynamic effects associated with pipe breaks are described. Information on the validation of the seismic design of the sub-foundation, civil structures, and safety-related equipment required to withstand seismic events is provided. Information concerning the containment design, isolation measures and validation tests is also provided. The resistance of systems and equipment to various loads and the environmental qualification of electrical equipment based on the design basis accidents are described.

In addition, design information, general principles of design and operation necessary for evaluation of safety are available in the relevant design basis information documents such as system design files (DSE), QADPs, Protection Files, Setpoints Manual(KBA 1227 E02507 and KBA1222E02027), Maintenance Manuals, IST Manual, ISI Manual, Design Specifications and Plant Drawings.

The above mentioned documents are available and accessible through the Main Document centre as hard copies and electronically available via Excalibur, Hyperwave and PIGO.

<u>INPUT DOCUMENT REFERENCE:</u>

- Safety Analysis Report (SAR)
- DSEs
- QADPs
- Maintenance Manuals
- KBA1222E02027 - NSSS Setpoints Manuals
- KBA 1227 E02507 - BNI Setpoints Manuals
- Protection Files
- IST Manual
- ISI Manual

Assessment:

All the important input design data such as design description, design basis including loads and other parameters necessary for evaluation of safety are available or accessible for the plant.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Ensure access to essential OEM DB documentation remains available. Refer to WBS 13.	Koeberg SALTO	Q4 2020

Functional Group Lead:	A Kotze	**C2.3**
Functional Group:	PS/SDE/SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 1.3: *Assessment of the current physical status of the plant.* - Check that information on maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept and managed in a proper way.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All information relating to maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept in QDAPs and managed in accordance with KSA-011," The Requirements for Controlled Documents" and KAA 500, "The Process for Controlled Documents". Maintenance history is captured in the Equipment History Records as per KSM-015, Maintenance History Records. Refer to QADPs, ISI outage reports, SAP history and Equipment History Records as per KSM-15, transient monitoring files, DSE and maintenance manuals. Information continues to be managed as required as per KAA-500, KSM-006 and other programmes requirements.

INPUT DOCUMENT REFERENCE:

- KSA-011," The Requirements for Controlled Documents"
- KAA 500, "The Process for Controlled Documents"
- KSM-015, "Maintenance History Records"
- KSM-006, "Investigating, Compiling and Execution of Maintenance Work Packages"
- 331-2, "Nuclear Engineering Management Manual".

Assessment:

Gathering of history of primary system has been attempted (with a focus on RPV) and all info could be retrieved. It is believed that history is available but at times difficult to retrieve. Note that some manufacturing details were not procured and remain available only from the OEM. There is concern over configuration management aspects.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Ensure access to essential OEM DB documentation remains available. Refer to WBS 13.	Koeberg SALTO	Q4 2020

Functional Group Lead:	A Kotze	**C2.4**
Functional Group:	SPS/PE/SDE	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 1.4: *Assessment of the current physical status of the plant.* - Confirm that review and assessment of the operating and maintenance history for each structure or component is part of the analyses accounting for such parameters as operational transients, past failures, or unusual conditions that affected the performance or condition of the structure or component. Confirm that examination of repairs, modifications or replacements relevant to ageing considerations are included in the analysis of the SCs

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Previous history of component failures are systematically reviewed when "component failures" are considered under KGU-033, "Failure investigation of plant equipment and evaluation of experience"' with component failures. KGU-033 provides guidance for investigating plant component failures. The experiences gained from these investigations are used to prevent recurrence, improve the Maintenance Basis and compile equipment failure statistics for trending purposes. All the component failures have been reviewed (and are to be regularly reviewed) to verify that all ageing/degradation effects are represented in the Ageing Management matrix. Modifications and equivalent replacements follow systematic failure mode assessments prior to authorisation.

The transient monitoring process is a good example of the processes used for continued history and analyses as required.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- 331-148 - Programme Engineer guide
- KGU-033, "Failure investigation of plant equipment and evaluation of experience"

Assessment:

All component failures that have been registered as type Component Failure (CF) in the EPMS system have been reviewed and confirmed to be represented in the AMM. All type CF have had an engineer consider the consequences and impact on maintenance requirements.

Integrity evaluations also as standard refer to previous operational history as part of the engineering evaluation that leads to the conclusions and possible justification of continued operation.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**C2.5**
Functional Group:	SPS/PE/SDE	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 1.5: *Assessment of the current physical status of the plant.* Determine that operational data are collected with a focus on transients and events and on generic operating experience. Also information relevant to power uprating, modification and replacement, surveillance and any trend curves are important to be available for the overall assessment.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Refer to transient monitoring process and links with international memberships, EDF. Trending by InSQL (on site data repository) provides for pre and post modification trends of operational aspects. Review and monitoring of operational and testing data provide insight into condition of plant. For mechanical components the IST, SRSM, operations and maintenance monitoring processes are typically captured in SAP history.

Assessment:

Data on transients are available, reviewed and evaluated to provide insight into plant condition. Specific reviews of events are performed prior to identification and specification of repair methods.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**C2.6**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 2.1: *Identification of ageing effects and degradation mechanisms.* - Check that a procedure exists for the structure, component or commodity grouping to assess ageing effects in detail.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Ageing Management Matrix process, 331-275, represent the ageing management matrix (AMM) derived from the EDF comprehensive ageing assessment. The EDF AMM has been reviewed by the System Engineers and Programme Engineers SMEs For Koeberg specific component and applicable degradations.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- 331-148 - Programme Engineer guide

Assessment:

Reviews of the AMM by SMEs to date (as well as a review of all Component Failures registered on EPMS) have not identified significant discrepancies.

There is currently no process standard specifying the requirements for the ageing matrix.

During the Koeberg SALTO project the verification of complete coverage of the AMM will be obtained when all Koeberg plant equipment will be scrutinised and ensured it is included in the AMM, where after a systematic review and comparison with IGALL will be undertaken.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Include development of a programmes standard for the aging matrix. Refer to WBS 4.	Koeberg SALTO	Q3 2016

Functional Group Lead:	A Kotze	**C2.7**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 2.2: *Identification of ageing effects and degradation mechanisms.* - Verify the plant ageing management review process identifies possible ageing effects/mechanisms, critical locations/ parts, material, environment and ageing management programmes addressing these subjects for SCs in the scope of LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Comprehensive reviews of ageing and degradation phenomena are being performed and managed via various plant programmes and processes and crosschecked with the Ageing Management Matrix as per 331-275, "Ageing Management Matrix".

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- 331-148 - Programme Engineer guide
- 331-102 - ETMM TOR
- KGU 011 – Life of Plant Plans
- NEPP 001 – Concept of position papers
- KGU 031 - System Health reporting
- KAA 826 - Plant Health committee
- KGA 035 – OE from EDF
- 238-22 - CURA integrated risk reporting
- QRA – 331-64 Qualitative Risk Assessment

Assessment:

Identification of possible and potential ageing effects are identified from Koeberg and international OE (mostly EDF), contact with other utilities at FROG, WANO and EPRI and the strategy for ageing review compared to IGALL. The scope of SALTO is considered comprehensively covered but not yet executed. The BAU aspect is however in place and being developed and expanded in an on-going manner. The LTO specific review and comparison with IGALL has not been performed.

For LTO a specific review will be performed and documented as per the Koeberg SALTO project. Refer to Koeberg SALTO project description.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Perform ageing management review of LTO SCs. Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**C2.8**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 2.3: *Identification of ageing effects and degradation mechanisms.* - Determine if materials, environment and stressors that are associated with each, component, or commodity grouping were considered in the process of identification of ageing effects.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Referenced documents are EDF ageing matrix, EDF OE, EPRI materials and issue tables, FROG concerns, PWROG topics and IGALL. All of these inputs are channelled towards the ageing management of components and commodity groupings.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- 331-148 - Programme Engineer guide
- Nuclear Position Papers

Assessment:

Ageing concerns and environmental stressors impacting SSCs are obtained and channelled towards management of the components or equipment groupings. The reviews of the AMM by the Koeberg technical leads have not identified many outstanding ageing concerns giving confidence that ageing concerns are captured and being dealt with.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**C2.9**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 2.4: *Identification of ageing effects and degradation mechanisms.* - Check if operating experience and research findings and results were adequately considered.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Research results and OE are well identified and made available to technical leads and system engineers to decide on management methods. Reference documents such as AMM, IGALL, EDF OE, EPRI research, WANO concerns, FROG and PWROG items, PSR reports, LOPPs and NEPPs are considered. The integrated approach of all of these provide for a comprehensive identification of concerns. The verification that all of the identified research findings have been adequately considered can be judged by reviewing the related plant equipment failures.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- 331-148 - Programme Engineer guide
- 331-23 – NE Processing of international OE
- KAA-688 – Corrective Action Process
- Nuclear Position Paper

Assessment:

Research results and OE are well identified and made available to technical leads to decide on management methods. Recent plant performance indicates good management of ageing concerns. Some expensive and complex concerns have been delayed and increase risk of production losses (e.g. unit 2 RPV head, pressuriser heaters, electronic cards, needle valves of RIS/EAS, need for cathodic protection of containment). The WANO and OSART peer reviews indicate that Koeberg is well aware of international degradation and develop own expertise where the ageing is Koeberg specific. The delay in Pzr heaters and RPVH are indications that not everything is 100%.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	The IAEA indicated that the research OE included into the AMM is not well procedurised. The procedure updating/creation that form part of theme 4 will solve this concern. Refer to WBS 4.	Koeberg SALTO	Q3 2016

Functional Group Lead:	A Kotze	**C2.10**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 2.5: *Identification of ageing effects and degradation mechanisms.* - For selected examples, check consistency with IGALL AMR tables.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Not yet done. IGALL comparison is scheduled for Koeberg SALTO project.

Assessment:

The comparison of KOU programmes with IGALL AMPs is currently in progress under SPS Self Assessment (SE 85540 (SE 35189)). The review of the AMRs & AMR tables will only be done under the Koeberg SALTO project

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	A review of the AMM against the IGALL AMR tables must be performed to confirm that the ageing matrix is comprehensive and complete. Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**C2.11**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 3.1: *Documentation of the evaluation and demonstration for management of ageing effects.* - Verify if demonstration was done that the effects of ageing will continue to be identified and managed such that the intended function of the SC will be maintained throughout the planned period of LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Effects of ageing will continue to be identified and managed via various BAU processes and programmes e.g. ETMM, AMM & engineering programmes, LOPP, NCR, Design and TAF, PSR, WANO, EPRI/FROG/PWROG memberships.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- 331-148 – Programme engineers guide
- 331-102 - Engineering Technical Management Meeting (ETMM), LOPP Guide
- KAA-506 - Temporary Alterations to Plant, Plant Structures or Operating Parameters that Affect the Design Base
- KAA-815 -Design Changes to Plant, Plant Structures or Operating Parameters
- KAA-690 - Operability Determinations

Assessment:

For the existing processes it will be easy to confirm these are expected to remain in place for LTO. For the international memberships it will be difficult to prove that the intention is to continue for the duration of LTO (especially since the financial attacks to reduce these are factual).

The gathering of international knowledge and operational experience to be performed in accordance with a standard procedure.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	The IAEA indicated that the research OE included into the AMM is not well procedurised. The procedure updating/creation that form part of theme 4 will solve this concern. (Also consider revision of 331-23 to incorporate the gathering of international knowledge and operational experience and standardise the reporting and feed into the engineering processes.) Refer to WBS 4.	Koeberg SALTO	Q3 2016

Functional Group Lead:	A Kotze	**C2.12**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 3.2: *Documentation of the evaluation and demonstration for management of ageing effects.* - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for effective management of ageing effects.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The documentation processes at KOU can be found in KAA 010, KAA 500 and 331-2. In addition all ageing management programmes augment the standard requirements with specific requirements for records generated. Most of the Engineering Programmes are identified in 331-148.

INPUT DOCUMENT REFERENCE:

- KSA 010 – The Requirements for Controlled Documents
- KAA 500 – The Process for Controlled Documents
- 331-3 – Document and Records Management Work Instruction
- 331-148 – Programme Engineer guide.

Assessment:

During SALTO review gaps will be identified and will be required to be closed. All information and documentation for SALTO to be captured as per approved documentation processes

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**C2.13**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 3.3: *Documentation of the evaluation and demonstration for management of ageing effects.* - Confirm that efficient data collection and record-keeping systems are in place so that trend analyses can readily be performed to predict SSC performance.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Data collection is dependent on the individual programme or process. Each AMP will have specific data collection and record keeping requirements.

INPUT DOCUMENT REFERENCE:

- 331-148 Programme Engineers guide

Assessment:

All required monitoring data is available and in some NB safety related cases, these are trended and sent to the NNR.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**C2.14**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 3.4: *Documentation of the evaluation and demonstration for management of ageing effects.* - Verify that the following information is available in the documents demonstrating management of the ageing effects:

- Clear identification of the ageing effects requiring management;
- Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed;
- Description of how the programmes and activities will manage the effects of ageing;
- List of substantiating references and source documents;
- Discussion of any assumptions or special conditions used in applying or interpreting the source documents;
- Description of existing and new programmes for LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The ageing management matrix addresses the following items:

- Clear identification of the ageing effects requiring management;
- Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed;

Each of the programmes individually addresses:

- Description of how the programmes and activities will manage the effects of ageing;
- List of substantiating references and source documents;

Discussion of any assumptions or special conditions used in applying or interpreting the source documents;

Assessment:

Self-evaluation (SE 88540 for SPS) is currently underway. It will review the existing and need for new programmes referring to the IGALL listing. The programme guide (331-148) needs to address the description of existing and new programmes for LTO.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Complete actions stemming from SE 88540. Refer to WBS 7.	Koeberg SALTO	Q1 2020

AREA C: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR MECHANICAL COMPONENTS

Subsection 3.3.3: Review of ageing management programmes

Functional Group: Engineering Programmes

Functional Group Lead: Andrew Ceto

Date Performed: 2015-08-19

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.3.1	Ageing management programmes should be evaluated against the nine attributes [6]. For selected AMPs, detailed description of the attributes is provided in IGALL. Existing programmes and newly developed ageing management programmes should incorporate insights and results of ageing management review.	• Ageing management programmes (procedures for implementation of SC-specific AMPs); • Other plant programmes for managing the effects of ageing degradation; • Report on PSR (if it exists); and • Existing plant programmes listed in section 3.2.2 (these are reviewed as preconditions).	331-275 - Ageing Management Matrix
			SRA II report – Chapter 4 Ageing
			331-148 - Programme Engineer guide
			SE 85540 (SE 35189) - Programmes Self-Assessment

Functional Group Lead:	Archie Mthandi	**C3.1**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

3.3.3.3 Bullets 1: *Verify that existing and proposed plant programmes that supports LTO were reviewed for meeting the nine attributes.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The existing programmes conforms to the following five elements as per of 331-148, "Programme Engineers Guide", Appendix 1.

- Scope
- Requirements and Acceptance Criteria
- Execution
- Results Evaluation
- Programme Oversight

INPUT DOCUMENT REFERENCE:

- 331-148, "Programme Engineers Guide".

Assessment:

No verification has been done against the IAEA nine attributes of IGALL AMP to support LTO. EPG is currently conducting a Self-Assessment, SE 88540, to review and evaluate the attributes of the current Programmes scoped in the Programme Guide, 331-148, with the intent to align with the nine attributes of the IGALL Ageing Management Programmes (AMPs).

Other plant programmes (e.g. Chemistry Programme, Fire Protection, etc.) which are not part 331-148 and have no similar requirements as stated in 331-148 will need to be reviewed.

Results: Meet [ ] Don't Meet [ ] Partially Met [x] N/A [ ]

No	Action Description	Lead	Due Date
1	Complete the Self-Assessment, SE 88540, to review all existing for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs. Refer to WBS 7.	Koeberg SALTO	Q1 2020
2	Other plant programmes or processes (Chemistry Programme, Fire Protection, etc.) not included into 331-148 scope but impacting on LTO, needs to be identified and reviewed for meeting the nine attributes of the IGALL AMP. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Archie Mthandi	**C3.2**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

3.3.3.3 Bullets 2: *Verify/ review specific sample of existing and new AMPs for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs, i.e. meeting the SC-specific nine attributes*.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-148, "Programme Engineers Guide", list all engineering programmes currently developed and implemented at Koeberg NPP which includes the following programmes relating to mechanical components:

- In-service Inspection Programme (ISI PRM)
- In-service Testing (IST PRM)
- Flow Assisted Corrosion (FAC)
- Corrosion Programme
- Boric Acid Corrosion (BAC)
- Pressure Equipment Regulation (PER)
- Transient Monitoring Programme
- Steam generator Programme (SG)
- Atmospheric Stress corrosion Cracking Programme(ASCC)
- Microbiology Induced Corrosion Programme (MIC)

INPUT DOCUMENT REFERENCE:

- 331-148, "Programme Engineers Guide".

Assessment:

Self-evaluation not yet done to compare the existing programmes with IGALL expectations. Engineering Programmes is currently conducting a Self-Assessment, SE 88540, to review the existing programmes for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs. The SE is expected to be completed before the end of September 2015 and action plan for new AMPs to will be developed. 100% sample of existing programmes will be reviewed as part of the Self-Assessment currently ongoing.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Completed Self-Assessment, SE 88540, to review existing programmes for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs. In addition, review other IGALL AMPs for applicability to Koeberg. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Archie Mthandi	**C3.3**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

3.3.3.3 Bullets 3: *Whether the plant concludes, after reviewing the existing plant programmes and/or ageing management programmes, that the management of ageing effects is not adequate in some cases. In this case, whether the plant modifies the existing programme or develops a new programme for the purpose of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-148, "Programme Engineers Guide", list all engineering programmes currently developed and implemented at Koeberg NPP. The existing programmes are continuously reviewed and kept current taking into account industry Operating Experience (OE) from various sources such as EDF exchange forums, FROG, PWR Owners Group, INPO and EPRI. Periodic safety assessment (SRA), self- assessments and peer reviews also conducted to align the programmes with international standards and practices. Any safety concerns arising from the OE, assessments or reviews is evaluated and discussed in various management safety review committees such Engineering Technical Management Meeting (ETMM) and Plant Health Committee (PHC) and existing programmes requirements are modified, new programme and plant changes are effected as applicable. The CAP process as per KAA-688 is used for the management and tracking of the concerns raised from OE.

Based OE, the Steam Generator (SG) Programme has been modified to consider cracking in the divider plate and drop-down of sleeve; the assessment is underway to evaluate the adequacy of the EQ for Mechanical at Koeberg. The RVSP programme has been initiated with additional inspections. These amongst others are an indication that Koeberg continuously makes improvements to the programmes or develops a new programme for the safe operation of the plant based on industry OE, new degradations or failures and experience exchange from EDF.

INPUT DOCUMENT REFERENCE:

- 331-148- Programme Engineers Guide
- 331- 102 - ETMM TOR
- KAA 826 – Plant Health Committee

Assessment:

331-148, "Programme Engineers Guide", list all engineering programmes currently developed and implemented at Koeberg NPP. The existing programmes are continuously reviewed and kept current taking into account industry Operating Experience (OE) from various sources such as EDF exchange forums, FROG, PWR Owners Group, INPO and EPRI. Periodic safety assessment (SRA), self- assessments and peer reviews also conducted to align the programmes with international standards and practices. Any safety concerns arising from the OE, assessments or reviews is evaluated and discussed in various management safety review committees such Engineering Technical Management Meeting (ETMM) and Plant Health Committee

(PHC) and existing programmes requirements are modified, new programme and plant changes are effected as applicable. The CAP process as per KAA-688 is used for the management and tracking of the concerns raised from OE.

A Self-Assessment, SE 88540, has been initiated to review all existing for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs. A decision whether to modify the existing programme or develops a new programme will be taken as part of the self-assessment.

There are two types of programmes, those that are defined in accordance with 331-148 and those that are run by the station and are not defined as programmes as per 331-148, however in many respects could easily be defined as programmes. Although, not specifically written in the process documents of some of the programmes, it's expected that programmes should have a living process that takes into account OE and makes improvement on an on-going basis.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Archie Mthandi	**C3.4**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

3.3.3.3 Bullets 4: *Confirm that operation, inspection/monitoring and maintenance programmes are well-coordinated by AMPs.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Programme Engineer Guide, 331-148, provides guidance to all programme engineers on the implementation of plant condition management activities including scope definition, establishing programme rules and requirements, acceptance criteria, execution details, evaluation of results, optimisation and oversight by Programme Health Reports. The inspection and maintenance programmes related to mechanical components are well coordinated by the existing programmes listed in 331-148.

The monitoring and trending of the system performance to identify problems and age related concerns before they adversely affect the functionality of the system engineers in accordance with the System health reporting guide, KGU-031. Trending results are documented in the System Health Report Action Plans, where they can receive increased visibility in order to promote overall system performance. In addition a Component Health Report is compiled by the Component Engineers on a 6-montly basis to document the system performance and condition and to determine the component health.

Plant Health Committee (PHC) reviews the quarterly System Health Report and six-monthly Component Health report before final issue and monitors the effectiveness of plant initiatives and operational forums and strategically determines the way forward for plant health. (include programme health reports)

All operation, inspection and maintenance requirements are loaded and implemented via SAP.

INPUT DOCUMENT REFERENCE:

- 331-148 – Programme Engineers Guide
- KLM-005 – Maintenance Listing
- KGU-031 – System Health Reporting Guide
- KAA 826 – Plant Health Committee

Assessment:

Although the operation, inspection/monitoring and maintenance programmes relating to all programmes are well-coordinated by existing programme listed in 331-148 other activities outside the scope of the 331-148 has not verified if they are well coordinated.

A Self-Assessment has been initiated, SE 88540, to review all existing for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs and to ensure condition of activities govern by those programmes.

There is insufficient overall programme ownership that manages the combination and integration of ageing programmes.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Verify whether other activities outside the scope of the 331-148 are well coordinated by plant programmes. Refer to WBS 7.	Koeberg SALTO	Q1 2020
2	Confirm the overall programme ownership that manages the combination and integration of ageing programmes. Refer to WBS 4.	Koeberg SALTO	Q3 2016

AREA C: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR MECHANICAL COMPONENTS

Subsection 3.3.4: Obsolescence management programme.

Functional Group: Engineering Programmes

Functional Group Lead: Andrew Ceto

Date Performed: 2015-08-19

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.4.1	The plant should demonstrate that technological obsolescence is properly managed. Management of obsolescence should be a continuous activity addressing both the maintenance and performance of SSCs. A programme to address obsolescence could be a part of normal plant programmes (e.g. maintenance). Responsibility for programme implementation should be clearly assigned within the organization of the plant.	• Procedures for the management of technological obsolescence; • Documentation to support SSC obsolescence and replacement; • List of spare parts; • Maintenance records; • Long term investment programme for classified equipment and systems.	KBA 0022 N NEPO NEPP 115 Rev 1:– Nuclear Engineering Position Paper titled – Obsolescence management at Koeberg Nuclear Power Station.
			DRA LOBSOLESC:– Project Definition Release Approval for Obsolescence Project
			331 -146 :– The Obsolescence Process
			4600055437:- Contract between KOU and PKMJ.

Functional Group Lead:	Lumkile Jibiliza	**C4.1**
Functional Group:	NE-SPS	
Date Performed:	2015-08-28	

Item:

3.3.4.3 Bullets 1: *Confirm that appropriate technological obsolescence management reviews and assessments have been performed for SCs.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

In October 2004 the design engineering department initiated an obsolescence project (LOBSOLESC) initially to cover C&I equipment and in 2006 extended to electrical and mechanical equipment.

The project investigated obsolescence in each system that make up Koeberg Nuclear Power Station (KNPS). The original equipment manufacturers (OEM) and original equipment suppliers (OES) were consulted to verify the availability and status of the each equipment. The project led to the replacement or modification of some C&I systems and a number of equivalent studies (for example: Fuji transmitters, Verdelet valves etc.) were performed. The project was closed on the 30 September 2009.

KNPS also has an agreement with EdF (Electricite de France) where a KNPS engineer is fully integrated into the EdF obsolescence management structure. This is because KNPS is a similar station to EdF stations designed and constructed by the same constructor and the equipment used is exactly the same. The engineer shares the KNPS obsolescence efforts with EdF and vice versa.

Since October 2009 until recently Obsolescence was dealt with reactively through the supply chain processes.

In 2014 KNPS contracted with PKMJ (subsidiary of Rolls Royce) for the creation of a web-based database (Proactive Obsolescence Management System – POMS). In addition to the database PKMJ commits to contact each and every manufacturer/ supplier of KNPS at least once a year to verify the obsolescence status of each KNPS equipment.

In 2014, the Obsolescence Working Committee (OWC) comprising of representatives from the groups below was re-formulated.

- Nuclear Engineering
- Plant Engineering
- Maintenance
- Procurement
- Eskom/EdF Obsolescence Liaison Engineer

The OWC meets twice a month and provide a platform for key stakeholders to identify, confirm, classify prioritise and drive the resolution of identified obsolescence issues.

INPUT DOCUMENT REFERENCE:

- KBA 0022 N NEPO NEPP 115 Rev 1 – Nuclear Engineering Position Paper titled – Obsolescence management at Koeberg Nuclear Power Station.
- DRA LOBSOLESC – Project Definition Release Approval for Obsolescence Project
- 331 -146 – The Obsolescence Process

Assessment:

Appropriate technological obsolescence management reviews and assessments have been performed for SCs at KNPS.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Lumkile Jibiliza	**C4.2**
Functional Group:	NE-SPS	
Date Performed:	2015-08-28	

Item:

3.3.4.3 Bullets 2: *Verify if demonstration was done that the effects of obsolescence will be continuously identified and managed such that the intended function of SCs will be maintained throughout the planned period of LTO.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

The obsolescence process (331-146) has been established. The obsolescence working committee (OWC) has been re-established. The OWC comprises of representative from the supply chain organisations (i.e. procurement, procurement engineering), plant engineering (represent system engineering and component engineering), nuclear engineering (i.e. specification engineering, engineering programmes etc.), maintenance as well as configuration management. The OWC meets twice a month to identify, confirm, classify prioritise and drive the resolution of identified obsolescence issues.

KOU has contracted with PKMJ (Rolls Royce) for the creation of POMS and POMS OM. Included in the contract is PKMJ commitment to contacting each supplier to verify each equipment Obsolescence status. The POMS OM assists in the prioritisation of the obsolescence resolution.

INPUT DOCUMENT REFERENCE:

- 331-146 :- Obsolescence Process
- 4600055437:- Contract between KOU and PKMJ.

Assessment:

The OWC process, as well as the contract with PKMJ are in place, however the contract is limited to the contractual period which does not run to the LTO time frame. SPS is currently investigating establishing an obsolescence managed in accordance with the IAEA process.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Lumkile Jibiliza	**C4.3**
Functional Group:	NE-SPS	
Date Performed:	2015-08-28	

Item:

3.3.4.3 Bullets 3: *Whether the plant is reviewing efficiency of the existing obsolescence programmes on a regular basis.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

Periodically, the Quality Assurance (QA) Group performs a QA monitoring programme on all departments' processes and programmes. For the Engineering department the processes audited include the obsolescence process/ programme.

Periodically, Nuclear Safety Assurance (NSA) department performs an external review of KOU processes and programmes (including Obsolescence), raise IRA where necessary and issue a status report

INPUT DOCUMENT REFERENCE:

- 331-146 :- Obsolescence Process

Assessment:

Currently the efficiency review of the Obsolescence Programmes is dependent of oversight and assurance departments. No self-assessment is specified in the obsolescence process.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1.	Review the Obsolescence process to include self-assessments, benchmarking initiatives etc. Refer to WBS 15.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Lumkile Jibiliza	**C4.4**
Functional Group:	NE-SPS	
Date Performed:	2015-08-28	

Item:

3.3.4.3 Bullets 4: *Whether management of technological obsolescence of SSCs (mechanical components and equipment) such as valves, pumps, etc. is in place.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

The Obsolescence process identifies all/ any types of obsolescence. Once identified the selected change process (modification or equivalency) will evaluate further, resolve and manage the obsolescence. The current plant change processes (modification or equivalencies) for management of technological obsolescence is robust and effective.

The main technological obsolescence observed in mechanical components and equipment is improvements in code and standards (ASME, RCCM) as well as material evolutions. In such cases the effects are evaluated under the Form, Fit and Function basis of the equivalency process.

Koeberg Operation Unit has a strong contractual relationship with EdF (Management, Engineering and Operation). This relationship benefits KOU in various forms including:

- Operating Experience, for example the martensitic steel aging problems experienced on valve stems
- Management decisions are sent to Koeberg NPP for review

The contractual relationship between our Original Equipment Suppliers (OES) is in place for the supply of spares parts.

KOU is a member of various international organisations (e.g. FROG, EPRI etc.). Through the interactions with these organisations certain recommendations are followed through.

INPUT DOCUMENT REFERENCE:

- 331-146 – Obsolescence process

Assessment:

The objective is met and the approach must be maintained through LTO.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

AREA C: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR MECHANICAL COMPONENTS

Subsection 3.3.5: Existing time limited ageing analyses.

Functional Group: SDE **Functional Group Lead:** Raymond Maapola

Date Performed: 2015-08-28

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.5.1	The plant should identify existing time limited ageing analyses regarding period of operation and design considerations or licence terms.	• List of time limited ageing analyses; • FSAR; • EQ documentation; • Design supporting documents (such as PTS analyses, fatigue calculations, etc.); • Other licensing documents.	331-250 Atmospheric Stress Corrosion Cracking (ASCC) of Austenitic Stainless Steel Components
			Safety Analysis Report (SAR)
			Koeberg Licence Basis Manual (KLBM)
			KBA 00 22 E00 006 NSSS Design Transients

Functional Group Lead:	Raymond Maapola	**C5.1**
Functional Group:	SDE	
Date Performed:	2015-08-28	

Item:

3.3.5.3 Bullets 1: *Whether the existing time limited ageing analyses (e.g. from FSAR) are properly documented in the current safety analyses report or other licensing basis documents and clearly and adequately describe the current licensing basis or the current design basis requirements for plant operation.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Ageing analyses are described within the SAR and CLB. These ageing analyses are adequately documented for the requirements for plant operation.

INPUT DOCUMENT REFERENCE:

- SAR
- KLBM

Assessment:

The ageing analyses are adequately documented for the requirements for plant operation.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Raymond Maapola	**C5.2**
Functional Group:	SDE	
Date Performed:	2015-09-03	

Item:

3.3.5.3 Bullets 2: *Whether the plant identified list of existing time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Various time limited ageing analyses for the plant exist and are referenced in the SAR. These include thermal stratification, and Reactor Vessel Stress Analysis. Time limited ageing analyses such as ASCC are documented separately.

INPUT DOCUMENT REFERENCE:

- Safety Analysis Report (SAR)
- SAR (II-3.2.5.6 Thermal Stratification)
- SAR(II-3.3.1.4 Reactor Vessel Stress Analysis)
- 331-250 Atmospheric Stress Corrosion Cracking (ASCC) of Austenitic Stainless Steel Components

Assessment:

While time limited ageing analyses have been performed, an independent indexed list of time limited ageing analyses is not in place.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	List all the time limited ageing analysis for KOU. Refer to WBS 8.	Koeberg SALTO	Q3 2016

Functional Group Lead:	Raymond Maapola	**C5.3**
Functional Group:	SDE	
Date Performed:	2015-09-03	

Item:

3.3.5.3 Bullets 3: *Whether the plant identified missing time limited ageing analyses based on results of screening.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Time limited ageing analyses exist within the SAR and other CLB documents. Currently, examples of specific mechanical component references in the SAR where the functional life span is clearly stipulated are found in the following Safety Analysis Report Revision 5/5A chapters:

- II-3.3.1.5.6.1 Sensitivity of the material to neutron irradiation
- II-3.3.1.5.6.2 Surveillance programme
- II-3.3.1.11.3 Significant Deficiency (SD-021) RPV Beltline Integrity (Unit 1 & 2)
- II-3.3.4.11.1 Significant Deficiency (SD-002) Primary Cast Elbows
- II-2.2.6.1.3 Reactivity Control System
- II-3.2.7 Protection against Fast Fracture
- II-3.3.2.4.2 Equipment Life (RCP pumps)
- II-3.3.5.10.2 Pressuriser Nozzle Bi-metallic Weld Cracking
- TABLE T-II-3.3.6-2: PRESSURISER SAFETY VALVES - RCP 011-012-013 VP
- TABLE T-II-7.1-1: BASIC RCV OPERATING CHARACTERISTICS

Comparison of Koeberg's TLAAs with IAEA IGALLs TLAAs has not yet been performed.

Assessment:

Comparison of Koeberg's TLAAs with IAEA IGALLs TLAAs has not yet been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Compare Koeberg's TLAA with IAEA list of IGALLs. Refer to WBS 9.	Koeberg SALTO	Q4 2016

Functional Group Lead:	Raymond Maapola	**C5.4**
Functional Group:	SDE	
Date Performed:	2015-09-03	

Item:

3.3.5.3 Bullets 4: *Whether the plant has launched time limited ageing analyses reconstitutions if needed.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Fatigue analysis as contained in the Transient Analysis (KBA 00 22 E00 006) files including the associated monitoring has been reconstituted due to Operating at Reduced Temperature modification.

RPV fluence margins are periodically updated to account for change in plant life expectancy as a function of neutron embrittlement.

INPUT DOCUMENT REFERENCE:

- KBA 00 22 E00 006 NSSS Design Transients

Assessment:

The identification of TLAAs for reconstitution is to be performed as part of Koeberg SALTO project and all of the identified TLAAs not referenced in the SAR included.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Identify mechanical TLAAs that require reconstitution (and include these in the SAR) as part of the Koeberg SALTO screening process. Refer to WBS 10.	Koeberg SALTO	Q1 2020

AREA C: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR MECHANICAL COMPONENTS

Subsection 3.3.6: Revalidation of time limited ageing analyses.

Functional Group: SDE

Functional Group Lead: Raymond Maapola

Date Performed: 2015-09-28

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.6.1	The capability of some SCs within the scope of LTO to accomplish intended function should be verified by plant specific time limited ageing analyses. The plant should demonstrate that all necessary design basis information is accessible. The revalidation of these analyses should be done with respect to the assumed period of LTO. The revalidation should confirm function and safety margins necessary for the whole period of LTO. Newly identified time limited ageing analyses should be valid for intended period of LTO. If a TLAA cannot be revalidated, appropriate corrective or compensatory measures should be proposed for managing ageing effects of SSCs during LTO.	• List of time limited ageing analyses; • FSAR; • Design supporting documents; • List of equipment with time limited EQ; • SSCs test and inspection records; • SSCs failure reports (including, where appropriate, root cause analysis); • Operational history and records on load cycles; ☐ Statistical data of SSCs failures and failure rates; • Revalidation reports.	10 CFR 50.49 – Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants
			238-6: KOU Documentation and Records Management Standard
			240-56296995 Standard for Records Retention Periods
			240-86502715: Process for Minor Modifications
			31-1 Documentation Management Policy
			32-1216 Process Control Manual for Document and Record Management
			32-6: Eskom Documentation and Records Management Procedure
			331-121: Configuration Management at Koeberg
			331-130: Controlling documentation and responsibilities for Configuration Management at KNPS
			331-143: The Equivalency Process to Change Plant
			331-146: The Obsolescence Process
			331-186, EQ Programme
			331-2 Nuclear Engineering Quality Manual
			331-215: Nuclear Engineering Configuration Management Implementation Programme Exists

			331-275 Process for the Development and Control of Aging Management Matrix at KOU rev 1
			331-3: Nuclear Engineering Documentation and Records Management Work Instruction
		D6.1	331-342: Integrated Plant Design Process for Changes to Systems, Structures or Components at Koeberg Operating Unit
			331-85: Design Basis Documentation Change Process
			331-88: Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base
			ISO 9001:2008 Quality Management System Requirements
			KAA-501: Process for Modifications at Koeberg
			Regulatory Guide 1.89 – Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants
			Safety Analysis Report (SAR)

Functional Group Lead:	ASTRID HOLLAND	**C6.1**
Functional Group:	Process Support – CM Group	
Date Performed:	2015-08-24	

Item:

3.3.6.3 Bullets 1: *Whether all necessary design basis information, applicable codes and regulatory requirements, fabrication records, operational and maintenance history and results of inspections are accessible.*

Current status description and input document reference:
(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The documentation management process followed at KOU cascades directly from the Eskom Documentation and Records Management Procedure.

Each Business Area within the Koeberg Operating Unit also has its own documentation and Records Management Standard that cascades down from the KOU standard.

The KOU Design Base documentation is managed within the Nuclear Engineering Business Area under the NE Work Instruction, 331-3.

All design basis information; i.e. drawings, Maintenance Manuals, DSE's (System Description Manual), etc. are accessible on the PIGO and Hyperwave databases.

All design basis documentation changes are managed using the process documented in document 331-85.

Technical documents are stored in the PIGO and non-technical documents are stored on Hyperwave.

The process for making changes to the Safety Analysis Report is documented in KAA-697,'Control of the Safety Analysis report.' All documents and records generated by this process follow the documentation and records management process described above.

Off-site original construction design base documentation is available at the OEM documentation repository (Alstom, Framatone, Spie Batignolle. Sofenol). If required, this information is available on request from the OEM.

INPUT DOCUMENT REFERENCE:

- 32-6: Eskom Documentation and Records Management Procedure
- 238-6: KOU Documentation and Records Management Standard
- 331-3: Nuclear Engineering Documentation and Records Management Work Instruction
- 331-85: Design Basis Documentation Change Process
- 331-88: Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base
- 331-121: Configuration Management at Koeberg
- 331-130: Controlling documentation and responsibilities for Configuration Management at KNPS
- 331-143: The Equivalency Process to Change Plant
- 331-146: The Obsolescence Process
- 331-215: Nuclear Engineering Configuration Management Implementation Programme Exists

- 331-342: Integrated Plant Design Process for Changes to Systems, Structures or Components at Koeberg Operating Unit
- KAA-501: Process for Modifications at Koeberg
- 240-86502715: Process for Minor Modifications

Assessment:

The PIGO database is currently Eskom's solution for technical documentation (including drawings) and Hyperwave is the repository for non-technical documentation.

The Koeberg Power Station Business Area within KOU, is currently incorrectly using the PIGO database to store both their technical and no-technical documentation.

No specific TLAA documents and records have been identified, so specific retrievability could be proven / tested.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Identify TLAA documents Refer to WBS 8.	Koeberg SALTO	Q3 2016
2	Verify compliance to the relevant procedures with regards to TLAA. Refer to WBS 10.	Koeberg SALTO	Q1 2020
3	Ensure that all KNPS groups (e.g. maintenance and operating) periodically review their processes and update the required records on their respective QRLs	TD&RM	Q1 2018
4	Ensure that all KNPS groups (e.g. maintenance and operating) periodically review their processes and update the required records on their respective QRLs	TD&RM	Q1 2018
5	Transfer KNPS documents to the correct storage systems to align with the Eskom Standard	TD&RM	Q4 2018
6	Verify no duplicate entries exist on the Technical and non-technical documentation repositories for KNPS	TD&RM	Q4 2017
7	Verify no duplicate entries exist on the Technical and non-technical documentation repositories for NE	NE-PS-CMG	Q4 2016
8	Determine what essential design base analyses and calculations, if any, need to be requisitioned. Refer to WBS 9.	Koeberg SALTO	Q4 2016
9	Secure access to the essential OEM DB documentation until updated EOL. Refer to WBS 13.	Koeberg SALTO	Q4 2020

Functional Group Lead:	J Venter		**C6.2**
Functional Group:	SDE		
Date Performed:	August 2015		

Item:

3.3.6.3 Bullets 2: *Whether these calculations/ analyses are properly documented.*

Current status description and input data document reference:

The revalidation of mechanical SCs has not been performed yet.

Assessment:

No revalidation calculations or analyses are available.

Results:	Meet		Don't Meet	X	Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Verify access to the TLAA calculations and analyses for TLAA revalidation. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	K Lukusa	**C6.3**
Functional Group:	SDE	
Date Performed:	2015/08/17	

Item:

3.3.6.3 Bullets 3: *Which kind of methods and criteria have been used for revalidation of time limited ageing analyses.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

TLAA revalidations have not been performed. Methods and criteria are still to be decided on.

-

Assessment:

TLAA revalidations have not yet been performed. Methods and criteria are still to be decided on.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Define a model for revalidation of TLAAs. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Andrew Ceto (L Uys)	**C6.4**
Functional Group:	SDE	
Date Performed:	2015-08-20	

Item:

3.3.6.3 Bullets 4: *Whether the reviewed time limited ageing analyses justify safe operation for LTO.*

Current status description and input document reference:

Revalidation of TLAAs has not been performed.

Assessment:

Revalidation of TLAAs has not been completed for the Koeberg LTO.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of mechanical TLAAs for Koeberg LTO. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Alan Lawrence	**C6.5**
Functional Group:	IPD-K	
Date Performed:	24 August 2015	

Item:

<u>3.3.6.3 Bullet 5:</u> *Whether the implications of revalidation are considered in the plant operational limits and conditions.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

To date the time-limited aging analysis (TLAA) considers the operating term as 40 years. No revalidation for LTO has been performed.

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-275 Process for the Development and Control of Aging Management Matrix at KOU rev 1.

Assessment:

There is currently an extent of ongoing aging analysis in the Environmental Qualification (EQ) Programme, applicable only to harsh environment equipment.

The Aging Management Matrix evaluates current aging concerns but does not assess for LTO.

The TLAA revalidation process for LTO must be initiated.

It is unclear if the QADPs stemming from original construction TLAAs (mechanical) are all readily available.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

<u>No</u>	<u>Action Description</u>	<u>Lead</u>	<u>Due Date</u>
1	Revalidate the TLAA for mechanical SSCs. Refer to WBS 10.	Koeberg SALTO	Q1 2020
2	Verify that the QADP process accomodates for LTO. Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Kabelo Moroka	**C6.6**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

<u>3.3.6.3 Bullets 6:</u> *Whether the qualification of SCs covered by the EQ programme has been satisfactorily established and maintained for LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The scope of the Environmental Qualification (EQ) Programme as described in 331-186 only includes electrical components (including I&C, cables, electrical penetrations) located in harsh environments which are required to perform their safety function in those harsh environments after the effects of in-service ageing. The current EQ programme is in line with the requirements of 10 CFR50.49 and Regulatory Guide 1.89.

EQ for Mechanical SCs is not covered in the scope of the EQ Programme as mechanical SCs falls outside the scope of 10CFR 50.49.

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-186, “Environmental Qualification Programme”;
- 10 CFR 50.49 – Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants;
- Regulatory Guide 1.89 – Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants.

Assessment:

EQ for Mechanical SCs is not included into current scope as mechanical components and civil structures falls outside the scope of 10CFR 50.49. As per EA-15-204, GA 35086-001 GA has been raised for EPG to review the adequacy of the requirements implemented via the KLM-005 or Maintenance Basis Mechanical or to establish EQ programme for mechanical SCs. Mechanical EQ Programmes (MEQ) typically contain the following activities:

- Identification of safety-related mechanical equipment located in harsh environments including operating time;
- Identification of the non-metallic equipment subcomponents;
- Identification of non-metallic material capabilities;
- Identification of service conditions under which equipment must operate (selection of environmental and process parameters for normal and accident conditions);
- Evaluation of environmental effects on equipment operability
- Preparation of auditable files with supporting documentation
- Maintenance and surveillance program development

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Review the need to develop the EQ programme for mechanical SCs which are to perform their safety function in those harsh environments after the effects of in-service ageing. - GA 35086-001. Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Alan Lawrence	**C6.7**
Functional Group:	IPD-K	
Date Performed:	24 August 2015	

Item:

3.3.6.3 Bullets 7: *What corrective or compensatory measures are taken, if the analyses cannot be revalidated.*

Current status description and input document reference:
(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

With respect to LTO equipment, the TLAAs revalidations can only be fully determined once revalidation of the TLAA has been performed. No revalidation of existing TLAAs has been required at this stage of operational life.

TLAAs for replacement modifications of the RPV head, SGR and Refuelling Water Storage Tank (PTR) have been and are being performed under the relevant modifications.

Assessment:

The TLAA revalidation process for LTO equipment must be initiated.

Failure to revalidate will likely result in a study to determine the most appropriate of the following:

- Repair
- Replace
- Modify

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Revalidate the TLAA for mechanical TLO equipment. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Raymond Maapola	**C6.8**
Functional Group:	SDE	
Date Performed:	2015/08/28	

Item:

3.3.6.3 Bullets 8: *Verify if evaluation was done to demonstrate that the safety analyses meet one of the following criteria:*

- The analysis remains valid for the intended period of LTO;
- The analysis has been projected to the end of the intended period of LTO; and
- The effects of ageing on the intended function(s) of the structure or component will be adequately managed for the intended period of LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of mechanical TLAAs to confirm the IGALL criteria is met. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Khaliel Isaacs	**C6.9**
Functional Group:	Safety Case Group	
Date Performed:	21 August 2015	

Item:

3.3.6.3 Bullets 9: *Check if the revalidation of time limited ageing analyses is documented in an update to the safety analyses report.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

The revalidation of time limited ageing analysis is not explicitly stated in the safety analysis report. A general reference to a limit for general plant age is not stated in the SAR however some components have specific references to time limited ageing analysis. Wherever these references are made the general component life is stated as 40 years and are linked to specific ageing and/or degradation mechanisms. The components referenced are mainly mechanical.

Although time limited ageing analysis may not have the same impact throughout the SAR, key principles regarding LTO needs to be specified as a framework for LTO in the SAR. There needs to guiding principles that ensure the design basis is preserved for LTO for critical components subject to TLAA e.g. Reactor Pressure Vessel.

The components that do reference time limited ageing analysis are listed in C6.10 and will require revalidation for the LTO period.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Consider adding a section in the SAR that provides the philosophy for LTO. Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	Khaliel Isaacs	**C6.10**
Functional Group:	Safety Case Group	
Date Performed:	21-24 August 2015	

Item:

3.3.6.3 Bullets 10: *Also check if typical time limited ageing analyses are part of the safety analyses such as:*

- o Irradiation embrittlement of the reactor pressure vessel;
- o Thermal and mechanical fatigue;
- o o Thermal ageing; o Loss of preload;
- o o Loss of material.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Currently, examples of specific mechanical component references in the SAR where the functional life span is clearly stipulated are found in the following Safety Analysis Report Revision 5/5A chapters:

- II-3.3.1.5.6.1 Sensitivity of the material to neutron irradiation
- II-3.3.1.5.6.2 Surveillance programme
- II-3.3.1.11.3 Significant Deficiency (SD-021) RPV Beltline Integrity (Unit 1 & 2)
- II-3.3.4.11.1 Significant Deficiency (SD-002) Primary Cast Elbows
- II-2.2.6.1.3 Reactivity Control System
- II-3.2.7 Protection against Fast Fracture
- II-3.3.2.4.2 Equipment Life (RCP pumps)
- II-3.3.5.10.2 Pressuriser Nozzle Bi-metallic Weld Cracking
- TABLE T-II-3.3.6-2: PRESSURISER SAFETY VALVES - RCP 011-012-013 VP
- TABLE T-II-7.1-1: BASIC RCV OPERATING CHARACTERISTICS

Assessment:

Revalidation of TLAAs must be performed by the Koeberg SALTO project.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Revalidate the time limited ageing analyses for items listed in the SAR. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Raymond Maapola	**C6.11**
Functional Group:	SDE	
Date Performed:	2015/08/27	

Item:

3.3.6.3 Bullets 11: *Verify that selected plant TLAAs are consistent with and meet the intent of the IGALL TLAAs.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Verify that plant mechanical TLAAs are consistent with and meet the intent of the IGALL TLAAs. Refer to WBS 9.	Koeberg SALTO	Q4 2016

Functional Group Lead:	J Venter	C6.12
Functional Group:	SDE	
Date Performed:	August 2015	

Item:

3.3.6.3 Bullets 12.1: *Operational limits and conditions.* - Determine if the stressors given in the design specifications or Current Licensing Basis have been used for assessment of SCs and their supports.

Current status description and input data document reference:

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of mechanical TLAAs and ensure stressors in the design and/or licensing basis have been taken into account. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	K Lukusa	**C6.13**
Functional Group:	SDE	
Date Performed:	2015/09/19	

Item:

3.3.6.3 Bullets 12.2: *Operational limits and conditions.* - Check if data from surveillance programmes and diagnostic systems were applied in the analyses.

Input data document reference: (NOTE: to be copied & pasted into the AIP)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs for LTO have not been performed. Koeberg has not performed any revalidation of TLAAs using data from surveillance programmes.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of mechanical TLAAs and verify that data from surveillance programmes and diagnostic systems were applied in the analyses. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Andrew Ceto (L Uys)	**C6.14**
Functional Group:	SDE	
Date Performed:	2015-08-20	

Item:

3.3.6.3 Bullets 12.3: *Operational limits and conditions.* - Verify if limits established in the design specifications or current licensing basis were used.

Current status description and input document reference:

Revalidation of TLAAs has not been performed.

Assessment:

Revalidation of TLAAs has not been completed for the Koeberg LTO.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Perform revalidation of mechanical TLAAs and verify that limits established in the design specifications or current licensing basis are used. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	ASTRID HOLLAND	**C6.15**
Functional Group:	Process Support – CM Group	
Date Performed:	2015-08-24	

Item:

***3.3.6.3* Bullets 13:** *Documentation of revalidation - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for revalidation of time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The documentation management process followed at KOU cascades directly from the Eskom Documentation and Records Management Procedure.

Each Business Area within the Koeberg Operating Unit also has its own documentation and Records Management Standard that cascades down from the KOU standard.

The KOU Design Base documentation is managed within the Nuclear Engineering Business Area under the NE Work Instruction, 331-3.

Each KOU department has a Quality Records List (QRL). The QRL captures the details of all records generated within the department. This detail includes the record medium, retention period and storage location. Each QRL is controlled by the business areas' Document Control Centre. This QRL must be reviewed every two years or each time a change to a record's detail is required. The QRL Master Copy is archived at DCC in hardcopy, as well as, electronic copy. The authorised form will be published on Hyperwave.

INPUT DOCUMENT REFERENCE:

- ISO 9001:2008 Quality Management System Requirements
- 31-1 Documentation Management Policy
- 238-6 Nuclear Documentation and Records Management Standard
- 331-2 Nuclear Engineering Quality Manual
- 32-6 Document and Records Management Procedure
- 32-1216 Process Control Manual for Document and Record Management
- 240-56296995 Standard for Records Retention Periods
- 331-3 Nuclear Engineering Documentation and Records Management Work Instruction

Assessment:

An accurate QRL allows for excellent retrieval and validation of all records generated.

KOU QRL's are currently either; accurate, inaccurate or none existent.

Results:	Meet		Don't Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	Identify which NE records are not listed in the QRL	NE-PS-CMG	Q4 2016
2	Identify NE records and documents that are not currently archived according to procedure	NE-PS-CMG	Q4 2016
3	Ensure that all documents and records are appropriately archived	TD&RM	Q4 2016
4	Ensure each NE department has a complete and accurate Quality Records List	NE-PS-CMG	Q4 2016
5	Action deleted.		
6	Identify TLAA documents Refer to WBS 8.	Koeberg SALTO	Q3 2016
7	Verify compliance to the relevant procedures with regards to TLAA. Refer to WBS 10.	Koeberg SALTO	Q1 2020

AREA D: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR ELECTRICAL AND I&C COMPONENTS

Subsection 3.3.1: Area-specific scoping and screening of SSCs for LTO.

Functional Group: Engineering Programmes

Functional Group Lead: Kabelo Moroka

Date Performed: 17 August 2015

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.1.1	A systematic process should be used to determine which SCs are to be included in the scope of evaluation for LTO. SCs determined to be within the scope of LTO should be subject to a screening process to determine which SCs are subject to revalidation of time limited ageing analyses and which SC's are subject to ageing management review. The plant should establish specific screening methods for mechanical components, electrical and I&C components and civil structures. A complete list of SCs in the scope of LTO should exist and determine boundaries between mechanical, electrical, I&C components and civil structures. The insights from deterministic safety analyses and the plant specific PSA results (if available) should be used to determine SSCs not important to safety failure of which may impact safety functions. Other methods used to identify those SSCs include plant walk downs and identification of compartments that house safety and non-safety related equipment.	• Plant procedures on methodology of SCs scoping and screening; • Plant procedure to identify SCs not important to safety within the scope; • List of SCs classification; • List/ database of SCs within the scope of LTO; • List/ table / database of SCs which shows the result of the screening; • Drawings which show boundaries of the scope (normally piping and instrument diagrams (P&IDs) with colour identifications).	331-123 (KSA 010) - Nuclear Safety, Seismic, Environmental, Quality And Importance Classification.
			331-94 (KLA-001) – Importance Category Classification Listing
			331-94 (KLA-001) – Importance Category Classification Listing
			331-275 – Process for the development and control of ageing matrix at KOU
			331-275 – Process for the development and control of ageing matrix at KOU

Functional Group Lead:	Kabelo Moroka (Neil Boonzaier)	**D1.1**
Functional Group:	SDE Elec and I&C	
Date Performed:	2015-08-25	

Item:

<u>3.3.1.3 Bullets 1:</u> *Verify if the master list of plant SCs is available and identify all items in scope of LTO and out of scope of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

In accordance with the LTO methodology, SAP Equipment Listing is the master list & items for the scope of LTO, which have an importance classification of SR & CSR and a seismic classification of ND, are SSCs for the KOU LTO Scope.

Pericles which is a Cable Management Database is a master list of plant cables from which a list of SR & CSR cables will be drawn in accordance.

<u>INPUT DOCUMENT REFERENCE:</u>

- SAP Equipment Listing - SAP Business Process software system ("Display Functional Location" lists all structures and components)
- 331-94 (KLA-0010 - Importance Category listing
- PERICLES - Cable Management Database

Assessment:

The electrical and I&C equipment lists of plant SCs can be found in the following:

- 331-94 (KLA-001 Importance Category listing). Lists the deterministic or probabilistic importance (whichever is the higher) of SCs. CSR and SR categories will be used to define the initial scope for LTO.
- SAP Business Process software system ("Display Functional Location" lists all structures and components)
  Contains a complete list of all functional locations (SCs) on the plant.
- 331-219 Environmental Qualification Maintenance Manual. Lists equipment on the EQ programme and specifies the maintenance requirements
- Ageing Management Matrix
- Pericles
  Cable Management Database
- IQ Review (AP913). Maintenance strategy software / database based on SCs listed in SAP.

All safety related electrical and I&C SCs identified by 331-94 (KLA 001) are incorporated into SAP and will be used for initial scoping. The SAP Functional Location is being updated with data from the classification documents but has not yet been verified.

In 331-94 it is possible that some safety related systems have components which by default are classified SR under "remainder of components" but do not perform a SR function and could be excluded from LTO scope.

Results:	Meet		Don't Meet		Partially Met	×	N/A	

No	Action Description	Lead	Due Date
1	Document the scoping and screening methodology. Refer to WBS 1	Koeberg SALTO	Q4 2016
2	Create a complete and cotrolled SAP Listing of all plant SSCs as the master list for LTO scoping. Clarify wth the SAP custodians the ease of adding of new columns to SAP for LTO purposes. Refer to WBS 3	Koeberg SALTO	Q1 2017

Functional Group Lead:	Deon Kruger	**D1.2**
Functional Group:	SDE	
Date Performed:	2015-09-03	

Item:

3.3.1.3 Bullets 2: *Verify if the scope of SCs for LTO is complete, documented and fulfilling scoping criteria.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The scope of SCs for LTO has not been formally documented and has therefore not been verified to be complete and fulfilling scoping criteria.

Relevant data is accessible from the following sources:

331-94 (KLA-001), “Importance Category Classification Listing”, is a list of all SSCs with their importance categories. It is compiled using deterministic as well as PSA analysis – the more conservative importance category is used. It classifies SSCs as Critically Safety Related (CSR), Safety Related (SR), Availability Related (AR) and Not Safety or Availability Related (NSA).

The SAP Equipment List is a business software package that contains a list of all plant components, together with the safety, seismic, quality, environmental and importance classifications.

331-275, “Ageing Management Matrix”, used the EDF ageing matrix (with inputs from the EDF Ageing Analysis Sheets and Continued Operation Capability File) to derive a matrix that contains a list of components and the ageing mechanisms applicable to the components. All safety related SSCs are included as well as some selected non-safety related equipment based on asset management considerations.

The IQReview Equipment Reliability Database stipulates which maintenance tasks must be done at which frequencies. The methodology used to identify the scope and determine the component ER Classifications is described in the guide KGU-035, “Integrated Equipment Reliability Process: Scoping & Classification of Components”. This methodology is based on the recommendations in INPO AP-913, “Equipment Reliability Process Description”, it is aligned with the methodology employed by EDF, and provides a structured approach to classify components in terms of their functional importance, duty cycle and service conditions.

331-219, “Environmental Qualification Maintenance Manual”, aims to provide documented proof that the equipment is qualified for its specific application in the plant in order to provide an adequate level of safety, throughout the life of the station. Current focus for EQ is on 1E electrical and I&C equipment inside containment, and harsh conditions outside of containment.

The Pericles Cables Database contains information regarding all cables installed on the plant during construction and commissioning stages. Later, an Access Database was developed and used to record information regarding cables installed as a result of modifications.

The design basis information can be found in the following documents: SAR, DSEs, OTS, protection files and set point manuals.

INPUT DOCUMENT REFERENCE:

- 331-94 (KLA-001) - Importance Category Classification Listing
- SAP Equipment List
- 331-275 - Ageing Management Matrix
- IQReview Equipment Reliability Database
- KGU-035 - Integrated Equipment Reliability Process: Scoping & Classification of Components
- INPO AP-913 - Equipment Reliability Process Description
- 331-219 - Environmental Qualification Maintenance Manual
- Pericles Cables Database
- Access Cables Database
- SAR
- DSEs
- Protection Files
- Set Point Manuals

Assessment:

All the relevant data to perform scoping for LTO is available, but the scoping has not been formalised, documented and verified to meet scoping criteria.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Formally document the scoping method and SCs within the LTO scope. Refer to WBS 1	Koeberg SALTO	Q2 2016

Functional Group Lead:	Alan Lawrence	**D1.3**
Functional Group:	IPD-K	
Date Performed:	24 August 2015	

Item:

3.1.1.3 Bullet 1: *Verify if SCs to prevent / mitigate design extension conditions are within the scope of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

For all plant functions, systems, structures, services, processes, software, components and parts at Koeberg Nuclear Power Station a classification process is used to determine their respective:

- Importance category
- Nuclear safety class
- Seismic class
- Environmental category
- Quality level
- Safety level

Importance Category defines the importance of functions, systems, processes, components, structures, services and software, pertaining to nuclear safety and plant availability.

Safety Class defines the impact on nuclear safety of functions, systems, components, structures, parts and software in accordance with the criteria defined in ANSI/ANS N18.2-1973 and IEEE 308-1971 for mechanical and electrical requirements respectively.

Seismic Class defines the functional or structural integrity required in the event of a Design Base Earthquake.

Environmental Category defines the nuclear environment in which components, structures and their parts are required to operate.

Quality Level defines the level of oversight required by Eskom during the design, manufacturing and procurement phases due to nuclear and/or technical requirements.

Safety Level defines the management system and other requirements of organisations providing products to KNPS in accordance with the requirements of RD-0034.

As governed by KSA-010, the document KLA-001 is a listing of the SSCs and their respective importance category.

INPUT DOCUMENT REFERENCE:

- 331-94 (KLA-001) – Importance Category Classification Listing
- KSA-010 - Nuclear Safety, Seismic, Environmental, Quality And Importance Classification
- 331-93 (KGA-003) – Guide For Classification of Plant Components, Structures and Parts
- 331-275 – Process for the Development and Control of Ageing Management Matrix at KOU
- RD-0034 – Quality and Safety Management Requirements for Nuclear Installations

Assessment:

The importance category listing, 331-94, does not identify SSCs required to prevent / mitigate design extension conditions.

The KOU classifications standard and guide, KSA-010 and 331-93 respectively, do not define a methodology to determine / identify SSCs required to prevent / mitigate design extension conditions.

The SSCs required to prevent / mitigate design extension conditions have not been identified and are consequently not confirmed to be in the LTO scope.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Revise KSA-010 and 331-93 to include the necessary classification changes to ensure that SSCs required to prevent / mitigate design extension conditions are identified. Refer to WBS 3.	Koeberg SALTO	Q1 2017
2	Revise 331-94 (KLA-001) to include all SSCs identified to prevent / mitigate design extension conditions. Refer to WBS 3.	Koeberg SALTO	Q1 2017
3	Ensure that the SSCs identified to prevent / mitigate design extension conditions are within the scope of LTO. Refer to WBS 1	Koeberg SALTO	Q4 2016

Functional Group Lead:	Kabelo Moroka (E Kerr)	**D1.4**
Functional Group:	SDE - Electrical	
Date Performed:	2015-08-17	

Item:

3.3.1.3 Bullets 4: *If scoping and screening data is distributed into more than one database, check that the data consistency is assured.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

The lists of plant SCs is found in the following:

- 331-94 (KLA-001 Importance Category listing). Lists the deterministic or probabilistic importance (whichever is the higher) of SCs. CSR and SR categories will be used to define the initial scope for LTO.
- SAP Business Process software system ("Display Functional Location" lists all structures and components)
  Contains a complete list of all functional locations (SCs) on the plant.
- 331-219 Environmental Qualification Maintenance Manual. Lists equipment within the scope the EQ programme.
- Ageing Management Matrix.
- Pericles
  Cable Management Database.
- IQ Review (AP913). Maintenance strategy software / database based on SCs listed in SAP.

SAP contains all the structures and components in the LTO scope will be used as the Master List for scoping; and KLA-001, derived from KBA 00 00 G00 032, can be used as a 'high level' reference of SC importance in the scoping exercise.

The 331-275 Ageing Management Process that results in the Ageing Management Matrix. The Ageing Management Matrix contains the SC's degradation/ageing mechanisms so it can be used as a reference for LTO screening, complemented by data sources such as the IQReview database.

INPUT DOCUMENT REFERENCE:
- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032 System Listing
- SAP
- 331-275 (Ageing Management Matrix)
- 331-86: Design Changes to Plant, Plant Structures, and Operating Parameters
- IQ Review Database (INPO AP-913: Equipment Reliability)

Assessment:

The Importance Category Classification Listing, KLA 001, is considered accurate but has no component detail under the 'remainder of components' category so SAP must be used as the Master List for scoping.

Due to the historic inclusion of Importance Categories into SAP, the data in SAP does not always have the classification 'granularity' required for comprehensive screening of all SCs so will need to be complemented by other data sources such as the IQReview database and design base documentation.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Document the scoping and screening methodology. Refer to WBS 1	Koeberg SALTO	Q4 2016

Functional Group Lead:	Abu-bakr Jakoet	**D1.5**
Functional Group:	Engineering Programmes	
Date Performed:	17 August 2015	

Item:

3.3.1.3 Bullets 5: *Whether SCs not important to safety which may impact on safety functions are in the scope.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-123 describes the standard used for the classification of SSCs based on international standards and guidelines.

Safety Class of electrical equipment, parts and software are assigned safety class 1E if they are essential to emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or otherwise are essential in preventing significant release of radioactive material to the environment. Safety class NSF or “No Safety Function” applies to systems, components, structures, parts and software that do not fulfil the criteria of fluid retaining SSCs as described in ANSI 18.2 and non-fluid retaining SSCs as described.

The electrical and I&C SSCs classified as CSR and SR in the importance listing of SAP and KLA-001 encompasses these electrical components with a safety class of 1E or NSF. Importance category items of CSR and SR with a NSF Safety Class are those electrical and C&I SSCs, who on a component level, might not have a safety function (NSF) but who’s failure could possibly result in an impact to a system or parent component safety function (CSR or SR, see 331-123 and reference documents therein for more detail)

The listing, SAP Equipment Listing and 331-94 (KLA-001), as governed by KSA-010, includes the SSCs not important to safety which may impact on a safety function.

INPUT DOCUMENT REFERENCE:

- SAP Equipment Listing
- 331-94 (KLA-001) – Importance Category Classification Listing
- 331-123 (KSA-010) - Nuclear Safety, Seismic, Environmental, Quality And Importance Classification
- KBA1222E1001 – Safety Classification for Electrical and Instrumentation Equipment
- 331-186 (KSA-125) – Environmental Qualification at Koeberg Operation Unit

Assessment:

SAP Equipment Listing is used as the basis for the scope of LTO and therefore SSCs as described by D1.5 are included in the scope for LTO.

Results:	Meet	X	Don’t Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Abu-bakr Jakoet	**D1.6**
Functional Group:	Engineering Programmes	
Date Performed:	17 August 2015	

Item:

<u>3.3.1.3 Bullets 6:</u> *Whether and how the SCs commodity groups (group of components and structures which have similar functions and similar materials) have been defined.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-275 - Process for the development and control of ageing management matrix at KOU describes the development of an ageing management programme. The ageing mechanisms and the SSCs combinations (commodity groups) that are considered in the KOU ageing management matrix are based on EDF's ageing management matrix that was adapted and populated with KOU specific reference documentation addressing the ageing commodity groups (combination of degradation mechanism and SSC).

The matrix intends to ensure that all equipment monitoring programmes are comprehensive and cater for all known potential degradation.

An assumption was made that for the initial matrix, the ageing concerns of EDF and KOU are similar enough to adopt and allow for the adaptation of the KOU specifics. The document describes the process for including SSCs into the scope of the ageing matrix, which are presented at Engineering Technical Management Meeting (ETMM) as gaps.

The following current commodity groups are defined in the KOU Ageing Matrix for electrical and C&I SCs:

• 600 – Electrical Components: • 601 – Emergency Diesel Generator; 602 – Electrical Panels; 604 – Converters and Inverters; 605 – Batteries; 606 – Main Transformer; 607 – Dry Transformer; 608 – Automatic Relays; 609 and 609a – Solenoid Valves; 610 – Connectors AIR-LB; 611 – Heat Shrink Tubing RAYCHEM Connection; 612 – K1 Connectors	• 700 – Instrumentation: • 701 – EX Core Neutronic Measurements; 702– Position Detectors; 703 – On-Off Captors; 704 – Resistance Temperature Sensor; 705 – Core Thermocouple;706 – Hydrogen Meter; 707 – Flow Meter; 708 – UT Flow Meter; 709 – Analogue Pressure Transmitter; 710 – UT Transmitter; 711 – KRT Protection; 712 – Regul Rod Position Measurement; 713 – Time Independent Protection Relay; 714 – Counter; 715 – RPV Level; 716 – Automatic Scram Protection; K717 – Electronic Cards; K718 – In-Core Instrumentation
• K111 – Motor Operated Valve Actuators	• K305a – LLS Diesels
• 302 – Fire Protection	• 500 – Cables: 501 – Electrical Cables; 502 – Cable Trays; 503 – Mineral and Coaxial Cables
• 305 – TURBOALTERNATEUR LLS	•

The commodity groups with a K reference Number (e.g. K111 – MOV Actuators) are those groups which have been added as a gap from the adopted EDF Matrix as they are specific to KOU.

INPUT DOCUMENT REFERENCE:

- 331-94 (KLA-001) – Importance Category Classification Listing
- 331-275 - Process for the development and control of ageing management matrix at KOU.

Assessment:

The ageing management matrix groups KOU SSCs based on the EDF couple groupings. Any gaps will be identified and presented to ETMM for inclusion into ageing matrix which would include the LTO scope.

An evaluation of SSCs in the LTO scope is required in order to classify what SSCs form part of which commodity group as defined in the matrix. Any SSCs in the list that cannot be grouped as part of the commodity groups described above will be assigned a specific "K" commodity group number and the subsequent ageing analysis will be performed for these.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform the screening of the Master SSCs list for LTO to match defined commodity groups in the Ageing Management Matrix. Refer to WBS 5	Koeberg SALTO	Q2 2017
2	Identify gaps and create additional Koeberg specific commodity group in the Ageing Management Matrix, if required. Refer to WBS 5	Koeberg SALTO	Q4 2016
3	Perform Ageing Management Reviews (AMR) for SSCs requiring AMR. Refer to WBS 6	Koeberg SALTO	Q4 2020
4	Perform TLAA Revalidation for the Electrical and I&C components. Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	Abu-bakr Jakoet	**D1.7**
Functional Group:	Engineering Programmes	
Date Performed:	17 August 2015	

Item:

3.3.1.3 Bullets 7: *Verify if SCs within the scope of LTO are subjected to an appropriate ageing management review and evaluation of time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

SAP Equipment Listing is used as the master list for scoping SSCs for LTO and includes both SSCs that require an AMR as well as those requiring a revalidation of a TLAA.

SSCs requiring a TLAA are those that are part of the EQ Programme. For a list of SSCs and their qualified life see 331-219 – Environmental Qualification Maintenance Manual.

INPUT DOCUMENT REFERENCE:

- 331-94 (KLA-001) – Importance Category Classification Listing;
- 331-186 (KSA-125) – Environmental Qualification at Koeberg Operation Unit;
- 331-219 (KBA 1222 E02 1002) – Environmental Qualification Maintenance Manual;
- 331-275 - Process for the development and control of ageing management matrix at KOU.

Assessment:

The KOU Ageing Management Matrix as well as the SSCs list in the Scope for LTO (SAP) does not specifically differentiate between the SSCs requiring an AMR or those requiring a TLAA. It can also not be assumed that ONLY the SSCs in the EQ Programme are those that require a revalidation of a TLAA. The SSCs in the list need to be screened using the processes described in IAEA Safety Series Report No. 57 and IAEA Technical Report Series No.338 to determine whether they require an AMR or a revalidation of a TLAA.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Perform a screening of the LTO Scope List to identify which SSCs require a TLAA or an AMR based on the screening process described in the IAEA TRS 338 and IAEA SRS 57 or the new KOU LTO strategy/methodology. Refer to WBS 5	Koeberg SALTO	Q2 2018

Functional Group Lead:	Abu-bakr Jakoet	**D1.8**
Functional Group:	Engineering Programmes	
Date Performed:	17 August 2015	

Item:

<u>3.3.1.3 Bullets 8:</u> *Whether there is a documented and verifiable methodology for the screening of SCs for ageing management review.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

At KOU, the ageing management approach is to use the EDF ageing matrix to derive a matrix that contains a list of components and the ageing mechanisms applicable to these components.

An assumption was made that for the initial matrix, the ageing concerns of EDF and KOU are similar enough to adopt the EDF matrix and allow for KOU adaptation. The components ageing information is only recorded in the ageing management matrix, listing the ageing couple and the KOU specific reference document addressing the ageing mechanism.

331-275 describes the EDF Ageing Management process and documentation. The process within EDF comprises of the procedure that describes the approach adopted. The ageing management matrix captures all applicable and potential degradation linked to the grouped equipment (called a couple/commodity group).

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-275 - Process for the development and control of ageing management matrix at KOU;
- 331-148 – Programme Engineers Guide;
- 331-102 – ETMM TOR;
- KGU-031 – System Health Reporting;
- KGU-011 – Life of Plant Plans.

Assessment:

The following logic diagram is extracted from IAEA Safety Report Series No.57. It describes the screening process to identify which SSCs from the master LTO list (KLA-001) will require an ageing management review (AMR) or a revalidation of the time limited ageing analysis (TLAA).

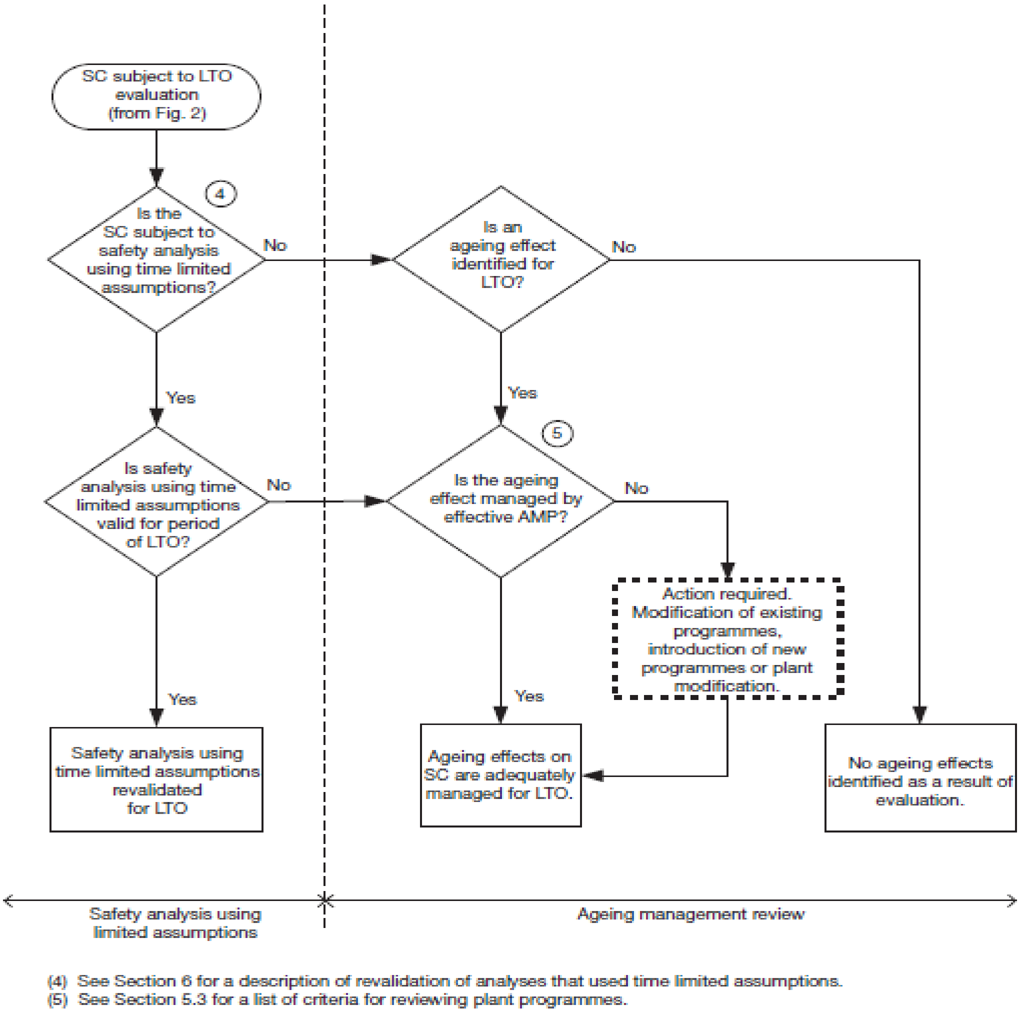


Figure 1: Screening Process for LTO (extracted from IAEA Safety Report Series No.57)

The intent of the KOU ageing matrix is to achieve the process of what Figure 1 describes, however, as it currently stands, there are gaps in the ageing matrix as it does not specify which couple groups or SSCs will require an AMR or revalidation of a TLAA.

The methodology for screening SSCs in the LTO scope for an AMR or revalidation of a TLAA has not formally been documented in KOU documentation.

Results: Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Develop the methodologies for scoping and screening SSCs for LTO based on IAEA guidelines in the IAEA TRS 338 and IAEA SRS 57 and updated 331-275 with the screening methodology. Refer to WBS 1	Koeberg SALTO	Q3 2016
2	Verify that all SSCs in the scope of LTO (according to the Master list [SAP list]) is represented in the ageing matrix. Refer to WBS 5	Koeberg SALTO	Q3 2017
3	Register and provide a unique number and revision to the ageing matrix. Refer to WBS 4.	Koeberg SALTO	Q3 2016

AREA D: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR ELECTRICAL AND I&C COMPONENTS

Subsection 3.3.2: Ageing management review.

Functional Group: Engineering Programmes **Functional Group Lead:** Kabelo Moroka

Date Performed: 2015-08-19

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.2.1	The physical status of SCs in scope of LTO should be assessed. For SCs determined to be within the scope of LTO, the plant should have adequate programmes for managing the effects of ageing degradation for the period of LTO. The plant ageing management review should identify for each SC in scope of LTO possible ageing effects and degradation mechanisms, critical locations/ parts, material, environment and ageing management programmes, see also IGALL AMR tables [6]. The plant should maintain documentation of LTO evaluations and demonstration that the effects of ageing are managed during the planned period of LTO. The plant should demonstrate that ageing effects and degradation of all SCs within the scope of LTO are covered by appropriate plant programmes, newly established ageing management programmes and revalidation of time limited ageing analyses, if applicable. If some SSCs cannot be inspected (e.g. due to inaccessibility) or assessed, justification for such SSCs to continue in service is necessary.	• Programmes for managing the effects of ageing; • Report on PSR (if it exists); • Past corrective actions resulting in enhancement of AMPs; • Existing plant programmes listed in Section 3.2.2 (these are reviewed as preconditions).	Ageing Management Matrix – 331-275 SRA II report – chapter 4 Ageing Programme Engineer guide – 331-148 ETMM TOR – 331- 102 KGU 011 – Life of Plant Plans NEPP 001 – Concept of position papers System Health reporting – KGU 031 Plant Health committee – KAA 826 KGA 035 – OE from EDF CURA integrated risk reporting (238-22) QRA – 331-64 Qualitative Risk Assessment

Functional Group Lead:	Anton Kotze	**D2.1**
Functional Group:	Engineering Programmes	
Date Performed:	August 2015	

Item:

<u>3.3.2.3 Bullets 1.1:</u> *Assessment of the current physical status of the plant* - Confirm that appropriate ageing management reviews and condition assessments have been performed for SCs subject to ageing management review.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Comprehensive reviews of ageing and degradation phenomena are being performed and managed via many various programmes such as the EQ programmes, Cable Ageing Management Programme for MV cables and Maintenance Basis processes. These are crosschecked by the Ageing Management Matrix as per 331-275, “Ageing Management Matrix”. A Programme Health report is issued on every six month on the health of SCs within the scope of the EQ and CAMP Programmes as per 331-148.

The monitoring and trending of the system performance to identify problems and age related concerns before they adversely affect the functionality of the system in accordance with the System health reporting guide, KGU-031. Trending results are documented in the System Health Report Action Plans, where they can receive increased visibility in order to promote overall system performance. In addition a Component Health Report is compiled by the Component Engineers on a 6-montly basis to document the system performance and condition and to determine the component health.

Plant Health Committee (PHC) reviews the quarterly System Health Report and six-monthly Component Health report before final issue and monitors the effectiveness of plant initiatives and operational forums and strategically determines the way forward for plant health.

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- 331-148 - Programme Engineer guide
- 331- 102 - ETMM TOR
- KGU 011 – Life of Plant Plans
- KGU-029 – Monitoring and Trending in Plant Engineering
- NEPP 001 – Concept of position papers
- KGU 031 - System Health Reporting Guide
- KAA 826 - Plant Health committee
- KGA 035 – OE from EDF
- 238-22 - CURA integrated risk reporting
- 331-64 Qualitative Risk Assessment

Assessment:

Ongoing task, and all of the above mentioned activities are in place. The screening according to 331-275 still needs to be completed for all identified electrical & I&C components.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Complete the ageing management reviews and condition assessments for electrical & I&C SCs subject to ageing management review (AMR). The EDF Ageing Matrix should be used in the AMR for LTO. Refer to WBS 6	Koeberg SALTO	Q1 2020

Functional Group Lead:	Kabelo Moroka	**D2.2**
Functional Group:	Engineering Programmes	
Date Performed:	August 2015	

Item:

3.3.2.3 Bullets 1.2: *Assessment of the current physical status of the plant.* - Determine if all the important input design data such as design description, design basis including loads and other parameters necessary for evaluation of safety are available or accessible for the plant.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Koeberg Safety Analysis Report (SAR) contains information of a general nature related to the nuclear power plant layout, the major systems and buildings, the engineered safeguard systems that prevent or mitigate the release of radioactivity, and the location of major equipment. The SAR also contains a review of the regulations, which apply to Koeberg for the design, construction and normal operation and for the prevention of accidents and mitigation of their consequences. Information on structures, systems, equipment and components necessary to maintain Koeberg Units 1 and 2 in a safe condition during all operational states is described in the SAR. Classification of civil, mechanical and electrical structures and equipment, and protection against climatic loads, missiles, the industrial environment and the dynamic effects associated with pipe breaks are described. Information on the validation of the seismic design of the sub-foundation, civil structures, and safety-related equipment required to withstand seismic events is provided. Information concerning the containment design, isolation measures and validation tests is also provided. The resistance of systems and equipment to various loads and the environmental qualification of electrical equipment based on the design basis accidents are described.

In addition, design information, general principles of design and operation necessary for evaluation of safety are available in the relevant design basis information documents such as system design files (DSE), QADPs, Protection Files, Setpoints Manual (KBA 1227 E02507 and KBA1222E02027), Maintenance Manuals, Design Specifications and Plant Drawings (Flow diagrams, SIP and SIN diagrams).

The above mentioned documents are available and accessible through the Main Document centre as hard copies and electronically available via Excalibur, Hyperwave and PIGO. Some design information with the OEM and could be obtained if required.

<u>INPUT DOCUMENT REFERENCE:</u>

- Safety Analysis Report (SAR)
- DSEs
- Quality Assurance Data Packages (QADPs)
- Maintenance Manuals – File 000 – File 920
- KBA1222E02027 - NSSS Setpoints Manuals
- KBA 1227 E02507 - BNI Setpoints Manuals
- Protection Files
- 331-291 - EQ Manual
- 331-217 – Cable Ageing Management Programme

Assessment:

All the important input design data such as design description, design basis including loads and other parameters necessary for evaluation of safety are available or accessible for the plant and some design information must be obtain from the OEM.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Obtain all missing QADPs, design documents and test reports from the OEM and ensure access to essential OEM Design Basis documentation for Koberg for the period of LTO. Refer to WBS 13	Koeberg SALTO	Q4 2017

Functional Group Lead:	Anton Kotze	**D2.3**
Functional Group:	Engineering Programmes	
Date Performed:	August 2015	

Item:

3.3.2.3 Bullets 1.3: *Assessment of the current physical status of the plant.* - Check that information on maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept and managed in a proper way.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All information relating to maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept in QADPs and managed in accordance with KSA-011,” The Requirements for Controlled Documents” and KAA 500, “The Process for Controlled Documents”. Maintenance history is captured in the Equipment History Records as per KSM-015, Maintenance History Records. Refer to QADPs, SAP history and Equipment History Records as per KSM-015, transient monitoring files, DSE and maintenance manuals. Information continues to be managed as per KAA-500, KSM-006 and other programmes requirements.

INPUT DOCUMENT REFERENCE:

- KSA-011,” The Requirements for Controlled Documents”
- KAA 500, “The Process for Controlled Documents”
- KSM-015, “Maintenance History Records”
- KSM-006, “Investigating, Compiling and Execution of Maintenance Work Packages”
- 331-2, “Nuclear Engineering Management Manual”.

Assessment:

Gathering of maintenance history of the ARE010MN, SG level, has been attempted as part of this assessment to illustrates that information could be retrieved dating from commissioning. It is believed that maintenance history is available but at times might difficult to retrieve. Note that some manufacturing details and test reports were not obtained and remain available only from the OEM. These missing documents need to obtained or evaluation needs to be done especially for EQ equipment to evaluate the qualified life and the need for replacement in case the documents cannot be located.

Results:	Meet		Don’t Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Identify missing design documents and test reports and ensure access to essential OEM Design Basis documentation for the period of LTO. Refer to WBS 13	Koeberg SALTO	Q4 2017

Functional Group Lead:	Anton Kotze	**D2.4**
Functional Group:	Engineering Programmes	
Date Performed:	2015-09-01	

Item:

<u>3.3.2.3 Bullets 1.4:</u> *Assessment of the current physical status of the plant.* - Confirm that review and assessment of the operating and maintenance history for each structure or component is part of the analyses accounting for such parameters as operational transients, past failures, or unusual conditions that affected the performance or condition of the structure or component. Confirm that examination of repairs, modifications or replacements relevant to ageing considerations are included in the analysis of the SCs

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Previous history of component failures are systematically reviewed when "component failures" are considered under KGU-033, "Failure investigation of plant equipment and evaluation of experience"' with component failures. KGU-033 provides guidance for investigating plant component failures. The experiences gained from these investigations are used to prevent recurrence, improve the Maintenance Basis and compile equipment failure statistics for trending purposes. All the component failures have been reviewed (and are to be regularly reviewed) to verify that all ageing/degradation effects are represented in the Ageing Management matrix.

The operational transients, abnormal conditions (i.e. loss of normal electrical power, turbine trip, malfunction of individual items of a normally running plant, failure to function of individual items of control equipment, etc.), elevated environmental condition (temperature and radiation) are considered when performing analyses to ensure no damage to items important to safety nor lead to accident conditions.

Modifications and equivalent replacements follow systematic process and assessments as stipulated in 331-86 and 331-144 respectively.

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-275 - Ageing Management Matrix
- 331-148 - Programme Engineer guide
- KGU-033 - Failure investigation of plant equipment and evaluation of experience
- 331-144 (KSA-017) - Standard for the preparation of an equivalency study
- 331-86 – Standard for Plant Changes affecting the Design of Koeberg Nuclear Power Station
- SAR

Assessment:

The review of all historical component failures have resulted in a few additional ageing/degradation couples being added to the AMM.

RC 15794 was raised as part of the SRA 2 to identify abnormal conditions that could result in damage to Class 1E qualified equipment. The definition of an "abnormal" condition as per IAEA Safety Report No. 48 must be added EQ Maintenance Manual 331-219.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Identify and monitor abnormal conditions that could result in damage to EQ qualified equipment and evaluate their impact on safety related functions and qualification. If required, update the EQ Maintenance Manual, 331-219, to include the reference to "abnormal" conditions.	NE EPG	Q4 2017

Functional Group Lead:	A Kotze	**D2.5**
Functional Group:	SPS/PE/SDE	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 1.5: *Assessment of the current physical status of the plant.* Determine that operational data are collected with a focus on transients and events and on generic operating experience. Also information relevant to power uprating, modification and replacement, surveillance and any trend curves are important to be available for the overall assessment.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Refer to transient monitoring process and links with international memberships, EDF. Trending by InSQL provides for pre and post modification trends of operational aspects. Review and monitoring of operational and testing data provide insight into condition of plant. For electrical/C&I components the EQ, SRSM, operations and maintenance monitoring processes are typically captured in SAP history.

Assessment:

Data on transients are available, reviewed and evaluated to provide insight into plant condition. Specific reviews of events are performed prior to identification and specification of repair methods. Review of transient monitoring is focussed on the mechanical effects of the transient. There is no review for electrical or I&C components.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Investigate the need for reviewing the transient monitoring information with a focus on the ageing electrical & I&C components.	SPS	Q4 2017

Functional Group Lead:	Anton Kotze	**D2.6**
Functional Group:	Engineering Programmes -	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 2.1: *Identification of ageing effects and degradation mechanisms.* - Check that a procedure exists for the structure, component or commodity grouping to assess ageing effects in detail.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Ageing Management Matrix, 331-275, represent the ageing management matrix (AMM) derived from the EDF comprehensive ageing assessment. The EDF AMM has been reviewed by the System Engineers and Programme Engineers SMEs For Koeberg specific component and applicable degradations.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- 331-148 - Programme Engineer guide

Assessment:

Reviews of the AMM by SMEs to date (as well as a review of all Component Failures registered on EPMS) have not identified significant discrepancies.

There is currently no process standard specifying the requirements for the ageing matrix.

During the Koeberg SALTO project the verification of complete coverage of the AMM will be obtained when all Koeberg plant equipment will be scrutinised and ensured it is included in the AMM, where after a systematic review and comparison with IGALL will be undertaken.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Development a new standard that provides the rules for the development of the programmes and the ageing management process at Koeberg . Refer to WBS 4	Koeberg SALTO	Q3 2016

Functional Group Lead:	Engineering Programmes	**D2.7**
Functional Group:	Engineering Programmes - Anton	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 2.2: *Identification of ageing effects and degradation mechanisms.* - Verify the plant ageing management review process identifies possible ageing effects/mechanisms, critical locations/ parts, material, environment and ageing management programmes addressing these subjects for SCs in the scope of LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Comprehensive reviews of ageing and degradation phenomena are being performed and managed via various plant programmes and processes and crosschecked with the Ageing Management Matrix as per 331-275, "Ageing Management Matrix".

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- Programme Engineer guide – 331-148
- ETMM TOR – 331- 102
- KGU 011 – Life of Plant Plans
- NEPP 001 – Concept of position papers
- System Health reporting – KGU 031
- Plant Health committee – KAA 826
- KGA 035 – OE from EDF
- CURA integrated risk reporting (238-22)
- QRA – 331-64 Qualitative Risk Assessment

Assessment:

Identification of possible and potential ageing effects are identified from Koeberg and international OE (mostly EDF), contact with other utilities at FROG, WANO and EPRI and the strategy for ageing review compared to IGALL. The scope of SALTO is considered comprehensively covered but not yet executed. The BAU aspect is however in place and being developed and expanded in an on-going manner.

For LTO a specific review will be performed and documented as per the Koeberg SALTO project. Refer to Koeberg SALTO project description.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Development a new standard that provides the rules for the development of the programmes and the ageing management process at Koeberg . Refer to WBS 4	Koeberg SALTO	Q3 2016

Functional Group Lead:	Engineering Programmes	**D2.8**
Functional Group:	Engineering Programmes - Anton	
Date Performed:	2015/08/24	

Item:

<u>3.3.2.3 Bullets 2.3:</u> *Identification of ageing effects and degradation mechanisms.* - Determine if materials, environment and stressors that are associated with each, component, or commodity grouping were considered in the process of identification of ageing effects.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Referenced documents are EDF ageing matrix, EDF OE, EPRI materials and issue tables, FROG concerns, PWROG topics and IGALL. All of these inputs are channelled towards the ageing management of components and commodity groupings.

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- Programme Engineer guide – 331-148
- Nuclear Position Papers

Assessment:

Ageing concerns and environmental stressors impacting SSCs are obtained and channelled towards management of the components or equipment groupings. The reviews of the AMM by the Koeberg technical leads have not identified many outstanding ageing concerns giving confidence that ageing concerns are captured and being dealt with.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Anton Kotze	**D2.9**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-28	

Item:

3.3.2.3 Bullets 2.4: *Identification of ageing effects and degradation mechanisms.* - Check if operating experience and research findings and results were adequately considered.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Research results and OE are well identified and made available to technical leads and system engineers to decide on management methods. Reference documents such as AMM, IGALL, EDF OE, EPRI research, WANO concerns, FROG and PWROG items, PSR reports, LOPPs and NEPPs are considered. The integrated approach of all of these provide for a comprehensive identification of concerns. The verification that all of the identified research findings have been adequately considered can be judged by reviewing the related plant equipment failures.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- 331-148 - Programme Engineer guide
- 331-23 – NE Processing of international OE
- KAA-688 – Corrective Action Process
- Nuclear Position Paper

Assessment:

Research results and OE are well identified and made available to technical leads to decide on management methods. Recent plant performance indicates good management of ageing concerns. Some expensive and complex concerns have been delayed and increase risk of production losses (e.g. unit 2 RPV head, pressuriser heaters, electronic cards, needle valves of RIS/EAS).

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Include into the Ageing Management process 331-275, how research and OE is used to update the AMM. Review NE document 331-23 to incorporate the process for gathering international knowledge and operational experience and to standardise the reporting and feedback into the engineering processes. Refer to WBS 4.	Koeberg SALTO	Q3 2016

Functional Group Lead:	A Kotze	**D2.10**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 2.5: *Identification of ageing effects and degradation mechanisms.* - For selected examples, check consistency with IGALL AMR tables.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Not yet done. IGALL comparison is scheduled for Koeberg SALTO project.

Assessment:

The comparison of KOU programmes with IGALL AMPs is currently in progress under SPS Selef Assessment (SE 85540 (SE 35189)). The review of the AMRs & AMR tables will only be done under the Koeberg SALTO project.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Review the Koeberg AMM against the IGALL AMR tables to confirm that the ageing matrix is comprehensive and complete. Refer to WBS 6	Koeberg SALTO	Q1 2017

Functional Group Lead:	A Kotze	**D2.11**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 3.1: *Documentation of the evaluation and demonstration for management of ageing effects.* - Verify if demonstration was done that the effects of ageing will continue to be identified and managed such that the intended function of the SC will be maintained throughout the planned period of LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Effects of ageing will continue to be identified and managed via various BAU processes and programmes e.g. ETMM, AMM & engineering programmes, LOPP, NCR, Design and TAF, PSR, WANO, EPRI/FROG/PWROG memberships.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- 331-148 – Programme engineers guide
- 331-102 - Engineering Technical Management Meeting (ETMM), LOPP Guide
- KAA-506 - Temporary Alterations to Plant, Plant Structures or Operating Parameters that Affect the Design Base
- KAA-815 -Design Changes to Plant, Plant Structures or Operating Parameters
- KAA-690 - Operability Determinations

Assessment:

For the existing processes it will be easy to confirm these are expected to remain in place for LTO. For the international memberships it will be difficult to prove that the intention is to continue for the duration of LTO (especially since the financial attacks to reduce these are factual).

The gathering of international knowledge and operational experience to be performed in accordance with a standard procedure.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Create a list of requirements (such as External OE memberships) to remain in place for LTO (sanctioned at NEXCO/NMC), possibly included into the LTO strategy.	NE PS	Q4 2016
2	Revise 331-23 to incorporate the gathering of international knowledge and operational experience and standardise the reporting and feed into the engieering processes. Refer to WBS 14	NE PS	Q4 2016
3	Include into the Ageing Management process, how research and OE is used to update the AMM is not well procedurised. Refer to WBS 4	Koeberg SALTO	Q3 2016

Functional Group Lead:	A Kotze	**D2.12**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 3.2: *Documentation of the evaluation and demonstration for management of ageing effects.* - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for effective management of ageing effects.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The documentation processes at KOU can be found in KAA 010, KAA 500 and 331-2. In addition all ageing management programmes augment the standard requirements with specific requirements for records generated. Most of the Engineering Programmes are identified in 331-148.

INPUT DOCUMENT REFERENCE:

- KSA 010 – The Requirements for Controlled Documents
- KAA 500 – The Process for Controlled Documents
- 331-3 – Document and Records Management Work Instruction
- 331-148 – Programme Engineer guide

Assessment:

During SALTO review gaps will be identified and will be required to be closed. All information and documentation for SALTO to be captured as per approved documentation processes.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**D2.13**
Functional Group:	SPS/PE	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 3.3: *Documentation of the evaluation and demonstration for management of ageing effects.* - Confirm that efficient data collection and record-keeping systems are in place so that trend analyses can readily be performed to predict SSC performance.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Data collection is dependent on the individual programme or process. Each AMP will have specific data collection and record keeping requirements.

INPUT DOCUMENT REFERENCE:

- 331-148 Programme Engineers guide

Assessment:

All required monitoring data is available and in some NB safety related cases, these are trended and sent to the NNR.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Verify that all AMP relevant data is collected and trended to support operation beyond year 40 and to year 60. Refer to WBS 12	Koeberg SALTO	Q4 2016

Functional Group Lead:	A Kotze	**D2.14**
Functional Group:	SPS	
Date Performed:	2015/08/24	

Item:

3.3.2.3 Bullets 3.4: *Documentation of the evaluation and demonstration for management of ageing effects.* - Verify that the following information is available in the documents demonstrating management of the ageing effects:

- Clear identification of the ageing effects requiring management;
- Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed;
- Description of how the programmes and activities will manage the effects of ageing;
- List of substantiating references and source documents;
- Discussion of any assumptions or special conditions used in applying or interpreting the source documents;
- Description of existing and new programmes for LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The ageing management matrix addresses the following items:

- Clear identification of the ageing effects requiring management;
- Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed;

Each of the programmes individually addresses:

- Description of how the programmes and activities will manage the effects of ageing;
- List of substantiating references and source documents;

Discussion of any assumptions or special conditions used in applying or interpreting the source documents;

Assessment:

Self-evaluation (SE 88540 for SPS) is currently underway. It will review the existing and need for new programmes referring to the IGALL listing. The programme guide (331-148) needs to address the description of existing and new programmes for LTO.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Complete the self-evaluation of electrical/C&I ageing management programmes vs IGALL. Refer to WBS 7.	NE EPG	Q4 2015

AREA D: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR ELECTRICAL AND I&C COMPONENTS

Subsection 3.3.3: Review of ageing management programmes

Functional Group: Engineering Programmes

Functional Group Lead: Kabelo Moroka

Date Performed: 2015-08-19

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.3.1	Ageing management programmes should be evaluated against the nine attributes [6]. For selected AMPs, detailed description of the attributes is provided in IGALL. Existing programmes and newly developed ageing management programmes should incorporate insights and results of ageing management review.	• Ageing management programmes (procedures for implementation of SC-specific AMPs); • Other plant programmes for managing the effects of ageing degradation; • Report on PSR (if it exists); and • Existing plant programmes listed in section 3.2.2 (these are reviewed as preconditions).	331-275 - Ageing Management Matrix – SRA II report – chapter 4 Ageing 331-148 - Programme Engineer guide – SE 85540 (SE 35189) - Programmes self-assessment – 331 -186 – Environmental Qualification Programme 331-187 – Environmental Qualification Process and Responsibilities 331-219 – Environmental Qualification Maintenance Manual 331-127 - Cable Ageing Management Programme 331-198 - Cable Ageing Management Programme Process and Responsibilities 331-311 – Medium Voltage Manual

Functional Group Lead:	Archie Mthandi / Kabelo Moroka	**D3.1**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

<u>3.3.3.3 Bullets 1:</u> *Verify that existing and proposed plant programmes that supports LTO were reviewed for meeting the nine attributes.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The existing programmes conforms to the following five elements as per of 331-148, "Programme Engineers Guide", Appendix 1.

- Scope
- Requirements and Acceptance Criteria
- Execution
- Results Evaluation
- Programme Oversight

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-148, "Programme Engineers Guide"

Assessment:

No verification has been done against the IAEA nine attributes of IGALL AMP to support LTO. EPG is currently conducting a Self-Assessment, SE 88540, to review and evaluate the attributes of the current Programmes scoped in the Programme Guide, 331-148, with the intent to align with the nine attributes of the IGALL Ageing Management Programmes (AMPs).

Other plant programmes (e.g. Fire Protection) which are not part 331-148 and have no similar requirements as stated in 331-148 will need to be reviewed.

Results: Meet [ ] Don't Meet [ ] Partially Met [x] N/A [ ]

No	Action Description	Lead	Due Date
1	Complete the Self-Assessment, SE 88540, to review all existing for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs Refer to WBS 7	NE EPG	2015/11/30
2	Identify and review other plant programmes or processes (Chemistry Programme, Fire Protection, etc.) not included within the scope of 331-148 scope but impacting on LTO, for meeting the nine attributes of the IGALL AMP. Refer to WBS 7	Koeberg SALTO	2015/10/30

Functional Group Lead:	Archie Mthandi / Kabelo Moroka	**D3.2**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

3.3.3.3 Bullets 2: *Verify/ review specific sample of existing and new AMPs for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs, i.e. meeting the SC-specific nine attributes*.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The following programmes relating to electrical, Instrumentation and control (including cables) have been developed and implemented at Koeberg:

- Environmental Qualification Programme (EQ)
- Cable Aging Management programme (CAMP) for Medium Voltage cables

INPUT DOCUMENT REFERENCE:

- 331-148, "Programme Engineers Guide".
- 331-186 – Environmental Qualification Programme
- 331-127 – Standard for Cable Ageing Management Programme at Koeberg Operating Unit

Assessment:

The existing programmes have not been reviewed for consistency with the IGALL AMPs with respect to meeting the intent of IGALL AMPs and the nine attributes of an effective AMP. Engineering Programmes is currently conducting a Self-Assessment, SE 88540, to review the existing programmes for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs. The EQ Programme and CAMP will be reviewed as part of the Self-Assessment.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Complete Self-Assessment, SE 88540, to review existing programmes for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs. In addition review other IGALL AMPs for applicability to Koeberg. Refer to WBS 7	Koeberg SALTO	Q1 2020

Functional Group Lead:	Archie Mthandi / Kabelo Moroka	**D3.3**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

3.3.3.3 Bullets 3: *Whether the plant concludes, after reviewing the existing plant programmes and/or ageing management programmes, that the management of ageing effects is not adequate in some cases. In this case, whether the plant modifies the existing programme or develops a new programme for the purpose of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-148, "Programme Engineers Guide", list all engineering programmes currently developed and implemented at Koeberg NPP. The existing programmes are continuously reviewed and kept current taking into account industry Operating Experience (OE) from various sources such as Equipment Qualification Data Bank (EQDB), EDF experience, FROG, PWR Owners Group, INPO and EPRI. Periodic safety assessment (SRA), self- assessments and peer reviews also conducted to align the programmes with international standards and practices. Any safety concerns arising from the OE, assessments or reviews is evaluated and discussed in various management safety review committees such Engineering Technical Management Meeting (ETMM) and Plant Health Committee (PHC) and existing programmes requirements are modified, new programme and plant changes are effected as applicable. The CAP process as per KAA-688 is used for the management and tracking of the concerns raised from OE.

Based OE, the assessment is underway to evaluate the adequacy of the EQ for Mechanical at Koeberg; the Cable Ageing Management Programme is developed based on the EPRI guidelines and industry failures of medium voltage cables. These amongst others are an indication that Koeberg continuously makes improvements to the programmes or develops a new programme for the safe operation of the plant based on industry OE, new degradations or failures and experience exchange from EDF.

INPUT DOCUMENT REFERENCE:

- 331-148- Programme Engineers Guide
- 331- 102 - ETMM TOR
- KAA 826 – Plant Health Committee

Assessment:

331-148, "Programme Engineers Guide", list all engineering programmes currently developed and implemented at Koeberg NPP. The existing programmes are continuously reviewed and kept current taking into account industry Operating Experience (OE) from various sources such as Equipment Qualification Data Bank (EQDB), EDF experience, FROG, PWR Owners Group, INPO and EPRI. Periodic safety assessment (SRA), self- assessments and peer reviews also conducted to align the programmes with international standards and practices. Any safety concerns arising from the OE, assessments or reviews is evaluated and discussed in various management safety review committees such Engineering Technical Management Meeting (ETMM) and Plant Health Committee (PHC) and existing programmes requirements are modified, new programme and plant changes are effected as applicable. The CAP process as per KAA-688 is used for the management and tracking of the concerns raised from OE.

A Self-Assessment, SE 88540, has been initiated to review all existing for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs. A decision whether to modify the existing programme or develops a new programme will be taken as part of the self-assessment.

There are two types of programmes, those that are defined in accordance with 331-148 and those that are run by the station and are not defined as programmes as per 331-148, however in many respects could easily be defined as programmes. Although, not specifically written in the process documents of some of the programmes, it's expected that programmes should have a living process that takes into account OE and makes improvement on an on-going basis.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Archie Mthandi / Kabelo Moroka	**D3.4**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

3.3.3.3 Bullets 4: *Confirm that operation, inspection/monitoring and maintenance programmes are well-coordinated by AMPs.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Programme Engineer guide, 331-148, provides guidance to all programme engineers on the implementation of plant condition management activities including scope definition, establishing programme rules and requirements, acceptance criteria, execution details, evaluation of results, optimisation and oversight by Programme Health Reports. The inspection and maintenance programmes related to qualified electrical and I&C equipment and Medium Voltage cables are coordinated by the EQ Programme and the Cable Ageing Management Programme (CAMP).

The monitoring and trending of the system performance to identify problems and age related concerns before they adversely affect the functionality of the system engineers in accordance with the System health reporting guide, KGU-031. Trending results are documented in the System Health Report Action Plans, where they can receive increased visibility in order to promote overall system performance. In addition a Component Health Report is compiled by the Component Engineers on a 6-montly basis to document the system performance and condition and to determine the component health.

Plant Health Committee (PHC) reviews the quarterly System Health Report and six-monthly Component Health report before final issue and monitors the effectiveness of plant initiatives and operational forums and strategically determines the way forward for plant health.

All operation, inspection and maintenance requirements are loaded and implemented via SAP.

INPUT DOCUMENT REFERENCE:

- 331-186 - Environmental Qualification Programme
- 331-219 – Environmental Qualification Maintenance Manual
- 331-127 – Cable Ageing Management Programme
- 331-148 – Programme Engineers Guide
- KLM-005 – Maintenance Listing
- SAP

Assessment:

Although the operation, inspection/monitoring and maintenance programmes relating to the EQ equipment and cables are well-coordinated by existing programme, i.e. EQ and CAMP, other activities outside the scope of the 331-148 has not verified if they are well coordinated.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Verify whether other activities outside the scope of the 331-148 are well coordinated by plant programmes. Refer to WBS 7	Koeberg SALTO	Q4 2016
2	Establish and document an Ageing Management Process that includes the overall programme ownership and manages the combination and integration of all ageing programmes. Refer to WBS 4	Koeberg SALTO	Q3 2016

AREA D: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR ELECTRICAL AND I&C COMPONENTS

Subsection 3.3.4: Obsolescence management programme.

Functional Group: NE EPG **Functional Group Lead:** Kabelo Moroka

Date Performed: 2015-08-11

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.4.1	The plant should demonstrate that technological obsolescence is properly managed. Management of obsolescence should be a continuous activity addressing both the maintenance and performance of SSCs. A programme to address obsolescence could be a part of normal plant programmes (e.g. maintenance). Responsibility for programme implementation should be clearly assigned within the organization of the plant.	• Procedures for the management of technological obsolescence; • Documentation to support SSC obsolescence and replacement; • List of spare parts; • Maintenance records; • Long term investment programme for classified equipment and systems.	KBA 0022 N NEPO NEPP 115 Rev 1 – Nuclear Engineering Position Paper titled – Obsolescence management at Koeberg Nuclear Power Station.
			DRA LOBSOLESC – Project Definition Release Approval for Obsolescence Project
			331 -146 – The Obsolescence Process

Functional Group Lead:	Lumkile Jibiliza	**D4.1**
Functional Group:	SPS	
Date Performed:	2015-08-11	

Item:

3.3.4.3 Bullets 1: *Confirm that appropriate technological obsolescence management reviews and assessments have been performed for SCs.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

In October 2004 the design engineering department initiated an obsolescence project (LOBSOLESC) initially to cover C&I equipment and in 2006 extended to electrical and mechanical equipment.

The project investigated obsolescence in each system that make up Koeberg Nuclear Power Station (KNPS). The original equipment manufacturers (OEM) and original equipment suppliers (OES) were consulted to verify the availability and status of the each equipment. The project led to the replacement or modification of some C&I systems

- GRE/ GSE System – Turbine Control and Protection System
- KRT System – Plant Radiation Monitoring System
- RGL System – Full Length Rod Control System

A number of equivalents studies (for example: Fuji transmitters, Verdelet valves etc) were performed. The project was closed on the 30 September 2009.

KNPS also has an agreement with EdF (Electricite de France) where a KNPS engineer is fully integrated into the EdF obsolescence management structure. This is because KNPS is a similar station to EdF stations designed and constructed by the same constructor and the equipment used is exactly the same. The engineer shares the KNPS obsolescence efforts with EdF and vice versa.

Since October 2009 until recently Obsolescence was dealt with reactively through the supply chain processes.

In 2014 KNPS contracted with PKMJ (subsidiary of Rolls Royce) for the creation of a web-based database (Proactive Obsolescence Management System – POMS). In addition to the database PKMJ commits to contact each and every manufacturer/ supplier of KNPS at least once a year to verify the obsolescence status of each KNPS equipment.

In 2014, the Obsolescence Working Committee (OWC) comprising of representatives from the groups below was re-formulated.

- Nuclear Engineering
- Plant Engineering
- Maintenance
- Procurement
- Eskom/EdF Obsolescence Liaison Engineer

The OWC meets twice a month and provide a platform for key stakeholders to identify, confirm, classify prioritise and drive the resolution of identified obsolescence issues.

INPUT DOCUMENT REFERENCE:

- KBA 0022 N NEPO NEPP 115 Rev 1 – Nuclear Engineering Position Paper titled – Obsolescence management at Koeberg Nuclear Power Station.
- DRA LOBSOLESC – Project Definition Release Approval for Obsolescence Project
- 331 -146 – The Obsolescence Process

Assessment:

Appropriate technological obsolescence management reviews and assessments have been performed for SCs at KNPS.

Results: Meet [ ] Don't Meet [ ] Partially Met [x] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform and document appropriate technological obsolescence management reviews and assessments of electrical and I&C SSCs including Digital Systems Refer to WBS 15	Koeberg SALTO	Q4 2016

Functional Group Lead:	Lumkile Jibiliza	**D4.2**
Functional Group:	Nuclear Engineering - SPS	
Date Performed:	2015-08-28	

Item:

3.3.4.3 Bullets 2: *Verify if demonstration was done that the effects of obsolescence will be continuously identified and managed such that the intended function of SCs will be maintained throughout the planned period of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Note: The answer is based on the current status of the obsolescence management programme

The obsolescence process (331-146) has been established. The obsolescence working committee (OWC) has been re-established. The OWC comprises of representative from the supply chain organisations (i.e. procurement, procurement engineering), plant engineering (represent system engineering and component engineering), nuclear engineering (i.e. specification engineering, engineering programmes etc.), maintenance as well as configuration management. The OWC meets twice a month to identify, confirm, classify prioritise and drive the resolution of identified obsolescence issues.

KOU has contracted with PKMJ (Rolls Royce) for the creation of POMS and POMS OM. Included in the contract is PKMJ commitment to contacting each supplier to verify each equipment Obsolescence status. The POMS OM assists in the prioritisation of the obsolescence resolution.

INPUT DOCUMENT REFERENCE:

- 331-146 :- Obsolescence Process
- 4600055437:- Contract between KOU and PKMJ

Assessment:

The OWC process, as well as the contract with PKMJ is in place, however the contract is limited to the contractual period which does not run to the LTO time frame. SPS is currently investigating establishing an obsolescence programme managed in accordance with the IAEA process.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	Lumkile Jibiliza	**D4.3**
Functional Group:	Nuclear Engineering- SPS	
Date Performed:	2015-08-24	

Item:

3.3.4.3 Bullets 3: *Whether the plant is reviewing efficiency of the existing obsolescence programmes on a regular basis.*

Current status description and input document reference:

Periodically, the Quality Assurance (QA) Group performs a QA monitoring programme on all departments' processes and programmes. For the Engineering department the processes audited include the obsolescence process/ programme.

Periodically, Nuclear Safety Assurance (NSA) department performs an external review of KOU processes and programmes (including Obsolescence), raise IRA where necessary and issue a status report

INPUT DOCUMENT REFERENCE:
331-146 :- Obsolescence Process

Assessment:

Currently the efficiency review of the Obsolescence Programmes is dependent of oversight and assurance departments. No self-assessment is specified in the obsolescence process.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Revise the obsolescence process to include self-assessments, benchmarking exercises etc. Refer to WBS 15.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Lumkile Jibiliza	**D4.4**
Functional Group:	Nuclear Engineering - SPS	
Date Performed:	2015-08-28	

Item:

3.3.4.3 Bullets 4: *Whether management of technological obsolescence of SSCs such as I&C equipment and systems, sensors, medium voltage cables, uninterruptable emergency power supply (UPS) is in place.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The current plant change processes (modification or equivalencies) for management of technological obsolescence is robust and effective. This has been demonstrated by completion of various designs/modifications/equivalencies to address obsolescence (RGL system, KIT system, GSE/GRE. Etc.)

Koeberg Operation Unit has a strong contractual relationship with EdF (Management, Engineering and Operation). This relationship benefits KOU in various forms including Koeberg NNP in various forms listed below:

- Operating Experience
- Management decisions are sent to Koeberg NPP for review

The contractual relationship between our Original Equipment Suppliers (OES) is in place for the supply of spares parts.

KOU is a member of various international organisations (e.g. FROG, EPRI etc.). Through the interactions with these organisations certain recommendations are followed through, for example KOU has a separate cable aging management program.

Assessment:

In general the objective is met. For Digital systems where components obsolescence exist even before a replacement modification is implemented, KOU IPDK is investigating a strategy to such obsolescence.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

AREA D: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR ELECTRICAL AND I&C COMPONENTS

Subsection 3.3.5: Existing time limited ageing analyses.

Functional Group: NE EPG

Functional Group Lead: Kabelo Moroka

Date Performed: 2015-08-11

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.5.1	The plant should identify existing time limited ageing analyses regarding period of operation and design considerations or licence terms.	• List of time limited ageing analyses; • FSAR; • EQ documentation; • Design supporting documents (such as PTS analyses, fatigue calculations, etc.); • Other licensing documents.	331-219 - Environmental Qualification Maintenance Manual
			SAR Chapter I, Part II – Environmental Qualification of Electrical Equipment for Accident Conditions in the Containment
			DSEs

Functional Group Lead:	Raymond Maapola	**D5.1**
Functional Group:	SDE	
Date Performed:	2015-09-03	

Item:

3.3.5.3 Bullets 1: *Whether the existing time limited ageing analyses (e.g. from FSAR) are properly documented in the current safety analyses report or other licensing basis documents and clearly and adequately describe the current licensing basis or the current design basis requirements for plant operation.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The components listed in 331-219, the Environmental Qualification Maintenance Manual (EQMM), have a qualified life and are replaced prior to reaching this qualified life. This is documented in 331-219- Environmental Qualification Maintenance Manual. EQ of safety related equipment is discussed in the Koeberg SAR Chapter I, Part II.

INPUT DOCUMENT REFERENCE:

- 331-219 Environmental Qualification Maintenance Manual
- SAR Chapter I, Part II

Assessment:

Time limited ageing analyses for electrical and I&C constitute Environmental Qualification of Electrical and I&C components. Koeberg's EQ maintenance programme is properly document in document 331-219.

The Environmental Qualification Programme (EQ) Maintenance Manual (EQMM), 331-219, provides maintenance requirements required to maintain the qualified status of the EQ equipment include replacements before end of equipment qualified life. Periodic maintenance, monitoring and inspection are done as per 331-219 or KLM-005. This is to ensure performance of the safety functions of qualified equipment throughout its life period considering all postulated initiating events. Qualified life is normally provided in the EQ Test Report and that include the equipment parts whose replacement is necessary because of the qualified life.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Raymond Maapola	**D5.2**
Functional Group:	SDE	
Date Performed:	2015-09-03	

Item:

<u>3.3.5.3 Bullets 2:</u> *Whether the plant identified list of existing time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The components listed in 331-219, the Environmental Qualification Maintenance Manual (EQMM), have a qualified life and are replaced prior to reaching this qualified life. This is documented in the SAR under Chapter I, Part II – Environmental Qualification of Electrical Equipment for Accident Condition inside Containment.

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-219 Environmental Qualification Maintenance Manual
- SAR Chapter I, Part II

Assessment:

Koeberg's EQ maintenance programme identifies all EQ related components with time limited analysis (i.e. with Qualified Life). This is documented in the Environmental Qualification (EQ) Maintenance Manual 331-219, and covers all relevant components located in in harsh environments.

1E equipment in mild environment is not included in the EQ maintenance programme but is not considered a TLAA (as per IGALL TLAA 201 definition that focuses purely on electrical and I&C components in harsh environments) and is handled in the ageing matrix.

Results:

Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Raymond Maapola	**D5.3**
Functional Group:	SDE	
Date Performed:	2015-09-03	

Item:

3.3.5.3 Bullets 3: *Whether the plant identified missing time limited ageing analyses based on results of screening.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The scope of the EQ programme includes original equipment qualified in accordance with IEEE 323-1971 standard. Most of the original equipment qualified to IEEE 323 1971 were replaced with qualified equipment as part of the EDF EQ modifications, 02261, 02253, 02262 and 91105 using the latest design and qualification standard. For all EQ equipment, 331-219, "Environmental Qualification Programme Maintenance Manual", provides specific requirements to ensure the qualified status of the equipment within the scope of the EQ programme is maintained.

Assessment:

A list of plant components missing QADP and time limited ageing analysis were identified following Koeberg's CP1 alignment project. These components needs to be requalified/replaced against the updated EQ standard (IEEE 323 1974).

Results: Meet **X** Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	Raymond Maapola	**D5.4**
Functional Group:	SDE	
Date Performed:	2015-09-03	

Item:

3.3.5.3 Bullets 4: *Whether the plant has launched time limited ageing analyses reconstitutions if needed.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Environmental Qualification Programme (EQ) Maintenance Manual (EQMM), 331-219, provides maintenance requirements required to maintain the qualified status of the EQ equipment include replacements before end of equipment qualified life. This process often required reconstitution of initial qualification information and documentation from OEMs and suppliers. This is to ensure performance of the safety functions of qualified equipment throughout its life period considering all postulated initiating events. Qualified life is normally provided in the EQ Test Report and that include the equipment parts whose replacement is necessary because of the qualified life. A qualified life of equipment is based on the thermal ageing of equipment simulated by an accelerated test process which exposes the equipment to a temperature higher than the normal plant temperature for a specified time period.

The current practice is to replace the equipment or parts before the end of its qualified life. All maintenance activities including replacement of equipment based on qualified life are done in accordance with 331-219 and results captured as per KSM-060.

Assessment:

Reconstitution of initial qualification information and documentation from OEMs and suppliers has previously been performed to recalculate and confirm the qualified life for electrical and I&C components in the EQ programme.

It is possible that further reconstitution of information will be required to perform recalculations for LTO. This is catered for under the current EQ programme.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

AREA D: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR ELECTRICAL AND I&C COMPONENTS

Subsection 3.3.6: Revalidation of time limited ageing analyses.

Functional Group: NE EPG **Functional Group Lead:** Kabelo Moroka

Date Performed: 2015-08-24

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.6.1	The capability of some SCs within the scope of LTO to accomplish intended function should be verified by plant specific time limited ageing analyses. The plant should demonstrate that all necessary design basis information is accessible. The revalidation of these analyses should be done with respect to the assumed period of LTO. The revalidation should confirm function and safety margins necessary for the whole period of LTO. Newly identified time limited ageing analyses should be valid for intended period of LTO. If a TLAA cannot be revalidated, appropriate corrective or compensatory measures should be proposed for managing ageing effects of SSCs during LTO.	• List of time limited ageing analyses; • FSAR; • Design supporting documents; • List of equipment with time limited EQ; • SSCs test and inspection records; • SSCs failure reports (including, where appropriate, root cause analysis); • Operational history and records on load cycles; ☐ Statistical data of SSCs failures and failure rates; • Revalidation reports.	331-219 - Environmental Qualification Maintenance Manual
			SAR Chapter I, Part II – Environmental Qualification of Electrical Equipment for Accident Conditions in the Containment
			DSEs
			32-6 - Eskom Documentation and Records Management Procedure
			238-6 - KOU Documentation and Records Management Standard
			331-3 - Nuclear Engineering Documentation and Records Management Work Instruction
			331-85 - Design Basis Documentation Change Process
			331-88 - Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base
			331-121 - Configuration Management at Koeberg
			331-130 - Controlling documentation and responsibilities for Configuration Management at KNPS
			331-143 - The Equivalency Process to Change Plant
			331-146 - The Obsolescence Process

			331-215 - Nuclear Engineering Configuration Management Implementation Programme Exists
			331-342 - Integrated Plant Design Process for Changes to Systems, Structures or Components at Koeberg Operating Unit
			KAA-501 - Process for Modifications at Koeberg
			240-86502715: Process for Minor Modifications
			32-6 - Eskom Documentation and Records Management Procedure
			238-6 - KOU Documentation and Records Management Standard
			331-219 - Environmental Qualification Maintenance Manual

Functional Group Lead:	ASTRID HOLLAND	**D6.1**
Functional Group:	Process Support – CM Group	
Date Performed:	2015-08-24	

Item:

<u>3.3.6.3 Bullets 1:</u> *Whether all necessary design basis information, applicable codes and regulatory requirements, fabrication records, operational and maintenance history and results of inspections are accessible.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The documentation management process followed at KOU cascades directly from the Eskom Documentation and Records Management Procedure.

Each Business Area within the Koeberg Operating Unit also has its own documentation and Records Management Standard that cascades down from the KOU standard.

The KOU Design Base documentation is managed within the Nuclear Engineering Business Area under the NE Work Instruction, 331-3.

All design basis information; i.e. drawings, Maintenance Manuals, DSE's (System Description Manual), etc. are accessible on the PIGO and Hyperwave databases.

All design basis documentation changes are managed using the process documented in document 331-85.

Technical documents are stored in the PIGO and non-technical documents are stored on Hyperwave.

The process for making changes to the Safety Analysis Report is documented in KAA-697,'Control of the Safety Analysis report.' All documents and records generated by this process follow the documentation and records management process described above.

Off-site original construction design base documentation is available at the OEM documentation repository (Alstom, Framatone, Spie Batignolle. Sofenol). If required, this information is available on request from the OEM.

<u>INPUT DOCUMENT REFERENCE:</u>

- 32-6: Eskom Documentation and Records Management Procedure
- 238-6: KOU Documentation and Records Management Standard
- 331-3: Nuclear Engineering Documentation and Records Management Work Instruction
- 331-85: Design Basis Documentation Change Process
- 331-88: Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base
- 331-121: Configuration Management at Koeberg
- 331-130: Controlling documentation and responsibilities for Configuration Management at KNPS
- 331-143: The Equivalency Process to Change Plant
- 331-146: The Obsolescence Process
- 331-215: Nuclear Engineering Configuration Management Implementation Programme Exists
- 331-342: Integrated Plant Design Process for Changes to Systems, Structures or Components at

Koeberg Operating Unit

- KAA-501: Process for Modifications at Koeberg
- 240-86502715: Process for Minor Modifications

Assessment:

The PIGO database is currently Eskom's solution for technical documentation (including drawings) and Hyperwave is the repository for non-technical documentation.

The Koeberg Power Station Business Area within KOU, is currently incorrectly using the PIGO database to store both their technical and no-technical documentation.

No specific TLAA documents and records have been identified, so specific retrievability could be proven / tested.

Results:	Meet		Don't Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	Identify all TLAA documents and records relating to Electrical and I&C components Refer to WBS 8	Koeberg SALTO	Q4 2016
2	Verify that existing and new TLAA are in compliance with relevant procedures . Refer to WBS 9	Koeberg SALTO	Q4 2016
3	Ensure that all KNPS groups (e.g. maintenance and operating) periodically review their processes and update the required records on their respective QRLs	TD&RM	Q1 2018
4	Ensure that all KNPS groups (e.g. maintenance and operating) periodically review their processes and update the required records on their respective QRLs	TD&RM	Q1 2018
5	Transfer KNPS documents to the correct storage systems to align with the Eskom Standard	TD&RM	Q4 2018
6	Verify no duplicate entries exist on the Technical and non-technical documentation repositories for KNPS	TD&RM	Q4 2017
7	Verify no duplicate entries exist on the Technical and non-technical documentation repositories for NE	NE-PS-CMG	Q4 2017
8	Determine what essential design base analyses and calculations, if any, need to be requisitioned. Refer to WBS 13	Koeberg SALTO	Q4 2016
9	Secure access to the essential OEM DB documentation until updated End Of Life. Refer to WBS 9	Koeberg SALTO	Q4 2016

Functional Group Lead:	Raymond Maapola (Peter Harrisankar)	**D6.2**
Functional Group:	SDE	
Date Performed:	August 2015	

Item:

3.3.6.3 Bullets 2: *Whether these calculations/ analyses are properly documented.*

Input data document reference: (NOTE: to be copied & pasted into the AIP)

The revalidation of electrical SCs has not been performed yet.

Assessment:

No revalidation calculations or analyses are available.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform electrical and I&C revalidation calculation/analyses and properly document all calculations/analyses. Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	Kabelo Moroka (compiled by S Kiewitt)	**D6.3**
Functional Group:	SPS (SDE)	
Date Performed:	Aug 2015	

Item:

3.3.6.3 Bullets 3: *Which kind of methods and criteria have been used for revalidation of time limited ageing analyses.*

Current status description and Input data document reference:
(NOTE: to be copied & pasted into the AIP)

Revalidation of TLAAs has not been performed.

Assessment:

Revalidation of TLAAs has not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of electrical and I&C TLAAs to justify LTO Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	RAYMOND MAAPOLA (Compiled: A MGULWA)	**D6.4**
Functional Group:	SDE Elec / I&C	
Date Performed:	2015-08-27	

Item:

3.3.6.3 Bullets 4: *Whether the reviewed time limited ageing analyses (TLAA) justify safe operation for LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs has not been performed.

Assessment:

Revalidation of TLAAs has not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of electrical TLAAs to justify LTO Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	Brian Trautmann	**D6.5**
Functional Group:	IPDK	
Date Performed:	2015-08-23	

Item:

3.3.6.3 Bullets 5: *Whether the implications of revalidation are considered in the plant operational limits and conditions.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The time-limited aging analysis (TLAA) is listed in the EQ manual (331-219). . No revalidation for LTO has been performed for extending electrical and I&C components to 60 years.

INPUT DOCUMENT REFERENCE:

- 331-219 Environmental Qualification Maintenance Manual Rev 0.
- 331-275 Process for the Development and Control of Aging Management Matrix at KOU rev 1.

Assessment:

There is currently an extent of ongoing aging analysis in the Environmental Qualification (EQ) Programme, applicable only to harsh environment equipment.

The Aging Management Matrix evaluates current aging concerns but does not make an assessment for LTO.

The TLAA revalidation process for LTO must be initiated (should be triggered by D6.3 assessment).

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Perform revalidation of electrical and I&C TLAAs to justify LTO Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	Kabelo Moroka	**D6.6**
Functional Group:	Engineering Programmes	
Date Performed:	2015-08-19	

Item:

3.3.6.3 Bullets 6: *Whether the qualification of SCs covered by the EQ programme has been satisfactorily established and maintained for LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The qualification of structures and components covered by the EQ Programme has been established and maintained through the operating life of SCs in accordance with 331-186, "Environmental Qualification Programme". The EQ programme has been developed in accordance with the 10 CFR 50.49 with additional guidance from Regulatory Guide 1.89.

The qualification documentation and maintenance records demonstrating the capability of the equipment to perform the safety functions in normal operating conditions, abnormal operating and accident conditions of the equipment environment throughout the qualified life have been reviewed and requirements EQ established. 331-219, "Environmental Qualification Maintenance Manual" (EQMM) prescribes the minimum preventive maintenance requirements required to preserve the environmental qualification of equipment. The EQMM document further presents the results of the analysis conducted to establish the requirements for, and forms the basis of, the Environmental Qualification Programme.

EQ activities include the monitoring, inspections, replacement of non-metallic parts and replacement of the entire component based on the qualified life. This is to ensure they retain sufficient margin to support functional and safety requirements through the component life. All EQ maintenance requirements are loaded on SAP and incorporated into the maintenance procedures for implementation.

INPUT DOCUMENT REFERENCE:

- 331-186, "Environmental Qualification Programme".
- 331-219, "Environmental Qualification Maintenance Manual" (EQMM)
- 10 CFR 50.49 – Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants
- Regulatory Guide 1.89 – Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants
- Maintenance procedures
- SAP

Assessment:

The qualification of structures and components covered by the EQ Programme has been satisfactorily established and maintained throughout the operating life of SCs. For LTO, the condition monitoring programme needs to be established to ensure the qualification condition remains within the test conditions used to established qualification of SCs. For SCs with qualified lives less than the period of LTO, a revalidation needs to be done.

Results:	Meet		Don't Meet		Partially Met	x	N/A	

No	Action Description	Lead	Due Date
1	Establish the condition monitoring programme to ensure the environmental qualification conditions remains within the test conditions used to establish qualification of SCs. Refer to WBS 7	Koeberg SALTO	Q4 2017
2	Perform a revalidation of qualified life for SCs with qualified lives less than the period of LTO or replace equipment before need of its qualified life. Refer to WBS 7	Koeberg SALTO	Q4 2020

Functional Group Lead:	Brian Trautmann	**D6.7**
Functional Group:	IPDK	
Date Performed:	2015-08-23	

Item:

3.3.6.3 Bullets 7: *What corrective or compensatory measures are taken, if the analyses cannot be revalidated.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

This can only be fully determined once revalidation of the TLAA has been attempted.

However, there is a standard response to failed revalidation of the TLAA for most electrical and I&C equipment: Replacement with equivalent on the component or system level.

Assessment:

The TLAA revalidation process for LTO must be initiated.

It is clear that replacement of some systems will be required. Examples are RPR and RPN. NB - these 2 systems are not included in the Environmental Qualification programme, so not all 1E components with a qualified life are in the EQ programme.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of TLAAs for electrical and I&C Refer to WBS 10	Koeberg SALTO	Q4 2020
2	Ensure that all Class 1E qualified electrical equipment located in mild environments are included into ageing management matrix.	Koeberg SALTO	Q4 2017

Functional Group Lead:	Raymond Maapola	**D6.8**
Functional Group:	SDE	
Date Performed:	2015/08/28	

Item:

3.3.6.3 Bullets 8: *Verify if evaluation was done to demonstrate that the safety analyses meet one of the following criteria:*

- The analysis remains valid for the intended period of LTO;
- The analysis has been projected to the end of the intended period of LTO; and
- The effects of ageing on the intended function(s) of the structure or component will be adequately managed for the intended period of LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of mechanical TLAAs and confirm the IGALL criteria is met. Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	Khaliel Isaacs	**D6.9**
Functional Group:	Safety Case	
Date Performed:	21 August 2015	

Item:

3.3.6.3 Bullets 9: *Check if the revalidation of time limited ageing analyses is documented in an update to the safety analyses report.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

The revalidation of time limited ageing analysis is not explicitly stated in the safety analysis report. A general reference to a limit for general plant age is not stated in the SAR however some components have specific references to time limited ageing analysis. Wherever these references are made the general component life is stated as 40 years and are linked to specific ageing and/or degradation mechanisms. The components referenced are mainly mechanical.

Although time limited ageing analysis may not have the same impact throughout the SAR, key principles regarding LTO needs to be specified as a framework for LTO in the SAR. There needs to guiding principles that ensure the design basis is preserved for LTO for critical components subject to TLAA e.g. Reactor Pressure Vessel.

The components that do reference time limited ageing analysis are listed in C6.10 and will require revalidation for the LTO period.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Consider adding a section in the SAR that provides the philosophy for LTO. Refer to WBS 11	Koeberg SALTO	Q4 2018

Functional Group Lead:	Khaliel Isaacs	**D6.10**
Functional Group:	Safety Case Group	
Date Performed:	21 August 2015	

Item:

3.3.6.3 Bullets 10: *Also check if typical time limited ageing analyses are part of the safety analyses such as:*

- Irradiation embrittlement of the reactor pressure vessel;
- Thermal and mechanical fatigue;
- o Thermal ageing; o Loss of preload;
- O Loss of material.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Currently, time limit ageing analysis is not explicitly stated in the SAR for Electrical or I&C components. There is only one reference made in the SAR to an electrical component. However the component can be replaced and is on a Preventive Maintenance (PM) schedule.

Safety Analysis Report Revision 5/5A chapters:

- II-2.3.3.3.1 Control Rod and Absorber Rod Drive Mechanism

Assessment:

Revalidation of TLAAs must be performed by the Koeberg SALTO project.

The only electrical component noted in the SAR with a specific time limit is in II-2.3.3.3.1 Control Rod and Absorber Rod Drive Mechanism. The limit is relative to the functional life of the electromagnetic coil unit of the drive mechanism. This is stated as:

"The mechanism coils consist of copper windings insulated by two protective coatings of glass fibre. The maximum allowable temperature compatible with the lifetime of the coils (20 years) is 230ºC as compared with an average temperature of 200ºC. Forced ventilation is provided to ensure that the coils are held within temperature limits. Failure of the stationary coil would trigger the insertion of the cluster under gravity."

These components are replaceable and included in a PM schedule. The PM schedule needs to be assessed for coverage of the LTO period.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Perform revalidation of the TLAAs for electrical and I&C components within the scope of LTO. Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	Raymond Maapola	**D6.11**
Functional Group:	SDE	
Date Performed:	2015/08/27	

Item:

3.3.6.3 Bullets 11: *Verify that selected plant TLAAs are consistent with and meet the intent of the IGALL TLAAs.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Verify that plant mechanical TLAAs are consistent with and meet the intent of the IGALL TLAAs. Refer to WBS 9 and 10	Koeberg SALTO	Q4 2018

Functional Group Lead:	Kabelo Moroka (E Cornelissen)	**D6.12**
Functional Group:	System Design Engineering	
Date Performed:	2015-08-25	

Item:

3.3.6.3 Bullets 12.1: *Operational limits and conditions.* - Determine if the stressors given in the design specifications or Current Licensing Basis have been used for assessment of SCs and their supports.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs has not been performed.

Assessment:

Revalidation of TLAAs has not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform the revalidation of the electrical TLAA associated with SALTO SCs scope Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	T vd Walt	**D6.13**
Functional Group:	SDE	
Date Performed:	2015/08/27	

Item:

3.3.6.3 Bullets 12.2: *Operational limits and conditions.* - Check if data from surveillance programmes and diagnostic systems were applied in the analyses.

Input data document reference: (NOTE: to be copied & pasted into the AIP)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidations of TLAAs for LTO have not been performed. Koeberg has not performed any revalidation of TLAAs using data from surveillance programmes.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of electrical TLAAs and verify that data from surveillance programmes and diagnostic systems were applied in the analyses. Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	Kabelo Moroka (Compiled by Riana Aschmann)	**D6.14**
Functional Group:	SDE	
Date Performed:	2015-08-19	

Item:

3.3.6.3 Bullets 12.3: *Operational limits and conditions.* - Verify if limits established in the design specifications or current licensing basis were used.

Current status description and input document reference:

*(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)*As per Annexure C of the Revalidation of TLAAs has not been performed.

Assessment:

Revalidation of TLAAs has not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of electrical TLAAs and verify that limits established in the design specifications or current licensing basis are used. Refer to WBS 10	Koeberg SALTO	Q4 2020

Functional Group Lead:	ASTRID HOLLAND	**D6.15**
Functional Group:	Process Support – CM Group	
Date Performed:	2015-08-24	

Item:

3.3.6.4 **Bullets 13:** *Documentation of revalidation - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for revalidation of time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The documentation management process followed at KOU cascades directly from the Eskom Documentation and Records Management Procedure.

Each Business Area within the Koeberg Operating Unit also has its own documentation and Records Management Standard that cascades down from the KOU standard.

The KOU Design Base documentation is managed within the Nuclear Engineering Business Area under the NE Work Instruction, 331-3.

Each KOU department has a Quality Records List (QRL). The QRL captures the details of all records generated within the department. This detail includes the record medium, retention period and storage location. Each QRL is controlled by the business areas' Document Control Centre. This QRL must be reviewed every two years or each time a change to a record's detail is required. The QRL Master Copy is archived at DCC in hardcopy, as well as, electronic copy. The authorised form will be published on Hyperwave.

INPUT DOCUMENT REFERENCE:

- ISO 9001:2008 Quality Management System Requirements
- 31-1 Documentation Management Policy
- 238-6 Nuclear Documentation and Records Management Standard
- 331-2 Nuclear Engineering Quality Manual
- 32-6 Document and Records Management Procedure
- 32-1216 Process Control Manual for Document and Record Management
- 240-56296995 Standard for Records Retention Periods
- 331-3 Nuclear Engineering Documentation and Records Management Work Instruction

Assessment:

An accurate QRL allows for excellent retrieval and validation of all records generated.

KOU QRL's are currently either; accurate, inaccurate or none existent.

Results: Meet [ ] Don't Meet [ ] Partially Met [x] N/A [ ]

No	Action Description	Lead	Due Date
1	Identify which NE records are not listed in the QRL	NE-PS-CMG	Q4 2016
2	Identify NE records and documents that are not currently archived according to procedure	NE-PS-CMG	Q4 2016
3	Ensure that all documents and records are appropriately archived.	TD&RM	Q4 2016
4	Ensure each NE department has a complete and accurate Quality Records List.	NE-PS-CMG	Q4 2016
5	Action deleted.		
6	Identify all existing and new TLAA documents. Refer to WBS 8	Koeberg SALTO	Q4 2016
7	Verify compliance to the relevant procedures with regards to TLAA. Refer to WBS 12	Koeberg SALTO	Q4 2020

AREA E: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR CIVIL STRUCTURES

Subsection 3.3.1: Area-specific scoping and screening of SSCs for LTO.

Functional Group: SDE

Functional Group Lead: Anton Kotze

Date Performed: 2015/08/07

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.1.1	A systematic process should be used to determine which SCs are to be included in the scope of evaluation for LTO. SCs determined to be within the scope of LTO should be subject to a screening process to determine which SCs are subject to revalidation of time limited ageing analyses and which SC's are subject to ageing management review. The plant should establish specific screening methods for mechanical components, electrical and I&C components and civil structures. A complete list of SCs in the scope of LTO should exist and determine boundaries between mechanical, electrical, I&C components and civil structures. The insights from deterministic safety analyses and the plant specific PSA results (if available) should be used to determine SSCs not important to safety failure of which may impact safety functions. Other methods used to identify those SSCs include plant walk downs and identification of compartments that house safety and non-safety related equipment.	• Plant procedures on methodology of SCs scoping and screening; • Plant procedure to identify SCs not important to safety within the scope; • List of SCs classification; • List/ database of SCs within the scope of LTO; • List/ table / database of SCs which shows the result of the screening; • Drawings which show boundaries of the scope (normally piping and instrument diagrams (P&IDs) with colour identifications).	331-94 Importance Category Classification Listing (KLA 001)
			NEPP 208 – Intermediate safety classification
			KSA-010 Nuclear Safety, Seismic, Environmental, Quality and Importance Classification
			331-275 Ageing Management Matrix
			KBA00 00 G00 032- List of systems

Functional Group Lead:	A Kotze	**E1.1**
Functional Group:	SDE Civil	
Date Performed:	2015/07/29	

Item:

3.3.1.3 Bullets 1: *Verify if the master list of plant SCs is available and identify all items in scope of LTO and out of scope of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All buildings (civil structures) are listed as per KBA00 00 G00 032 and classified by 331-94 Importance Category Classification Listing (KLA 001). The buildings that are safety related (within LTO scope) are indicated as such.

INPUT DOCUMENT REFERENCE:

- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032 – List of systems

Assessment:

All safety related buildings and structures are identified by KLA 001.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Not considered complete after Pre-SALTO. Requires a comprehensive LTO equipment list. Refer to WBS 3.	Koeberg SALTO	Q1 2017

Functional Group Lead:	A Kotze	**E1.2**
Functional Group:	SDE Civil	
Date Performed:	2015/07/29	

Item:

3.3.1.3 Bullets 2: *Verify if the scope of SCs for LTO is complete, documented and fulfilling scoping criteria.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All buildings (civil structures) are listed as per KBA00 00 G00 032 and classified by 331-94 Importance Category Classification Listing (KLA 001). The original deterministic design classifications were compiled by the constructor and later expanded to include equipment, sub-components and parts as well. In addition, an additional classification termed Importance Classification was added whereby the importance of all equipment and systems have been considered by PSA and provides for a classification system that can be used to differentiate between the nuclear safety importance of equipment for maintenance, procedures, etc. The buildings that are safety related (within LTO scope) are indicated in the KBA document.

INPUT DOCUMENT REFERENCE:

- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032

Assessment:

All safety related buildings and structures are identified by KLA 001. A sample of civil structures was used to verify completeness of the listing.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Not considered complete after Pre-SALTO. Requires a comprehensive LTO equipment list. Refer to WBS 3.	Koeberg SALTO	Q1 2017

Functional Group Lead:	A Kotze	**E1.3**
Functional Group:	SDE Civil	
Date Performed:	2015/07/29	

Item:

3.3.1.3 Bullets 3: *Verify if SCs to prevent/ mitigate design extension conditions are within the scope of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All buildings are listed as per KBA00 00 G00 032 and classified by 331-94 Importance Category Classification Listing (KLA 001). Design extension considerations have been included in the Importance classification and therefore list the DE civil structures. The buildings that are safety related (within LTO scope) are indicated as such.

INPUT DOCUMENT REFERENCE:

- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032 System Listing

Assessment:

A check of station blackout diesel building (HDD) is not listed in KLA 001 and by default resorts under "other" buildings that are classified as NSA, and as such the DEC structure is not included in the scope of LTO. (Anton)

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Review all DEC structures for inclusion into LTO/KLA 001. Refer to WBS 3.	Koeberg SALTO	Q1 2017

Functional Group Lead:	A Kotze	**E1.4**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.1.3 Bullets 4: *If scoping and screening data is distributed into more than one database, check that the data consistency is assured.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

LTO scoping resides in KBA00 00 G00 032 as derived from 331-94 Importance Category Classification Listing (KLA 001). In addition SAP contains lists of equipment including the equipment breakdown structures and the civil structures. For screening, use is to be made of 331-275 Ageing Management Matrix where all degradation/ageing is to be identified and listed.

INPUT DOCUMENT REFERENCE:

- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032 System Listing
- SAP
- 331-275 Ageing Management Matrix

Assessment:

Scoping database is considered complete and comprehensive, however the listing from SAP is not considered accurate and complete (it is not in a state that SDE considers it appropriate to use for a source of accurate information). Screening of civil structures has not been reviewed in the AMM and as such cannot be considered complete.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Establish an accurate SAP equipment listing for civil components. Refer to WBS 3.	Koeberg SALTO	Q1 2017
2	Ensure configuration management of all sources of civil structures information. Refer to WBS 12.	Koeberg SALTO	Q4 2020
3	Review AMM for civil structures Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E1.5**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.1.3 Bullets 5: *Whether SCs not important to safety which may impact on safety functions are in the scope.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All buildings are listed as per KBA00 00 G00 032 and classified by 331-94 Importance Category Classification Listing (KLA 001). The buildings that are safety related (within LTO scope) are indicated as such. Seismic and internal flooding concerns stemming from non-safety related equipment resulted in specific studies and plant walk downs.

INPUT DOCUMENT REFERENCE:

- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032 System Listing
- JN195/NC/ESKOM/J2/365 Rev 0 KPNS Internal Flooding Analysis
- JN377/AMEC/NCI/TR/6393/rev 1 Seismic Event Fall-Down Hazard Report

Assessment:

A check of station blackout diesel building (HDD) is not listed in KLA 001 and by default resorts under “other” buildings that are classified as NSA, and as such the DEC structure is not included in the scope of LTO. An item identified by SRA II (and EERI) is the concern of NAB block walls and their fall down potential impact on safety related equipment during seismic activity.

Results:	Meet		Don’t Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Review all DEC structures for inclusion into LTO/KLA 001. Refer to WBS 3.	Koeberg SALTO	Q1 2017

Functional Group Lead:	A Kotze	**E1.6**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.1.3 Bullets 6: *Whether and how the SCs commodity groups (group of components and structures which have similar functions and similar materials) have been defined.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All buildings are listed as per KBA00 00 G00 032 and classified by 331-94 Importance Category Classification Listing (KLA 001). The buildings that are safety related (within LTO scope) are indicated as such. 331-275 Ageing Management Matrix where the commodity groupings are reflected has been derived from EDF grouping. The AMM is reviewed by Koeberg SMEs and expanded and made Koeberg specific.

INPUT DOCUMENT REFERENCE:

- 331-94 Importance Category Classification Listing (KLA 001)
- KBA00 00 G00 032 System Listing
- 331-275 Ageing Management Matrix

Assessment:

Screening of civil structures has not been reviewed in the AMM and as such cannot be considered complete.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Verify all LTO civil structures are covered in AMM. Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E1.7**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.1.3 Bullets 7: *Verify if SCs within the scope of LTO are subjected to an appropriate ageing management review and evaluation of time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-275 Ageing Management Matrix where the commodity groupings are reflected has been derived from EDF grouping. The AMM is reviewed by Koeberg SMEs and expanded and made Koeberg specific. Identification of ageing/degradation is augmented by participation in international fora such as EPRI, FROG, WANO and PWROG. Koeberg has not performed a specific LTO review & comparison with IGALL.

INPUT DOCUMENT REFERENCE:

- 331-275 Ageing Management Matrix

Assessment:

A specific LTO review and comparison with IGALL is to be undertaken. Screening of civil structures has not been reviewed in the AMM and as such cannot be considered complete.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Ensure all LTO civil structures are catered for by appropriate AMP or TLAA. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E1.8**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.1.3 Bullets 8: *Whether there is a documented and verifiable methodology for the screening of SCs for ageing management review.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

331-275 Ageing Management Matrix (AMM) procedure provides the methodology used to compile the matrix. The AMM is compiled by using the EDF ageing matrix as a departure point, then making it Koeberg specific by adding unique equipment and reviewing the EDF concerns by Koeberg technical leads. The AMM represents the LTO screening of SCs for ageing management.

INPUT DOCUMENT REFERENCE:

- 331-275 Ageing Management Matrix

Assessment:

Once complete the AMM ito civil structures can be considered to satisfy the LTO screening process, but screening of civil structures has not been reviewed in the AMM and as such cannot be considered complete.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Verify the methodology for AMM include screening aspects of civil structures. Refer to WBS 4.	Koeberg SALTO	Q3 2016

AREA E: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR CIVIL STRUCTURES

Subsection 3.3.2: Ageing management review.

Functional Group: SDE Civil **Functional Group Lead:** A Kotze

Date Performed: 2015/08/07

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.2.1	The physical status of SCs in scope of LTO should be assessed. For SCs determined to be within the scope of LTO, the plant should have adequate programmes for managing the effects of ageing degradation for the period of LTO. The plant ageing management review should identify for each SC in scope of LTO possible ageing effects and degradation mechanisms, critical locations/ parts, material, environment and ageing management programmes, see also IGALL AMR tables [6]. The plant should maintain documentation of LTO evaluations and demonstration that the effects of ageing are managed during the planned period of LTO. The plant should demonstrate that ageing effects and degradation of all SCs within the scope of LTO are covered by appropriate plant programmes, newly established ageing management programmes and revalidation of time limited ageing analyses, if applicable. If some SSCs cannot be inspected (e.g. due to inaccessibility) or assessed, justification for such SSCs to continue in service is necessary.	• Programmes for managing the effects of ageing; • Report on PSR (if it exists); • Past corrective actions resulting in enhancement of AMPs; • Existing plant programmes listed in Section 3.2.2 (these are reviewed as preconditions).	331-275 - Ageing Management Matrix SRA II report – Chapter 4 Ageing 331-148 - Programme Engineer guide 331-102 - ETMM TOR KGU 011 – Life of Plant Plans NEPP 001 – Concept of position papers KGU 031 - System Health reporting KAA 826 - Plant Health committee KGA 035 – OE from EDF 238-22 - CURA integrated risk reporting QRA – 331-64 Qualitative Risk Assessment KSA 128 - Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station

Functional Group Lead:	A Kotze	**E2.1**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 1.1: *Assessment of the current physical status of the plant* - Confirm that appropriate ageing management reviews and condition assessments have been performed for SCs subject to ageing management review.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Comprehensive reviews of ageing and degradation phenomena are being performed and managed via many various programmes and processes and crosschecked by the Ageing Management Matrix as per 331-275, "Ageing Management Matrix". For LTO a specific review will be documented as per the Koeberg SALTO project. For civil structures a monitoring programme has been developed that cover all plant structures. This programme was benchmarked with that of EDF and requires walk downs of all plant areas by qualified civil staff to identify anomalies, which are compared with previous findings, evaluated for impact and identification and prioritisation of rectification actions.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- 331-148 - Programme Engineer guide
- 331-102 - ETMM TOR
- KGU 011 – Life of Plant Plans
- NEPP 001 – Concept of position papers
- KGU 031 - System Health reporting
- KAA 826 - Plant Health committee
- KGA 035 – OE from EDF
- 238-022 - CURA integrated risk reporting
- 331-64 Qualitative Risk Assessment

Assessment:

Ongoing task, but all of the above mentioned activities are in place. Still need to complete the civil review of the AMM and the Koeberg SALTO project.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Perform ageing management reviews and condition assessments all for SCs subject to ageing management review (AMR). The EDF Ageing Matrix should be used in the AMR for LTO. Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E2.2**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 1.2: *Assessment of the current physical status of the plant.* - Determine if all the important input design data such as design description, design basis including loads and other parameters necessary for evaluation of safety are available or accessible for the plant.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Koeberg Safety Analysis Report (SAR) contains information of a general nature related to the nuclear power plant layout, the major systems and buildings, the engineered safeguard systems that prevent or mitigate the release of radioactivity, and the location of major equipment. The SAR also contains a review of the regulations, which apply to Koeberg for the design, construction and normal operation and for the prevention of accidents and mitigation of their consequences. Information on structures, systems, equipment and components necessary to maintain Koeberg Units 1 and 2 in a safe condition during all operational states is described in the SAR. Classification of civil, mechanical and electrical structures and equipment, and protection against climatic loads, missiles, the industrial environment and the dynamic effects associated with pipe breaks are described. Information on the validation of the seismic design of the sub-foundation, civil structures, and safety-related equipment required to withstand seismic events is provided. Information concerning the containment design, isolation measures and validation tests is also provided. The resistance of systems and equipment to various loads and the environmental qualification of electrical equipment based on the design basis accidents are described.

In addition, design information, general principles of design and operation necessary for evaluation of safety are available in the relevant design basis information documents such as system design files (DSE), QADPs, Protection Files, Setpoints Manual, Maintenance Manuals, IST Manual, ISI Manual, Design Specifications and Plant Drawings.

The above mentioned documents are available and accessible through the Main Document centre as hard copies and electronically available via Excalibur, Hyperwave and PIGO.

Additionally, the original OEM design information in archived between Areva (Framatome), Sofinel, Alstom & Spie-Batignols and accessible through them.

INPUT DOCUMENT REFERENCE:

- Safety Analysis Report (SAR)
- DSEs
- QADPs
- Maintenance Manuals
- NSSS and BNI Setpoint Manuals
- IST Manual
- ISI Manual

Assessment:

All the important input design data such as design description, design basis including loads and other parameters necessary for evaluation of safety are available or accessible for the plant.

It's known that some of the original design documentation is not available on site and it is unclear of the state of this information in the OEM archives.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Controls are to be put in place to ensure that documentation held by the OEM are in good condition and retrievable. Refer to WBS 13.	Koeberg SALTO	Q4 2020

Functional Group Lead:	A Kotze	**E2.3**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 1.3: *Assessment of the current physical status of the plant.* - Check that information on maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept and managed in a proper way.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All information relating to maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept in QDAPs and managed in accordance with KSA-011," The Requirements for Controlled Documents" and KAA 500, "The Process for Controlled Documents". Maintenance history is captured in the Equipment History Records as per KSM-015, Maintenance History Records. Refer to QADPs, ISI outage reports, SAP history and Equipment History Records as per KSM-15, transient monitoring files, DSE and maintenance manuals. Information continues to be managed as required as per KAA-500, KSM-006 and other programmes requirements.

INPUT DOCUMENT REFERENCE:

- KSA-011," The Requirements for Controlled Documents"
- KAA 500, "The Process for Controlled Documents"
- KSM-015, "Maintenance History Records"
- KSM-006, "Investigating, Compiling and Execution of Maintenance Work Packages"
- 331-2, "Nuclear Engineering Management Manual".

Assessment:

Gathering of history of primary system has been attempted (with a focus on RPV) and all info could be retrieved. It is believed that history for most items is available but at times difficult to retrieve. Note that some manufacturing details were not procured and remain available only from the OEM. There is concern over configuration management aspects.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Identify equipment for which the argument for long term serviceability & safety is based on the availability of the relevant QADPs, maintenance history & test reports and ensure these documents are retrievable. Refer to WBS 13.	Koeberg SALTO	Q4 2020

Functional Group Lead:	A Kotze	**E2.4**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

<u>3.3.2.3 Bullets 1.4:</u> *Assessment of the current physical status of the plant.* - Confirm that review and assessment of the operating and maintenance history for each structure or component is part of the analyses accounting for such parameters as operational transients, past failures, or unusual conditions that affected the performance or condition of the structure or component. Confirm that examination of repairs, modifications or replacements relevant to ageing considerations are included in the analysis of the SCs

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Previous history of component failures are systematically reviewed when "component failures" are considered under KGU-033, "Failure investigation of plant equipment and evaluation of experience"' with component failures. KGU-033 provides guidance for investigating plant component failures. The experiences gained from these investigations are used to prevent recurrence, improve the Maintenance Basis and compile equipment failure statistics for trending purposes. All the component failures have been reviewed (and are to be regularly reviewed) to verify that all ageing/degradation effects are represented in the Ageing Management matrix. Modifications and equivalent replacements follow systematic failure mode assessments prior to authorisation.

Civil structure defects and failures are reviewed by trained civil engineers under the civil monitoring programme for appropriate repair methods to be identified and this experience is used to perform the ageing analysis.

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-275 - Ageing Management Matrix
- 331-148 - Programme Engineer guide
- KSA 128 - Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station
- KGU-033, "Failure investigation of plant equipment and evaluation of experience"

Assessment:

No civil structure component failures have been registered as type Component Failure (CF) in the EPMS system. However all civil failures are reviewed by trained civil engineers for appropriate repair methods to be identified. This experience will be used to perform the civil AMM review. This has however not been done.

As there is no senior civil engineer appointed for the Koeberg, civil structures are not being managed in a holistic, integrated manner and there is no comprehensive civil structures LOPP.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Preform ageing management reviews and condition assessments all for SCs subject to ageing management review (AMR). The EDF Ageing Matrix should be used in the AMR for LTO. Refer to WBS 6.	Koeberg SALTO	Q1 2020
2	Establish a consolidated LOPP for civil structures taking into consideration historical maintenance, current condition reports, ageing & dynamic loading. Refer to WBS 16.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E2.5**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 1.5: *Assessment of the current physical status of the plant.* Determine that operational data are collected with a focus on transients and events and on generic operating experience. Also information relevant to power uprating, modification and replacement, surveillance and any trend curves are important to be available for the overall assessment.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Transient and event information is gathered by the transient monitoring process and links with international memberships (EPRI, FROG, PWR Owners Group, INPO, WANO) and with reference to EDF. Trending by InSQL (onsite plant data repository) provides for pre and post modification trends of operational aspects. Review and monitoring of operational and testing data provide insight into condition of plant. For civil structures operational condition is gathered by the civil monitoring processes in place refer to the civil monitoring programme as per KSA 128 Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station and KAA 671 Management of License Binding Civil Surveillances at KNPS.

INPUT DOCUMENT REFERENCE:

- KSA 128 - Civil Preventative Maintenance Strategy for KNPS;
- KAA 671 - Management of License Binding Civil Surveillances at KNPS
- KAA 652 – Accounting of Transients

Assessment:

Data on transients are available, reviewed and evaluated to provide insight into plant condition. Specific reviews of civil structures experiences are performed prior to identification and specification of repair methods.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**E2.6**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 2.1: *Identification of ageing effects and degradation mechanisms.* - Check that a procedure exists for the structure, component or commodity grouping to assess ageing effects in detail.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Ageing Management Matrix, 331-275, represent the ageing management matrix (AMM) derived from the EDF comprehensive ageing assessment. The matrix reflects the Koeberg specific aging couples as bench-marked against EDF. Work to validate the EDF specific OE as it pertains to the Koeberg equipment is ongoing.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- SRA II report – Chapter 4 Ageing
- 331-148 - Programme Engineer guide

Assessment:

During the Koeberg SALTO project the verification of complete coverage of the AMM will be obtained when all Koeberg plant equipment will be scrutinised and ensured it is included in the AMM, where after a systematic review and comparison with IGALL will be undertaken.

Reviews of the AMM by SMEs to date (as well as a review of all Component Failures registered on EPMS) have not identified significant discrepancies. The international Expert Panel used to debate a unique to Koeberg civil degradation is a good example.

In addition to 331-275, a procedure for how scoping, screening and aging assessment of the items and couples are populated into the ageing matrix.

Results:	Meet		Don't Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	Complete the development of the aging matrix and associated procedures & processes. Refer to WBS 4.	Koeberg SALTO	Q3 2016

Functional Group Lead:	A Kotze	**E2.7**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 2.2: *Identification of ageing effects and degradation mechanisms.* - Verify the plant ageing management review process identifies possible ageing effects/mechanisms, critical locations/ parts, material, environment and ageing management programmes addressing these subjects for SCs in the scope of LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Comprehensive reviews of ageing and degradation phenomena are being performed and managed via various plant programmes and processes and crosschecked with the Ageing Management Matrix as per 331-275, "Ageing Management Matrix". Identification of possible and potential ageing effects are identified from Koeberg and international OE (mostly EDF), contact with other utilities at FROG, WANO and EPRI and the strategy for ageing review compared to IGALL.

For civil structures also refer to the civil monitoring programme as per KSA 128 Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station and KAA 671 Management of License Binding Civil Surveillances at KNPS.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- SRA II report – Chapter 4 Ageing
- 331-148 - Programme Engineer guide
- 331- 102 - ETMM TOR
- KGU 011 – Life of Plant Plans
- NEPP 001 – Concept of position papers
- KGU 031 - System Health reporting
- KAA 826 - Plant Health committee
- KGA 035 – OE from EDF
- 238-22 = CURA integrated risk reporting
- 331-64 Qualitative Risk Assessment (QRA)

Assessment:

The scope of SALTO is considered comprehensively covered but not yet executed. The BAU aspect is however in place and being developed and expanded in an on-going manner. Screening of civil structures has not been reviewed in the AMM and as such cannot be considered complete. In addition, the LTO specific review and comparison with IGALL has not been performed.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Review AMM for civil structures Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E2.8**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 2.3: *Identification of ageing effects and degradation mechanisms.* - Determine if materials, environment and stressors that are associated with each, component, or commodity grouping were considered in the process of identification of ageing effects.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The ageing management matrix (331-275) summarises this information. Referenced documents are EDF ageing matrix, EDF OE, EPRI materials and issue tables, FROG concerns, PWROG topics and IGALL. All of these inputs are channelled towards the ageing management of components and commodity groupings.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- SRA II report – chapter 4 Ageing
- 331-148 - Programme Engineer guide
- Nuclear Position Papers

Assessment:

Ageing concerns and environmental stressors impacting SSCs are obtained and channelled towards management of the components or equipment groupings. The reviews of the AMM by the Koeberg technical leads have not identified many outstanding ageing concerns giving confidence that ageing concerns are captured and being dealt with. Screening of civil structures has not been reviewed in the AMM and as such cannot be considered complete.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Review AMM for civil structures. Refer to WBS 6.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E2.9**
Functional Group:	**SDE Civil**	
Date Performed:	**2015/08/07**	

Item:

3.3.2.3 Bullets 2.4: *Identification of ageing effects and degradation mechanisms.* - Check if operating experience and research findings and results were adequately considered.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Research results and OE are well identified and made available to technical leads and system engineers to decide on management methods. Reference documents such as AMM, IGALL, EDF OE, EPRI research, WANO concerns, FROG and PWROG items, PSR reports, LOPPs and NEPPs are considered. The integrated approach of all of these provide for a comprehensive identification of concerns. The verification that all of the identified research findings have been adequately considered can be judged by reviewing the related plant equipment failures.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- 331-148 - Programme Engineer guide
- Nuclear Position Papers

Assessment:

Research results and OE are well identified and made available to technical leads to decide on management methods. Recent plant performance indicates good management of ageing concerns. Some expensive and complex concerns have been delayed and increase risk of production losses (e.g. unit 2 RPV head, pressuriser heaters, electronic cards, needle valves of RIS/EAS, the need for cathodic protection of containment). The R&D gathered from EPRI involvement as e.g. improvement of containment structure monitoring method, the assessment of wide scale ASR and the containment failure experienced in the USA indicate that Koeberg is well aware of international degradation and develop own expertise where the ageing is Koeberg specific.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Review IGALL civil structure degradation to confirm all OE has been considered and included in AMM. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E2.10**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 2.5: *Identification of ageing effects and degradation mechanisms.* - For selected examples, check consistency with IGALL AMR tables.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Currently, this has not been done.

Assessment:

IGALL comparison is scheduled for Koeberg SALTO project and review of civil AMM not done.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Review IGALL civil structure degradation to confirm all OE has been considered and included in AMM. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E2.11**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 3.1: *Documentation of the evaluation and demonstration for management of ageing effects.* - Verify if demonstration was done that the effects of ageing will continue to be identified and managed such that the intended function of the SC will be maintained throughout the planned period of LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Effects of ageing will continue to be identified and managed via various BAU processes, e.g. ETMM, AMM, LOPP, NCR, Design and TAF, PSR, WANO, EPRI/FROG/PWROG memberships.

INPUT DOCUMENT REFERENCE:

- 331-275 - Ageing Management Matrix
- 331-102 - Engineering Technical Management Meeting (ETMM), LOPP Guide
- KAA-506 - Temporary Alterations to Plant, Plant Structures or Operating Parameters that Affect the Design Base
- KAA-815 -Design Changes to Plant, Plant Structures or Operating Parameters
- KAA-690 - Operability Determinations

Assessment:

For the existing processes it will be easy to confirm these are expected to remain in place for LTO. For the international memberships it will be difficult to prove that the intention is to continue for the duration of LTO (especially since the financial attacks to reduce these are factual). A knowledge management strategy and process needs to be developed to specify the basis for the international memberships and the incorporation of knowledge gained into the ageing and design process.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	A knowledge management strategy and process needs to be developed to specify the basis for the international memberships and the incorporation of knowledge gained into the ageing and design process. Refer to WBS 14.	Koeberg SALTO	Q4 2020

Functional Group Lead:	A Kotze	**E2.12**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 3.2: *Documentation of the evaluation and demonstration for management of ageing effects.* - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for effective management of ageing effects.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The documentation processes at KOU can be found in KAA 010, KAA 500 and 331-2. In addition all ageing management programmes augment the standard requirements with specific requirements for records generated. Most of the Engineering Programmes are identified in 331-148.

INPUT DOCUMENT REFERENCE:

- KSA 010 – The Requirements for Controlled Documents
- KAA 500 – The Process for Controlled Documents
- 331-3 – Document and Records Management Work Instruction
- 331-148 – Programme Engineer guide

Assessment:

During SALTO review gaps will be identified and will be required to be closed. All information and documentation for SALTO to be captured as per approved documentation processes.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Complete AMR for all LTO identified scope. Refer to WBS 6.	Koeberg SALTO	Q1 2020
2	Complete and document all required TLAA revalidations for LTO identified scope Refer to WBS 10.	Koeberg SALTO	Q1 2020
3	Develop comprehensive LOPP for LTO civil structures. Refer to WBS 16.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E2.13**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 3.3: *Documentation of the evaluation and demonstration for management of ageing effects.* - Confirm that efficient data collection and record-keeping systems are in place so that trend analyses can readily be performed to predict SSC performance.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Data collection is dependent on the individual programme or process. Each AMP will have specific data collection and record keeping requirements. For civil structures also refer to the civil monitoring programme as per KSA 128 Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station and KAA 671 Management of License Binding Civil Surveillances at KNPS.

INPUT DOCUMENT REFERENCE:

- KSA 128 - Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station
- KAA 671 - Management of License Binding Civil Surveillances at KNPS.

Assessment:

AMPs to be verified for data collection for LTO.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Verify that all AMP relevant data is collected and trended to support operation beyond year 40 and to year 60. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E2.14**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.2.3 Bullets 3.4: *Documentation of the evaluation and demonstration for management of ageing effects.* - Verify that the following information is available in the documents demonstrating management of the ageing effects:

- Clear identification of the ageing effects requiring management;
- Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed;
- Description of how the programmes and activities will manage the effects of ageing;
- List of substantiating references and source documents;
- Discussion of any assumptions or special conditions used in applying or interpreting the source documents;
- Description of existing and new programmes for LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The ageing management matrix addresses the following items:

- Clear identification of the ageing effects requiring management;
- Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed;

Each of the programmes individually addresses:

- Description of how the programmes and activities will manage the effects of ageing;
- List of substantiating references and source documents;
- Discussion of any assumptions or special conditions used in applying or interpreting the source documents;

Assessment:

Self-evaluation (SE 88540 for SPS) is currently underway. It will review the existing and need for new programmes referring to the IGALL listing. The programme guide (331-148) needs to address the description of existing and new programmes for LTO.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Complete actions stemming from SE 88540 for civil structures. Refer to WBS 7.	Koeberg SALTO	Q1 2020

AREA E: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR CIVIL STRUCTURES

Subsection 3.3.3: Review of ageing management programmes

Functional Group: SDE Civil **Functional Group Lead:** A Kotze

Date Performed: 2015/08/07

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.3.1	Ageing management programmes should be evaluated against the nine attributes [6]. For selected AMPs, detailed description of the attributes is provided in IGALL. Existing programmes and newly developed ageing management programmes should incorporate insights and results of ageing management review.	• Ageing management programmes (procedures for implementation of SC-specific AMPs); • Other plant programmes for managing the effects of ageing degradation; • Report on PSR (if it exists); and • Existing plant programmes listed in section 3.2.2 (these are reviewed as preconditions).	331-275 - Ageing Management Matrix
			SRA II report – Chapter 4 Ageing
			331-148 - Programme Engineer guide
			SE 85540 (SE 35189) - Programmes self-assessment
			KSA 128 - Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station

Functional Group Lead:	A Kotze	**E3.1**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.3.3 Bullets 1: *Verify that existing and proposed plant programmes that supports LTO were reviewed for meeting the nine attributes.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The existing Civil Monitoring Programme as well all existing programmes conforms to the following five elements as per of 331-148, "Programme Engineers Guide", Appendix 1.

- Scope
- Requirements and Acceptance Criteria
- Execution
- Results Evaluation
- Overall Status

The existing Civil Monitoring Programme has not been reviewed for alignment with the nine attributes of the IGALL AMP.

INPUT DOCUMENT REFERENCE:

- 331-148- Programme Engineers Guide
- SE 88540 - Review of the Koeberg Engineering Programme Architecture to align to the LTO initiative

Assessment:

Self-evaluation not yet done to compare the civil monitoring programme with IGALL expectations. EPG is currently conducting a Self-Assessment, SE 88540 to review and evaluate the attributes of the current Programmes scoped in the Programme Guide, 331-148, with the intent to align with the nine attributes of the IGALL Ageing Management Programmes (AMPs). The SE is expected to be concluded by end of September 2015.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Complete the Self-Assessment, SE 88540, to review all existing for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs - update any AMP that requires it. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E3.2**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.3.3 Bullets 2: *Verify/ review specific sample of existing and new AMPs for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs, i.e. meeting the SC-specific nine attributes*.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The existing Civil Monitoring Programme has not been reviewed for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs.

INPUT DOCUMENT REFERENCE:

- 331-148- Programme Engineers Guide
- SE 88540 - Review of the Koeberg Engineering Programme Architecture to align to the LTO initiative

Assessment:

Self-evaluation not yet done to compare the civil monitoring programme with IGALL expectations. Engineering Programmes is currently conducting a Self-Assessment, SE 88540, to review the existing programmes for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs. The SE is expected to be completed before the end of September 2015 and action plan for new AMPs to will be developed. 100% sample due to Self-Assessment currently ongoing.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Complete the Self-Assessment, SE 88540, to review all existing for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs - update any AMP that requires it. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E3.3**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.3.3 Bullets 3: *Whether the plant concludes, after reviewing the existing plant programmes and/or ageing management programmes, that the management of ageing effects is not adequate in some cases. In this case, whether the plant modifies the existing programme or develops a new programme for the purpose of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The existing Civil Monitoring Programme is in accordance with 331-148, "Programme Engineers Guide". Although, not specifically written in the process documents of some of Civil Monitoring Programme, it's expected that programmes should have a living process that takes into account OE and makes improvement on an on-going basis. International Codes and Standards, EDF experience, INPO and EPRI guidelines are also taken into account. The CAP process as per KAA-688 is used for the management and tracking of the living process for most the programmes. The CAP process is an independent process.

The Civil Monitoring Programme has not been reviewed for consistency with the civil related IGALL AMPs.

INPUT DOCUMENT REFERENCE:

- 331-148- Programme Engineers Guide
- SE 88540 - Review of the Koeberg Engineering Programme Architecture to align to the LTO initiative

Assessment:

Self-evaluation and Koeberg SALTO project not yet done. A Self-Assessment, SE 88540, has been initiated to review all existing for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs. A decision whether to modify the existing programme or develops a new programme will be taken as part of the self-assessment. In addition Koeberg SALTO project to identify any anomalies for civil structure programme/s.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Complete the Self-Assessment, SE 88540, to review all existing for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs - update any AMP that requires it. Refer to WBS 7.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E3.4**
Functional Group:	SDE Civil	
Date Performed:	2015/08/07	

Item:

3.3.3.3 Bullets 4: *Confirm that operation, inspection/monitoring and maintenance programmes are well-coordinated by AMPs.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Ageing Management Matrix – 331-275 that is compiled by using the EDF ageing matrix as a departure point, then making it Koeberg specific by adding unique equipment and reviewing the EDF concerns by Koeberg technical leads, Programme Engineer guide – 331-148 that provides guidance to all programme engineers on implementation of plant condition management activities including scope definition, establishing programme rules and requirements, acceptance criteria, execution details, evaluation of results, optimisation and oversight by Programme Health reports. These two processes provide for an integrated and co-ordinated AMP effort.

INPUT DOCUMENT REFERENCE:

- 331-148 Programme Engineers Guide
- 331-275 Ageing Management Matrix

Assessment:

When considering the status of the civil programme as reflected in the Programme Health report, there are some aspects that are not well co-ordinated by the AMP

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Complete actions stemming from SE 88540 for civil structures. Refer to WBS 7.	Koeberg SALTO	Q1 2020

AREA E: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR CIVIL STRUCTURES

Subsection 3.3.4: Obsolescence management programme.

Functional Group: SDE Civil **Functional Group Lead:** A Kotze

Date Performed: 2015/08/24

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.4.1	The plant should demonstrate that technological obsolescence is properly managed. Management of obsolescence should be a continuous activity addressing both the maintenance and performance of SSCs. A programme to address obsolescence could be a part of normal plant programmes (e.g. maintenance). Responsibility for programme implementation should be clearly assigned within the organization of the plant.	• Procedures for the management of technological obsolescence; • Documentation to support SSC obsolescence and replacement; • List of spare parts; • Maintenance records; • Long term investment programme for classified equipment and systems.	331 -146 – The Obsolescence Process 4600055437 - Contract between KOU and PKMJ DRA LOBSOLESC – Project Definition Release Approval for Obsolescence Project KBA 0022 N NEPO NEPP 115 Rev 1 – Nuclear Engineering Position Paper titled – Obsolescence management at Koeberg Nuclear Power Station.

Functional Group Lead:	A Kotze	**E4.1**
Functional Group:	SDE Civil	
Date Performed:	2015/08/28	

Item:

3.3.4.3 Bullets 1: *Confirm that appropriate technological obsolescence management reviews and assessments have been performed for SCs.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

In October 2004 the design engineering department initiated an obsolescence project (LOBSOLESC) initially to cover C&I equipment and in 2006 extended to electrical and mechanical equipment.

The project investigated obsolescence in each system that make up Koeberg Nuclear Power Station (KNPS). The original equipment manufacturers (OEM) and original equipment suppliers (OES) were consulted to verify the availability and status of the each equipment. The project led to the replacement or modification of some C&I systems and a number of equivalent studies (for example: Fuji transmitters, Verdelet valves etc.) were performed. The project was closed on the 30 September 2009.

KNPS also has an agreement with EdF (Electricite de France) where a KNPS engineer is fully integrated into the EdF obsolescence management structure. This is because KNPS is a similar station to EdF stations designed and constructed by the same constructor and the equipment used is exactly the same. The engineer shares the KNPS obsolescence efforts with EdF and vice versa.

Since October 2009 until recently Obsolescence was dealt with reactively through the supply chain processes.

In 2014 KNPS contracted with PKMJ (subsidiary of Rolls Royce) for the creation of a web-based database (Proactive Obsolescence Management System – POMS). In addition to the database PKMJ commits to contact each and every manufacturer/ supplier of KNPS at least once a year to verify the obsolescence status of each KNPS equipment.

In 2014, the Obsolescence Working Committee (OWC) comprising of representatives from the groups below was re-formulated.

- Nuclear Engineering
- Plant Engineering
- Maintenance
- Procurement
- Eskom/EdF Obsolescence Liaison Engineer

The OWC meets twice a month and provide a platform for key stakeholders to identify, confirm, classify prioritise and drive the resolution of identified obsolescence issues.

For civil structures specifically, obsolescence reviews have been performed sporadically due to information gained that the original cement type was no longer going to be available, or some of the monitoring equipment (and experts performing these) were at risk of obsolescence. Proactive work has also been undertaken where Eskom together with EPRI are testing a potential replacement for containment Invar wire monitoring system.

INPUT DOCUMENT REFERENCE:

- KBA 0022 N NEPO NEPP 115 Rev 1 – Nuclear Engineering Position Paper titled – Obsolescence management at Koeberg Nuclear Power Station.
- DRA LOBSOLESC – Project Definition Release Approval for Obsolescence Project
- 331 -146 – The Obsolescence Process

Assessment:

Appropriate technological obsolescence management reviews and assessments have been performed for SCs at KNPS.

Results:	Meet	**X**	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**E4.2**
Functional Group:	SDE Civil	
Date Performed:	2015/08/28	

Item:

3.3.4.3 Bullets 2: *Verify if demonstration was done that the effects of obsolescence will be continuously identified and managed such that the intended function of SCs will be maintained throughout the planned period of LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The obsolescence process (331-146) has been established. The obsolescence working committee (OWC) has been re-established. The OWC comprises of representative from the supply chain organisations (i.e. procurement, procurement engineering), plant engineering (represent system engineering and component engineering), nuclear engineering (i.e. specification engineering, engineering programmes etc.), maintenance as well as configuration management. The OWC meets twice a month to identify, confirm, classify prioritise and drive the resolution of identified obsolescence issues.

KOU has contracted with PKMJ (Rolls Royce) for the creation of POMS and POMS OM. Included in the contract is PKMJ commitment to contacting each supplier to verify each equipment Obsolescence status. The POMS OM assists in the prioritisation of the obsolescence resolution.

Specific to civil structures, continued obsolescence identification and resolution is based on interaction with international entities such as EDF and EPRI as well as the continued focus on contingencies developed in response to operational issues (e.g. borehole replacements, new seismic hammer development)

INPUT DOCUMENT REFERENCE:

- 331-146 :- Obsolescence Process
- 4600055437:- Contract between KOU and PKMJ.

Assessment:

The OWC process, as well as the contract with PKMJ are in place, however the contract is limited to the contractual period which does not run to the LTO time frame. SPS is currently investigating establishing an obsolescence managed in accordance with the IAEA process.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**E4.3**
Functional Group:	SDE Civil	
Date Performed:	2015/08/28	

Item:

3.3.4.3 Bullets 3: *Whether the plant is reviewing efficiency of the existing obsolescence programmes on a regular basis.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Periodically, the Quality Assurance (QA) Group performs a QA monitoring programme on all departments' processes and programmes. For the Engineering department the processes audited include the obsolescence process/ programme.

Periodically, Nuclear Safety Assurance (NSA) department performs an external review of KOU processes and programmes (including Obsolescence), raise IRA where necessary and issue a status report

INPUT DOCUMENT REFERENCE:

- 331-146 :- Obsolescence Process

Assessment:

Currently the efficiency review of the Obsolescence Programmes is dependent of oversight and assurance departments. No self-assessment is specified in the obsolescence process.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1.	Review the Obsolescence process to include self-assessments, benchmarking initiatives etc. Refer to WBS 15.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E4.4**
Functional Group:	SDE Civil	
Date Performed:	2015/08/28	

Item:

3.3.4.3 Bullets 4: *Whether management of technological obsolescence of SSCs such as I&C equipment and systems, sensors, medium voltage cables, uninterruptable emergency power supply (UPS) is in place.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Obsolescence process identifies all/ any types of obsolescence. Once identified the selected change process (modification or equivalency) will evaluate further, resolve and manage the obsolescence. The current plant change processes (modification or equivalencies) for management of technological obsolescence is robust and effective.

The main technological obsolescence observed in mechanical components and equipment is improvements in code and standards (ASME, RCCM) as well as material evolutions. In such cases the effects are evaluated under the Form, Fit and Function basis of the equivalency process.

Koeberg Operation Unit has a strong contractual relationship with EdF (Management, Engineering and Operation). This relationship benefits KOU in various forms including:

- Operating Experience, for example the martensitic steel aging problems experienced on valve stems
- Management decisions are sent to Koeberg NPP for review

The contractual relationship between our Original Equipment Suppliers (OES) is in place for the supply of spares parts.

KOU is a member of various international organisations (e.g. FROG, EPRI etc.). Through the interactions with these organisations certain recommendations are followed through.

INPUT DOCUMENT REFERENCE:

- 331-146 – Obsolescence process

Assessment:

The objective is met and the approach must be maintained through LTO.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

AREA E: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES

Subsection 3.3.5: Existing time limited ageing analyses.

Functional Group: SDE Civil

Functional Group Lead: A Kotze

Date Performed: 2015/08/14

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.5.1	The plant should identify existing time limited ageing analyses regarding period of operation and design considerations or licence terms.	• List of time limited ageing analyses; • FSAR; • EQ documentation; • Design supporting documents (such as PTS analyses, fatigue calculations, etc.); • Other licensing documents.	SAR – Koeberg Safety Analysis Report
			KSA – 128 Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station
			KAA – 671 Management of License Binding Civil Surveillances at KNPS
			331-275 – Ageing Management Matrix
			KBA 00 22 E00 006 NSSS Design Transients
			KAA 652 – Accounting of Transients

Functional Group Lead:	A Kotze	**E5.1**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.5.3 Bullets 1: *Whether the existing time limited ageing analyses (e.g. from FSAR) are properly documented in the current safety analyses report or other licensing basis documents and clearly and adequately describe the current licensing basis or the current design basis requirements for plant operation.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Civil Structures TLAAs are referenced in the SAR (II-1.9.2.4.6, II-1.9.2.4.6, II-1.9.2.6.2.5, II-1.9.2.8, II-1.9.3.6, II-4.2.2, II-3.4.2). The TLAAs mentioned are linked to the soil-cement sub-foundation, the aseismic bearings, the containment structure and containment liner. In all cases, the TLAAs are supported by monitoring programmes with limiting envelopes providing the extremes of acceptability/operability.

INPUT DOCUMENT REFERENCE:

- SAR – Koeberg Safety Analysis Report
- KSA-128 - Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station
- KAA-671 Management of License Binding Civil Surveillances at KNPS

Assessment:

The SAR mentions the TLAAs but these are not well described in the SAR. The actual limitations and the design inputs are not documented (other than the containment liner that stipulates 200 Temp/pressure transients – the same as contained and tracked in the fatigue transient monitoring programme).

From IGALL concrete strength degradation due to creep and shrinkage is expected to be a referenced TLAA. There is no indication that this aspect has been catered for. The other 3 TLAAs in IGALL (Containment liner fatigue, Soil settlement and Containment tendon relaxation) are catered for in the SAR, but only by means of monitoring programmes – not by clear reference to the actual analysis performed to document the limitations.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Include in the SAR TLAA list, the civil structures TLAAs and develop and capture the required TLAAs in the SAR Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	A Kotze	**E5.2**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.5.3 Bullets 2: *Whether the plant identified list of existing time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Currently, Koeberg does not have a consolidated list of all Koeberg specific TLAA

Assessment:

This list is currently being put together by SDE and will be compared to the IGALL TLAA list.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Compile a consolidated TLAA list for Koeberg and compare this to the IGALL TLAA list. Refer to WBS 8.	Koeberg SALTO	Q3 2016

Functional Group Lead:	A Kotze	**E5.3**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.5.3 Bullets 3: *Whether the plant identified missing time limited ageing analyses based on results of screening.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

LTO screening is catered for by 331-275 Ageing Management Matrix (AMM) where all ageing and degradation of equipment and civil structures are documented. The AMM where the commodity groupings are reflected has been derived from EDF grouping. The AMM is reviewed by Koeberg SMEs and expanded and made Koeberg specific. TLAAs are not identified by the AMM, but the method of AMM management include reference to the limitations (or TLAA envelope).

INPUT DOCUMENT REFERENCE:

- 331-275 – Ageing Management Matrix

Assessment:

The identification of TLAAs are to be performed as part of Koeberg SALTO project and all of the identified TLAAs not referenced in the SAR included. This project has not been completed. In addition, the AMM has not been reviewed and updated for civil structures.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Complete review of civil structures in AMM and identify the TLAAs that should be reflected in the SAR Refer to WBS 9.	Koeberg SALTO	Q4 2016

Functional Group Lead:	A Kotze	**E5.4**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.5.3 Bullets 4: *Whether the plant has launched time limited ageing analyses reconstitutions if needed.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Relaxation rate of containment tendons is evaluated every 10 years following the Integrated Leak Rate Test (ILRT) in order to update the containment TLAA which projects margins on containment structural integrity until end of life.

For non-civil structures, the fatigue analysis as contained in the Transient Analysis (KBA 00 22 E00 006) files including the associated monitoring has been reconstituted due to Operating at Reduced Temperature modification. No other need for civil structure TLAAs reconstitution has been identified.

INPUT DOCUMENT REFERENCE:

- KBA 00 22 E00 006 NSSS Design Transients
- KAA 652 – Accounting of Transients

Assessment:

The identification of TLAAs are to be performed as part of Koeberg SALTO project and all of the identified TLAAs not referenced in the SAR included. This project has not been completed. It is estimated that there will be some civil structure TLAAs identified that will require reconstitution (or creation if it does not exist).

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Identify civil structure TLAAs that require reconstitution (and include these in the SAR) as part of the Koeberg SALTO screening process Refer to WBS 10.	Koeberg SALTO	Q1 2020

AREA E: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR CIVIL STRUCTURES

Subsection 3.3.6: Revalidation of time limited ageing analyses.

Functional Group: SDE Civil

Functional Group Lead: A Kotze

Date Performed: 2015/08/14

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.3.6.1	The capability of some SCs within the scope of LTO to accomplish intended function should be verified by plant specific time limited ageing analyses. The plant should demonstrate that all necessary design basis information is accessible. The revalidation of these analyses should be done with respect to the assumed period of LTO. The revalidation should confirm function and safety margins necessary for the whole period of LTO. Newly identified time limited ageing analyses should be valid for intended period of LTO. If a TLAA cannot be revalidated, appropriate corrective or compensatory measures should be proposed for managing ageing effects of SSCs during LTO.	• List of time limited ageing analyses; • FSAR; • Design supporting documents; • List of equipment with time limited EQ; • SSCs test and inspection records; • SSCs failure reports (including, where appropriate, root cause analysis); • Operational history and records on load cycles; ☐ Statistical data of SSCs failures and failure rates; • Revalidation reports.	SAR – Koeberg Safety Analysis Report KSA – 128 Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station KAA – 671 Management of License Binding Civil Surveillances at KNPS 331-275 – Ageing Management Matrix List of Civil Structures monitoring submissions to the NNR (obtainable from Licensing)

Functional Group Lead:	A Kotze	**E6.1**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 1: *Whether all necessary design basis information, applicable codes and regulatory requirements, fabrication records, operational and maintenance history and results of inspections are accessible.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

License binding civil structure monitoring is documented in KSA-128 - Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station and caters for Load Monitoring of Aseismic Sample Bearings, Long Term Monitoring of the Soil Cement Sub-foundation, Long Term Monitoring of Aseismic Bearings, Monitoring the Structural Integrity of Containment Structures and ISI Requirements for Concrete Containment Structures. The monitoring, design bases, history, records and trends are stipulated and require regular submission to the NNR.

INPUT DOCUMENT REFERENCE:

- KSA-128 - Civil Preventative Maintenance Strategy for KNPS
- KAA-671 - Management of License Binding Civil Surveillances at KNPS

Assessment:

Compliance to License binding civil monitoring requirements are believed to be good.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**E6.2**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 2: *Whether these calculations/ analyses are properly documented.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

License binding civil structure monitoring is documented in KSA-128 - Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station and caters for Load Monitoring of Aseismic Sample Bearings, Long Term Monitoring of the Soil Cement Sub-foundation, Long Term Monitoring of Aseismic Bearings, Monitoring the Structural Integrity of Containment Structures and ISI Requirements for Concrete Containment Structures. The monitoring, design bases, history, records and trends are stipulated and require regular submission to the NNR.

INPUT DOCUMENT REFERENCE:

- KSA-128 - Civil Preventative Maintenance Strategy for KNPS
- KAA-671 - Management of License Binding Civil Surveillances at KNPS

Assessment:

Compliance to License binding civil monitoring requirements are believed to be good. The results of the calculations/analyses are documented. However, access to the actual calculations/analyses has not been verified.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Verify access to the TLAA calculations and analyses for TLAA revalidation. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.3**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 3: *Which kind of methods and criteria have been used for revalidation of time limited ageing analyses.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.4**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 4: *Whether the reviewed time limited ageing analyses justify safe operation for LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.5**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 5: *Whether the implications of revalidation are considered in the plant operational limits and conditions.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.6**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 6: *Whether the qualification of SCs covered by the EQ programme has been satisfactorily established and maintained for LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

EQ programme does not cover civil structures.

Assessment:

N/A

Results: Meet [ ] Don't Meet [ ] Partially Met [ ] N/A [X]

No	Action Description	Lead	Due Date

Functional Group Lead:	A Kotze	**E6.7**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 7: *What corrective or compensatory measures are taken, if the analyses cannot be revalidated.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed. For components where serviceability until the end of plant life has a high probability of not being able to be demonstrated, a replacement plan has already been initiated.

Assessment:

Revalidation of TLAAs have not been performed.

Results:	Meet		Don't Meet	X	Partially Met		N/A	

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.8**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 8: *Verify if evaluation was done to demonstrate that the safety analyses meet one of the following criteria:*

- The analysis remains valid for the intended period of LTO;
- The analysis has been projected to the end of the intended period of LTO; and
- The effects of ageing on the intended function(s) of the structure or component will be adequately managed for the intended period of LTO.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.9**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 9: *Check if the revalidation of time limited ageing analyses is documented in an update to the safety analyses report.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs and include updates into the SAR. Refer to WBS 11.	Koeberg SALTO	Q4 2020

Functional Group Lead:	A Kotze	**E6.10**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 10: *Also check if typical time limited ageing analyses are part of the safety analyses such as:*

- o Irradiation embrittlement of the reactor pressure vessel;
- o Thermal and mechanical fatigue;
- o o Thermal ageing; o Loss of preload;
- o O Loss of material.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

TLAAs for civil structures include loss of pre-load of containment tendons. Civil Structures TLAAs are referenced in the SAR (II-1.9.2.4.6, II-1.9.2.4.6, II-1.9.2.6.2.5, II-1.9.2.8, II-1.9.3.6, II-4.2.2, II-3.4.2). The TLAAs mentioned are linked to the soil-cement sub-foundation, the aseismic bearings, the containment structure and containment liner. In all cases, the TLAAs are supported by monitoring programmes with limiting envelopes providing the extremes of acceptability/operability.

INPUT DOCUMENT REFERENCE:

- SAR – Koeberg Safety Analysis Report
- KSA-128 - Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station
- KAA-671 - Management of License Binding Civil Surveillances at KNPS

Assessment:

The SAR mentions the TLAAs but these are not well described in the SAR. The actual limitations and the design inputs are not documented (other than the containment liner that stipulates 200 Temp/pressure transients – the same as contained and tracked in the fatigue transient monitoring programme).

From IGALL concrete strength degradation due to creep and shrinkage is expected to be a referenced TLAA. There is no indication that this aspect has been catered for. The other 3 TLAAs in IGALL (Containment liner fatigue, Soil settlement and Containment tendon relaxation) are catered for in the SAR, but only by means of monitoring programmes – not by clear reference to the actual analysis performed to document the limitations.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.11**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 11: *Verify that selected plant TLAAs are consistent with and meet the intent of the IGALL TLAAs.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

TLAAs for civil structures include loss of pre-load of containment tendons. Civil Structures TLAAs are referenced in the SAR (II-1.9.2.4.6, II-1.9.2.4.6, II-1.9.2.6.2.5, II-1.9.2.8, II-1.9.3.6, II-4.2.2, II-3.4.2). The TLAAs mentioned are linked to the soil-cement sub-foundation, the aseismic bearings, the containment structure and containment liner. In all cases, the TLAAs are supported by monitoring programmes with limiting envelopes providing the extremes of acceptability/operability.

INPUT DOCUMENT REFERENCE:

- SAR – Koeberg Safety Analysis Report
- KSA-128 - Civil Preventative Maintenance Strategy for Koeberg Nuclear Power Station
- KAA-671 Management of License Binding Civil Surveillances at KNPS

Assessment:

From IGALL concrete strength degradation due to creep and shrinkage is expected to be a referenced TLAA. There is no indication that this aspect has been catered for. The other 3 TLAAs in IGALL (Containment liner fatigue, Soil settlement and Containment tendon relaxation) are catered for in the SAR, but only by means of monitoring programmes – not by clear reference to the actual analysis performed to document the limitations. The assessment indicate that the intent of IGALL has not been achieved.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Review civil structures TLAAs vs IGALL and analyse and revalidate required TLAAs. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.12**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 12.1: *Operational limits and conditions.* - Determine if the stressors given in the design specifications or Current Licensing Basis have been used for assessment of SCs and their supports.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs and ensure stressors in the design and/or licensing basis have been taken into account. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.13**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 12.2: *Operational limits and conditions.* - Check if data from surveillance programmes and diagnostic systems were applied in the analyses.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs and ensure stressors in the design and/or licensing basis have been taken into account. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.14**
Functional Group:	SDE Civil	
Date Performed:	2015/08/14	

Item:

3.3.6.3 Bullets 12.3: *Operational limits and conditions.* - Verify if limits established in the design specifications or current licensing basis were used.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Perform revalidation of civil structure TLAAs and verify that limits established in the design specifications or current licensing basis are used. Refer to WBS 10.	Koeberg SALTO	Q1 2020

Functional Group Lead:	A Kotze	**E6.15**
Functional Group:	SDE Civil	
Date Performed:	SDE Civil	

Item:

3.3.6.5 Bullets 13: *Documentation of revalidation* - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for revalidation of time limited ageing analyses.

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Revalidation of TLAAs have not been performed.

Assessment:

Revalidation of TLAAs have not been performed.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Ensure all information and documentation necessary (and used) for revalidation of time limited ageing analyses of civil structures are maintained in an auditable and retrievable form. Refer to WBS 11.	Koeberg SALTO	Q4 2020

AREA F: HUMAN RESOURCES, COMPETENCE AND KNOWLEDGE MANAGEMENT FOR LTO.

Subsection 3.4.1: Human resources policy and strategy to support LTO.

Functional Group: HR

Functional Group Lead: Nyameko Ntlokombini

Date Performed: September 2015

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.4.1.1	The plant should have human resources policy and strategy in place to enable necessary LTO activities and cover intended period of LTO. The plant should be staffed with an adequate number of qualified and experienced personnel and competent managers who are duly aware of the technical and administrative requirements for LTO. The plant should provide reasonable amount of time overlap when personnel are to be replaced, so that replacement personnel can acquire an understanding of their new duties and responsibilities as well as knowledge and experience prior to assuming their positions.	• Human resource management procedures, guidelines and flowcharts; • Plant procedures describing recruiting, succession planning and retirement; • Human resource planning and staffing databases; • Organizational flowcharts and job descriptions; • Plant procedures describing organizational structure in the plant; • Task and job descriptions related to LTO; • Human resource statistics from past and plans for future (e.g. recruitment and retirement numbers).	32-1072 Job Evaluation 32-1020 Learning Policy 240-42854346 Further Studies 331-2 Nuclear Engineering Management Manual 238-8 Nuclear Division's Safety and Quality Manual 240-42853813 Strategic Workforce Planning 240-42851932 Recruitment and Selection Procedure 32-1066 Remuneration & Benefits Policy 32-1108 Car Scheme Procedure 32-1068 Annual Performance Scheme 240-52455369 Recognition and Awards Procedure 240-42853883 Talent, Career Path and Succession planning

Functional Group Lead:	Lionel Henn	F1.1
Functional Group:	Human Resource Management	
Date Performed:	24 August 2015	

Item:

3.4.1.3 Bullets 1: *Check if the plant human resources policy and strategy reflects LTO requirements.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Human Resources (HR) is mandated to partner and empower line management to recruit, develop, and retain skilled, committed, engaged and accountable employees across Eskom. HR is committed to the building of skills not only internally to Eskom but also for the communities in which Eskom operates. This is done in support of Eskom's aspiration and duty to grow the economy and improve the quality of life of people in South Africa and in the region.

In response to the Eskom strategy to shift performance and grow sustainability, HR has defined its enabling strategy to be creating a high-performing culture as a desired end state. The foundation of the HR strategy is that people management begins with the alignment of HR objectives to business objectives.

In creating the step change required to enable a high-performing culture, the Eskom HR strategy is anchored around the following five core themes that work together to bring about step change in order to support the execution of the overall business strategy:

- Engaged employees: to create workplace harmony and win hearts and minds
- A safe work-place: to promote discipline, accountability and behaviour change for safety
- Competent and highly skilled workforce beyond Eskom: to ensure the right mix and right quantities of skills at the right time
- Performance-based work-place: to drive collaborative methods of work that ensures a high performing organization, accompanied by appropriate reward and recognition system
- Transformed work-place: to promote values-based effective and accountable leaders driving transformation beyond compliance.

Engineering department is staffed with a mixture of skills and competencies; however the focus is on qualified engineers. As part of the pipeline strategy Eskom recruits learners after they have completed their schooling and offers them bursaries to study towards a tertiary qualification i.e. Engineering .These learners, once they qualify; join Eskom as Engineers in Training (EIT). The training is up to 24 months as they get exposed to different aspects of the plant and engineering. This ensures that we have a constant flow of new employees entering the organisation. Eskom's career path is very broad starting with the minimum Task Grade of 04-20. A typical career path for an Engineer starts as an EIT. When the training is completed they are appointed as Engineers after which they must register as a candidate engineer with the Engineering Council of South African (ECSA). Following 4 years post qualification experience and achieving Professional Engineer status with ECSA, the engineers can be promoted to Senior Engineer. After 7 years of experience, senior engineers may be promoted to Chief Engineer. There is also a management career path that engineers can choose to follow.

Eskom is a learning organisation which affords employees the opportunity to acquire competencies for their current positions as well as future roles. All employees are encouraged to have Individual

Development Plans (IDP) that captures training required to close the competency gaps. These IDPs are reviewed by managers on a yearly basis. Furthermore employees are encouraged to enhance their knowledge and expertise by studying further on a part-time and full time basis.

INPUT DOCUMENT REFERENCE:

- 32-1019 – Resourcing Policy
- 32-1072 - Job Evaluation
- 32-1020 - Learning Policy
- 240-42854346 - Further Studies
- HR Strategy & Mandate
- EIT manual

Assessment:

There is no specific Human Resources strategy for LTO.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1.	Develop and implement a HR strategy for LTO requirements. Refer to WBS 17.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Nyamie Ntlokombini	**F1.2**
Functional Group:	PS- QM group	
Date Performed:	14 August 2015	

Item:

<u>3.4.1.3 Bullets 2:</u> *Check and verify whether the management manuals and job descriptions determine roles, responsibilities and delegations of authority for all managers in key positions related to LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Eskom is a certified company in accordance with ISO-9001 (2008). Both ISO and RD-0034 require that the KOU business unit has developed an Integrated Management System (Nuclear Safety and Quality Management). In line with these requirements, each business unit within KOU has developed management manuals that contain the business unit mandate.

The roles & responsibilities for key positions have been derived to fulfil the business unit mandates. The Nuclear Engineering Management Manual (331-2) and Functional Organisational Structure (FOS) (240-88257644) provide roles and responsibilities for each department and group within the NE business area.

The job description sets out:

- the purpose of the job and where it fits into the organisational structure;
- the context in which the job holder functions;
- the principal accountabilities of the job holder;
- the main responsibilities he/she has to carry out;
- And the qualifications and competencies required.

It is a standard practise within Eskom that each manager be issued with the letter of appointment or delegation of authority for the position occupied.

<u>INPUT DOCUMENT REFERENCE:</u>

- 331-2 Nuclear Engineering Management Manual
- 240-88257644: Koeberg Operating Unit: Functional Organisation Structure (F.O.S.) – Nuclear Engineering)
- 238-8 Nuclear Division's Safety and Quality Manual

Assessment:

Some departmental HODs and HOGs do not have Delegation of authority or letters of appointment. LTO has not yet been considered in the management manuals, job descriptions and roles, responsibilities and delegations of authority.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Issue delegation of authority or letters of appointment for all higher positions (HODs and HOGs)	NE	Q4 2016
2	Review and update the Nuclear Engineering Management Manual (331-2) for LTO	NE-PS-QM	2016-07-31
3	Develop and implement tasks (job descriptions) for LTO Refer to WBS 18	Koeberg SALTO	Q1 2020
4	Develop and implement a skills and qualification matrix for LTO Refer to WBS 17	Koeberg SALTO	Q1 2020
5	Develop and implement a resource plan for LTO Refer to WBS 17	Koeberg SALTO	Q1 2020
6	Develop and implement a training and authorisation plan for LTO Refer to WBS 17	Koeberg SALTO	Q1 2020
7	Review and update the Nuclear Engineering Functional Organisational Structure (FOS) (240-88257644) for LTO	NE	Q2 2017

Functional Group Lead:	Phindiwe Xotyeni	**F1.3**
Functional Group:	PQE	
Date Performed:	2015-09-10	

Item:

__3.4.1.3 Bullets 3:__ *Find out if good coordination is maintained among different plant groups, among the site organizations and contractors involved in LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

These are interventions which have been done by the Organisational Effectiveness group within HR to foster good coordination/ collaboration / breaking silos / working together:

- Crucial Conversation Training done in heterogeneous groups, teaching people how to have difficult conversations in a way so that we walk away with a greater understanding of each other and greater respect for each other.
- Management Paired Observations: Managers pair up to do workplace observations in a different department that his / her own.
- Leadership Training done in heterogeneous groups, working on real cross departmental problems as part of the Business Driven Action Learning
- Staff Engagement Sessions with Senior Management
- Rotation of Middle Managers in order to cross pollenate knowledge and skills.
- Secondments to different departments are also facilitated and encouraged in order to build bridges between departments.
- Transformation workshops
- Work Team Sessions
- Open Forum's at Peter's Pit with the Power Station Manager (PSM)

There are authorised standards and procedures (listed below) for Eskom to interact and foster relationships with contractors and suppliers.

<u>INPUT DOCUMENT REFERENCE:</u>

- KSA 089 Procurement Quality Engineering Requirements
- KAA 570 Supplier Quality Audit and Surveillance process
- KAA 639 Vendor Qualification Process
- KAA 733 Monitoring of the receipt inspection process
- KGA 098 To determine Quality Programme Monitoring and Verification Requirements
- KGA 099 Supplier Assessment and Evaluation guide
- 238-101 Nuclear Division Supplier Safety and Quality Management Requirements
- 238-102 Nuclear Safety Level 2 Supplier Quality Management Requirements
- DSG 318 087

Assessment:

Coordination is maintained among different plant groups.

The partners that PQE interacts with in the supply chain include:

- Although the supplier monitoring requirements have been established for RD0034 Level I and Level 2 suppliers to ensure that the KOU Approved Suppliers List conforms , there are inadequate resources within PQE to establish and maintain these requirements
- There is no process plan in place to detail the manner in which RD 0034 is going to be applied when purchasing spare parts where lead times are short and a new supplier is identified for the supply.
- There are no suppliers in the market who are already RD0034 ready. With a long term contract, a supplier gets an opportunity to improve their Quality Management System to meet the requirements of RD 0034 over a period of time and the process is monitored by PQE. The supplier does not get the same opportunity when the transaction is short term with no prospects of building a long term partnership with the KOU.
- There is no Supply Chain Management function, which is independent of the supply chain partners, to oversee matters around the supply chain in order to improve supplier relations and performance.
- There is no formal interface between Eskom Corporate (Group Commercial) and Koeberg Operating Unit (Nuclear Commercial) when it comes to the placing of National Contracts. A formal interface would assist in ensuring that Nuclear Safety and Quality requirements are adequately included in the National Contracts so that the KOU can be able to draw task orders, taking advantage of economies of scale
- The activities of PQE, which include supplier monitoring, are not well understood by the other stake holders in the plant. This is noticeable by the fact that supplier performance matters and concerns are not brought to the attention of PQE for continual improvement in supplier performance and supplier relations with the employer

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Adequately resource PQE to establish and maintain the supplier monitoring requirements have been established for RD0034 Level I and Level 2 suppliers	Nuclear Commercial	Q3 2017
2	Investigate the process plan to detail the manner in which RD 0034 is going to be applied when purchasing spare parts where lead times are short and a new supplier is identified for the supply.	IPD-K	2018/12/31

3	Investigate the need for a supply chain management function to oversee matters around the supply chain in order to improve supplier relations and performance.	Nuclear Commercial	Q4 2017
4	Investigate the need for a formal interface between Eskom Corporate (Group Commercial) and Koeberg Operating Unit (Nuclear Commercial) to assist in ensuring that Nuclear Safety and Quality requirements are adequately included in the National Contracts so that the KOU can be able to draw task orders, taking advantage of economies of scale	Nuclear Commercial	Q4 2017
5	Inform/train the plant stakeholder in the activities of PQE to ensure that supplier performance matters and concerns are brought to the attention of PQE for continual improvement in supplier performance and supplier relations with the employer	PQE	2017/06/30

Functional Group Lead:	Lionel Henn	**F1.4**
Functional Group:	Human Resources Department	
Date Performed:	2015-09-11	

Item:

3.4.1.3 Bullets 4: *Check whether the staffing and resources are sufficient to accomplish the tasks assigned.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The current staffing complement in Engineering has various skills set (i.e. engineers, technicians, physicists, advisors and support staff). Nuclear Engineering has a complement of 182 permanent employees:

- 35% of these employees are professional engineers;
- 47% are technicians, advisors and physicists
- 18% is the support staff.

The average age in the department is 40 years with 3.2 % staff retiring in the next 5 years. The current turnover in the engineering department has been just under 5% in the past 2 years.

KOU conducted a strategic workforce planning exercise in 2014. The Strategic Workforce Planning outlines strategic alignment of Human Resources with the business direction of the organisational. It analyses the current workforce needs, identify gaps between present and the future and implementing solutions / strategies that will enable the accomplishment of the vision, mission, goals and objectives of the organisation. This exercise determined that Nuclear Engineering would require a total of 225 staff complement in the next 10 years to accomplish its mandate. The normal process at Eskom to close the gaps is through recruitment process. There are7 B's (principles) that can be used and they are:

- Birth (in house talent pool);
- Buy (recruitment);
- Build (on-job training);
- Borrow (using consultants);
- Bridge (shrinking workforce);
- Bind (retention);
- Boost (promotion).

INPUT DOCUMENT REFERENCE:

- 240-42853813 Strategic Workforce Planning
- Strategic Workforce Report
- 240-42851932 Recruitment and Selection Procedure

Assessment:

Current restrictions on recruitment due to financial constraints.

Strategic Workforce Planning exercise did not include specific analysis of LTO requirements.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Recruit for LTO positions. Refer to WBS 17	Koeberg SALTO	Q1 2020
2	Revise the Work Force Plan for Engineering to include LTO requirements Refer to WBS 18	Koeberg SALTO	Q1 2020

Functional Group Lead:	Lionel Henn	**F1.5**
Functional Group:	Human Resources Management	
Date Performed:	24 August 2015	

Item:

3.4.1.3 Bullets 5: *Check whether the staffing policy is directed to retaining a pool of experienced and knowledgeable staff.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Eskom's positions its business strategies as a preferred employer in the market. Eskom provides market related remuneration structures. Eskom targets to pay competent employees at the 50th percentile of the external market. The task job evaluation is used to determine the relative worth of each position in the organisation. The Basic Conditions of Employment Act was established to enforce basic conditions of employment in South Africa. Eskom strives to equal or better these conditions of employment. Eskom provides a number of fringe benefits and flexible remuneration packages which include medical aid, pension fund, car allowances, 13th cheque, subsides meals, housing allowance to mention a few. In addition Eskom has a Financial Company that offers employee's competitive rate for housing. Eskom has an incentive scheme to encourage and reward employees for performance on or better than target.

In addition, due to the unique nature of the Nuclear business, the Koeberg Operating Unit (KOU) developed a strategy to attract and retain core, scarce and critical skills. This is done through a payment of a monthly premium referred to as Nuclear Skills Premium (NSP) which can vary from 0% -40% (depending on the position) of employees' salaries.

Eskom has also recognised that employees cannot be retained by remuneration alone. Eskom supports flexible work practices to support differing businesses and employee's requirements. The statistic on staff movement is analysed and reported to management for tracking. All employees leaving the organisation are interviewed by Human Resources to ascertain their reasons for leaving and how the organisation can improve its retention strategies.

The current turnover in Engineering is less than 5% compared to the market.

INPUT DOCUMENT REFERENCE:

- 32-1066 Remuneration & Benefits Policy
- 32-1108 Car Scheme Procedure
- 32-1068 Annual Performance Scheme
- 240-52455369 Recognition and Awards Procedure
- ??? - Nuclear Skills Manual
- Conditions of service

Assessment:

Due to Eskom's financial constraints, Human Resources do not review employee's remuneration on an annual basis to check if they are paid on the 50th percentile of the external market.

The annual incentive scheme was not paid for the previous financial year, due to qualifying key performance not being met.

Policies and manuals to be reviewed

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1.	Review current retention practices in respect to current financial challenges and staff attrition.	HR	Q2 2017
2.	Review of the outdated HR policies, procedures and manuals	HR	Q4 2017

Functional Group Lead:	Lionel Henn	**F1.6**
Functional Group:	Human Resource Management	
Date Performed:	24 August 2015	

Item:

3.4.1.3 Bullets 6: *Check whether the long-term staffing policy objectives for human resources are established and maintained.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Eskom employs different resourcing strategies, which encompasses the use of permanent and non-permanent employees.

Eskom is committed to ensuring that resourcing of the organisation is conducted in a fair, open and transparent way. This statement is therefore guiding the organisation towards implementation of a credible resourcing strategy. The objective of the resourcing policy is to ensure alignment to national requirements and create a level platform and equal opportunities to allow for all to apply for vacancies and ensure resourcing processes are fit for purposes. Eskom believes in the development of staff and career advancement, so any recruitment to fill positions should first consider permanent internal employees especially for promotional opportunities. If the internal campaign does not yield results then external to Eskom candidates should be considered.

The following non-permanent employment categories are also used at Eskom:

- **Third Party contracts**, are used where specific scope of work and contracts are negotiated and agreed with a third party.
- **Vendors:** individual business that provides a service or product to Eskom within a specified contract.
- **Fixed Term contract:** can include ex-Eskom employees identified by Eskom Specific and determinable scope of work that is not of permanent nature, but can be for a maximum of 5 years.
- **Temporary Employees**: retired member of the Eskom Pension and Provident Fund (EPPF) over the age of 55 and who are appointed on an annual contract.
- **Occasional Employees** for a specific purpose or for a period not longer than six months.
- **Personnel agencies (labour brokers)** External third party agencies which supplies labour to Eskom on an “as and when required” basis. Employed for a specific purpose or for a period not longer than six months.

In addition as part of resourcing and development, Eskom uses secondments to respond to the business needs. Secondment is process when an employee is temporarily placed (seconded) in a specific post to gain exposure or training in another area of business (internal) or an organisation external to Eskom. The seconded employee shall return to the substantive position within the business unit that is releasing the employee, upon the termination of the secondment.

INPUT DOCUMENT REFERENCE:

- 32-1019 Resourcing Policy
- 32-1097 Management of Non-Permanent Employees Procedure
- 240-42856131 Procedure for Mobility Services/Employee Assignment/ Secondment Management

Assessment:

Due to financial constraints not all resourcing strategies can be implemented.

Procedures and policies to be reviewed.

Results: Meet [ ] Don't Meet [ ] Partially Met [×] N/A [ ]

No	Action Description	Lead	Due Date
1.	Financial approval to employ all resourcing strategies where applicable Refer to WBS 17	Koeberg SALTO	Q1 2020
2	HR long-term staffing policy and procedures to be reviewed for LTO needs. Refer to WBS 17.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Lionel Henn	**F1.7**
Functional Group:	Human Resources Department	
Date Performed:	2015-09-11	

Item:

3.4.1.3 Bullets 7: *Confirm that specific competence requirements for LTO related positions have been identified and these are used in the recruitment/selection process for these positions.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

All job descriptions are graded at divisional level, and each division only has one grading committee. There are different streams for different disciplines that are responsible for grading of the jobs. All jobs across disciplines throughout Eskom are evaluated using the TASK factor i.e. complexity, knowledge, influence and pressure of the job. All jobs need to be reflected on the organisational structure. The position grade should at all-time be the same as the employee's pay grade. The corporate grading committee was established to grade jobs that are generic across Eskom businesses (i.e. Engineering). Generic job descriptions are utilised to ensure consistency across Eskom. The competence and the minimum education requirements in the job descriptions are utilised in the advertisement and selection purpose during the recruitment process. Recruitment and selection occurs as a standard process governed by Eskom's recruitment and selection procedure.

INPUT DOCUMENT REFERENCE:

- 32- 1072 Corporate Job Evaluation
- 240-42851932 Recruitment and Selection
- Job description KC 30/E Rev F Engineer/ Snr Engineer Job code: 497/496

Assessment:

Current job descriptions do not contain all the nuclear specific requirements for LTO.

There is a lack of KOU management representation in the current job grading committees.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	NE to develop job descriptions that caters for nuclear aspects, and LTO requirements Refer to WBS 18	Koeberg SALTO	Q1 2020
2.	Submit the revised job descriptions to the divisional grading committee	NE	Q2 2017

Functional Group Lead:	Lionel Henn	**F1.8**
Functional Group:	Human Resource Management	
Date Performed:	24 August 2015	

Item:

3.4.1.3 Bullets 8: *Check whether the long term succession planning is established and implemented.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Eskom supports South Africa's growth and development aspiration. To do this effectively, Eskom must consistently provide stakeholders with confidence that its activities are managed sustainably, effectively and efficiently for the benefit of the South African economy. This is achieved by adopting safety, health, environment and quality (SHEQ) management as a business imperative for sustainable business performance and continual improvement.

Eskom has a Talent Management process which ensures a constant supply of talented individuals into key positions and successors for critical, core and scarce skills category. Eskom uses performance segmentation (bottom performer – do not deliver, solid performer-important to potential success of the business and top quartile performer-exceptional functional/technical performance) and learning agility which speaks to individual's ability to learn quickly in a new environment, continuously improve knowledge and adapt easily to new challenges. From this employees are segmented into talent bench which forms a dash board for the talent in the organisation.

Succession management is the process of building internal capability and skills across managerial roles and critical roles to ensure business continuity by identifying possible replacement for key positions and provide strategies for developing individuals to meet the organisation's future needs. A succession pool is therefore established from the talent pool identified from the talent management process. The potential successor is identified from the talent pool by the talent review board. They would identify competences gaps (technical/non-technical) to be closed before the employee can successfully occupy the position. The Eskom Recruitment Procedure allows for the identification of suitable candidates from succession pools. A minimum of three potential successors should be in the succession pool for this process to be considered. Employees in a succession pool will undergo a selection process to identify the best suitable candidate for appointment

INPUT DOCUMENT REFERENCE:

- 240-42853883 - Talent, Career Path and Succession planning
- 240-42851932 - Recruitment and Selection Procedure
- 32-727 - SHEQ Policy

Assessment:

Currently this succession planning is not fully implemented in the KOU.

Not all LTO positions are included in the current talent succession plans.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Full implementation of succession planning Refer to WBS 14	Koeberg SALTO	Q4 2020
2.	Identify critical positions for succession planning. Refer to WBS 18	Koeberg SALTO	Q1 2020

Functional Group Lead:	Loyiso Tyabashe
Functional Group:	NE
Date Performed:	2015-08-31

F1.9

Item:

3.4.1.3 Bullets 9: *Check and verify whether the plant managers have the appropriate resources to carry out their assigned LTO responsibilities and accountabilities.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The check and verify for appropriate resources for LTO can only be carried out once the plan for LTO has been established and implemented. As such, this assessment can only be completed following the implementation of the LTO plan.

Assessment:

To be checked and verified once the LTO plan is in place.

Results: Meet [ ] Don't Meet [X] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date
1	Identify the appropriate resources required by managers to carry out the department assigned LTO duties. Refer to WBS 18.	Koeberg SALTO	Q1 2020
2	Check and verify that the appropriate resources required by managers to carry out the department assigned LTO duties are available. Refer to WBS 18.	Koeberg SALTO	Q1 2020

AREA F: **HUMAN RESOURCES, COMPETENCE AND KNOWLEDGE MANAGEMENT FOR LTO.**

Subsection 3.4.2: Competence management for LTO and recruitment and training/ qualification processes for personnel involved in LTO activities.

Functional Group: Competence Management **Functional Group Lead:** Nyameko Ntlokombini

Date Performed: September 2015

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.4.2.1	The plant should have process in place to ensure competent human resources for LTO. The process for identification, recruitment and training of staff for LTO related activities should be consistent with normal HR processes, ensuring full job descriptions, training and qualification requirements etc. are available. All personnel assigned to LTO duties that can affect safety should have a sufficient understanding of the plant and its safety features. In addition to competence requirements for individual roles, the operating organization should consider the needs for organizational competences by setting team level objectives and ensuring effective and interdisciplinary teamwork. During the LTO decision process, refurbishments and transition period there will be new demands for the organizational competencies, skill types and levels. Plant should consider enhancement of training programmes for staff at ageing plants to compensate for losses of personnel due to retirement or job changes and for other reasons. Training programmes should also be adapted to accommodate the special technical, administrative and operational needs for LTO. The recruitment and selection	Competence management procedures and guidelines and flowcharts; Training records and/or databases; Training programme descriptions; Resources related to training; On-job-training programmes and records; Trainee assessment records.	CP-189 of 1995 (ASME 11): ASNT Standard for Qualification and Certification of Non-destructive Testing Personnel ASNT CP-189-1995 (formerly ANSI/ASNT CP-189-1995); INPO ACAD 02-001 Rev1: The Process for Accreditation of Training in the Nuclear Power Industry; INPO ACAD 98-004: Guidelines for Training and Qualification of Engineering Personnel; ISO-9712: Non-destructive testing - Qualification and certification of NDT Personnel. KAA-780 through KAA-784: Systematic Approach to Training procedures KAA 844 - Control of organisational structures procedure LDCSC procedure KGT-047: Inspection and Test training; KGT-006 – Graded approach to training. KGT-054- Chemistry Training Programme

	policy at the plant should be aimed at retaining a pool of experienced staff for LTO. A broad distribution of both age and experience should be established to ensure that the necessary pool of knowledge, skills and safety expertise is sustained and that long term objectives of human resources policy are met. Suitably qualified personnel should be selected and recruited in accordance with needs of LTO.		Guide
			KGT-055-General Radiation Protection Training Programme Guide
			KGT-056- Radiation Protection Group Training Programme Guide
			KGT-070: Education, Training and Development Practitioner Training Programme
			KGT-071: Plant Engineering Training;
			KGT-072: Nuclear Engineer's Programme Guide
			KSA-049: Station Training Standard;
			238-144: Nuclear Training Manual;
			240-42851932: Recruitment and Selection Procedure
			240-97226881: Employment Equity Policy
			331- 218: Training and Development of Nuclear Engineering Staff;
			331-549: Nuclear Engineering GIT Guide

Functional Group Lead:	Jarno Harker	**F2.1**
Functional Group:	Training	
Date Performed:	2015-08-31	

Item:

3.4.2.3 Bullets 1: *Check if the plant has process to ensure competent human resources for LTO including external support.*

Current status description and input document reference:

The plant process for training is described in the Nuclear Training Manual 238-144. The process is further expanded on in the Station Training Standard (KSA-049) and it's associated Systematic Approach to Training Procedures (KAA-780 through KAA-784). The plant engineering training process descriptions are documented in KGT-071 for Plant Engineering Training, in 331- 218 (Training and Development of Nuclear Engineering Staff) for Nuclear Engineering training and in KGT-047 for Inspection and Test training. The training processes follow both national and international guidance. The Process for Accreditation of Training in the Nuclear Power Industry INPO ACAD 02-001 Rev1, INPO ACAD 98-004 and Standard for qualification and certification of NDT personnel CP-189 of 1995 (ASME 11) and ISO-9712.

INPUT DOCUMENT REFERENCE:

- 238-144: Nuclear Training Manual;
- KSA-049: Station Training Standard;
- KAA-780 through KAA-784: Systematic Approach to Training Procedures;
- KGT-071: Plant Engineering Training;
- 331- 218: Training and Development of Nuclear Engineering Staff;
- KGT-047: Inspection and Test training;
- INPO ACAD 02-001 Rev1: The Process for Accreditation of Training in the Nuclear Power Industry;
- INPO ACAD 98-004: Guidelines for Training and Qualification of Engineering Personnel;
- CP-189 of 1995 (ASME 11): ASNT Standard for Qualification and Certification of Non-destructive Testing Personnel ASNT CP-189-1995 (formerly ANSI/ASNT CP-189-1995);
- ISO-9712: Non-destructive testing - Qualification and certification of NDT
- Personnel.

Assessment:

A review of the processes applied by the plant indicated that internationally accepted practices are followed for engineering and related training. Support personnel are also dealt with in terms of the standard training and competency requirements.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Jarno Harker	**F2.2**
Functional Group:	Training	
Date Performed:	2015-08-31	

Item:

<u>3.4.2.3 Bullets 2:</u> *Verify that the plant has adequate process for assessing and meeting the organizational competency requirements to support LTO.*

Current status description and input document reference:

The plant processes for training and assessment are described in applicable engineering training guides (KGU-002, KGU-023, KGU-034, KSR-003, KAR-240, 331-549, 331-218). The assessment results are captured in competency indices for each area. The training processes follow both national and international guidance. The Process for Accreditation of Training in the Nuclear Power Industry INPO ACAD 02-001 Rev1, INPO ACAD 98-004 and Standard for qualification and certification of NDT personnel CP-189 of 1995 (ASME 11) and ISO-9712.

<u>INPUT DOCUMENT REFERENCE:</u>

- KGU-002: Guide For System Engineers;
- KGU-023: Guide For Component Engineers;
- KGU-034:Guide For Reliability Engineers;
- KSR-003: Certification and Authorisation of Personnel Performing Functional Testing At KNPS
- KAR-240:Qualification and Certification of Inspection & Test NDT Personnel & Sub-Contractors;
- 331- 218: Training and Development of Nuclear Engineering Staff;
- 331-549: Nuclear Engineering Graduate in Training Guide
- INPO ACAD 02-001 Rev1: The Process for Accreditation of Training in the Nuclear Power Industry;
- INPO ACAD 98-004: Guidelines for Training and Qualification of Engineering Personnel;
- CP-189 of 1995 (ASME 11): ASNT Standard for Qualification and Certification of
- Non-destructive Testing Personnel ASNT CP-189-1995 (formerly ANSI/ASNT CP-189-1995);
- ISO-9712: Non-destructive testing - Qualification and certification of NDT
- Personnel.

Assessment:

In plant engineering applicable process guides are developed and implemented.

Nuclear Engineering has developed some training guides but still needs to do a gap analysis to identify if there are more guides that need to be developed.

The Nuclear Engineering Competency Matrix reflects progress made in the attainment of the required competencies. It also displays areas for further development in meeting organizational competency requirements. The matrix needs to be aligned to the training programme once the latter is finalised.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

<u>No</u>	<u>Action Description</u>	<u>Lead</u>	<u>Due Date</u>
1	NE to develop and implement an NE Training Programme.	NE-PS-Training	Q3 2017
2	NE to identify training guides for areas where guides do not exist.	NE-PS-Training	Q3 2016

Functional Group Lead:	Jarno Harker	**F2.3**
Functional Group:	**Training**	
Date Performed:	**2015-08-31**	

Item:

3.4.2.3 Bullets 3: *Confirm that all key technical competences for LTO activities have been identified and all involved staff meet these requirements.*

Current status description and input document reference:

All applicable technical competencies have been identified based on task lists developed as per the Systematic Approach to Training (SAT). The results are documented in competency indices for each area within engineering. Specific staff has been identified to possess certain competencies and are thus trained on these as per the needs of the plant. Competency indices are reviewed at the Engineering Curriculum Steering Committee (CSC).

INPUT DOCUMENT REFERENCE:

- KGU-002: Guide For System Engineers;
- KGU-023: Guide For Component Engineers;
- KGU-034:Guide For Reliability Engineers;
- KGT-071: Plant Engineering Training;
- INPO ACAD 98-004: Guidelines for Training and Qualification of Engineering Personnel

Assessment:

A review of Plant Engineering competency indices indicated that the present overall competency indicator indicates that adequately and skilled staff is available.

Nuclear engineering has its own Competency Matrix which is reviewed in Mancom. Deficiencies have been identified in the matrix and have not been updated for LTO scope. It is unclear if Nuclear Engineering will have its own CSC or join an established training regime (e.g. TTY).

For specific key competencies not adequate staff may be qualified on a competency that may be needed for a specific time frame in the future. These skills will have to be hired on an if and as needed basis

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1.	Identify which critical skills will require more individuals to be qualified on for specific LTO activities and describe what strategy will be followed to augment these skills. Refer to WBS 17	Koeberg SALTO	Q1 2020
2	Document the NE training position on CSC.	NE-PS-Training	Q3 2016

Functional Group Lead:	Jarno Harker	**F2.4**
Functional Group:	Training	
Date Performed:	2015-08-31	

Item:

3.4.2.3 Bullets 4: *Check if personnel assigned to LTO duties that can affect safety has a sufficient understanding of the plant and its safety features.*

Current status description and input document reference:

Engineering staff are trained on plant systems by attending the required training. Selected staff attend an extensive Nuclear Engineers Programme (NEP) which focuses on the plant's design basis and safety features as well as managing incidents and accidents including SAMGs. The NEP curriculum is based on the reactor operator accredited training programme. Engineers are further trained to become safety screeners/evaluators.

Programme engineers attend programme specific training as per the competency index.

INPUT DOCUMENT REFERENCE:

- KGT-072: Guide For Nuclear Engineers Programme;
- KTA-005: Safety Screening / Evaluators

Assessment:

Relevant staff are trained as required.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	Thegan Govender	**F2.5**
Functional Group:	KOU Training	
Date Performed:	2015-08-31	

Item:

3.4.2.3 Bullets 5: *Check and verify if plant management have the necessary management skills, experience and knowledge needed to manage the safe LTO.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The plant managers are selected and appointed by adhering to the Job Specification for each post, which states the qualifications, skills and requisite experience required for a post. The qualification, skills and experience requirements in the job spec is informed by the job post demands. This is further assessed by undergoing interviews and psychometric testing as required.

In the event of organisational changes being necessary, the control of organisational structures procedure (KAA 844) will facilitate the changes and review thereof. This process will determine what changes in management training are required and will go to the Leadership Development Steering Committee (LDCSC) for action and implementation as per the Systematic Approach to Training (SAT) process.

The LDCSC periodically reviews the leadership task list and updates the changes, content and programs as requires. A 5 year leadership plan is currently being developed and reviewed. This process ensures that leaders' training requirements are continuously monitored and updates based on changes in the environment.

INPUT DOCUMENT REFERENCE:

- KAA 844 - Control of organisational structures procedure LDCSC procedure
- KAA 780 – KAA 784 : Systematic Approach to Training Procedure suite
- KGT-006 – Graded approach to training.

Assessment:

Managing safe LTO will see a continuation and enhancement (continuous improvement) of the current practices over plant life (pre SALTO, during transitions and post SALTO).

Koeberg is undertaking some significant plant changes and to date, no tangible plant management issues have surfaced.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Check and verify that plant management have the necessary management skills, experience and knowledge needed to manage the safe LTO. Refer to WBS 17.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Thegan Govender	**F2.6**
Functional Group:	KOU Training	
Date Performed:	2015-08-31	

Item:

3.4.2.3 Bullets 6: *Check and verify if the opportunity is given to the managers and plant personnel to learn from external peer organizations and their lessons learned.*

Current status description and input document reference:

Managers and personnel are often provided opportunities to learn from external peer organisations.

This is done through benchmarking, conference and peer group participation and through training & development initiatives. Our WANO participation requires us to continually benchmark with peers. This takes the form of benchmarking with recommended stations on item of interest to Koeberg. We also request technical support missions (TSM) via WANO. These TSMs comprise of industry specialists and a WANO lead. Koeberg also suppliers peers for WANO peer reviews and TSMs.

Koeberg regularly participates in international industry development and training sessions. With plant modifications, personnel are often required to benchmark before a change decision is made. Once the change decision is made they are required to train at OEM (or similar) facilities.

OSART and IAEA reviews occur regularly.

INPUT DOCUMENT REFERENCE:

- 331-280 Benchmarking with Reference Plants

Assessment:

The current processes in place provide opportunity to the managers and plant personnel to learn from external peer organizations and their lessons learned.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	Lionel Henn	**F2.7**
Functional Group:	Human Resource Management	
Date Performed:	24 August 2015	

Item:

3.4.2.3 Bullets 7: *Check if the plant has appropriate plant recruitment policy for LTO;*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Recruiting, selecting and retaining the appropriately skilled people is paramount to Eskom's success. The recruitment procedure at Eskom (240-42851932) has been established for recruitment of employees to ensure legislative compliance, in line with business needs, transformational objectives, and integration with talent management. Vacancies, subject to the inherent requirements of the job, are open to eligible applicants. In addition, Eskom is committed to the achievement and maintenance of employee diversity and equity in its employment procedure and practices. In line with the Employment Equity Act, selection criteria is based on the minimum inherent requirements of the job and factors such as formal qualifications, recognition of prior learning, relevant experience and capacity to acquire knowledge.. Reasonable steps are being taken to fill vacancies within Eskom. External candidates are considered only where a suitable internal candidate could not be identified.

The succession and the career progression pools (i.e. Engineer In Training) are considered as sourcing options when a vacancy exists. Integrity assessments are conducted on successful candidates, regardless of grading, before an offer of employment is made. The Koeberg Operating Unit (KOU) operates in a national key point and therefore the South African Government Statutory Requirements applies i.e. Security Vetting Policy, and the Security of Information Policy. Authenticity of applicable qualifications is verified with the relevant issuing body before an offer is made. Psychometric assessments are done prior to the appointment of all KOU employees.

INPUT DOCUMENT REFERENCE:

- 240-42851932: Recruitment and Selection Procedure
- 240-97226881: Employment Equity Policy

Assessment:

Meet.

Results:	Meet	×	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Jarno Harker/Msi	**F2.8**
Functional Group:	Nuclear Training	
Date Performed:	2015-08-31	

Item:

3.4.2.3 Bullets 8: *Whether the policy and role of plant management supports training needs and allocates sufficient resources.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The nuclear organisation includes the training departments, training functions and training management. Roles of the training management are clearly defined with in the specific training guides. Resources are allocated to adequately support the training function. Management and line support also provide training needs quarterly and on an ad-hoc basis.

INPUT DOCUMENT REFERENCE:

- KGT-070 – Education, Training and Development Practitioner Training Programme
- KGT-071- Plant Engineering Training Programme Guide
- KGT-072- Nuclear Engineer's Programme Guide
- KGT-054- Chemistry Training Programme Guide
- KGT-055-General Radiation Protection Training Programme Guide
- KGT-056- Radiation Protection Group Training Programme Guide
- 331-218 – Training and Development of Nuclear Engineering Staff
- 331-549 – Nuclear Engineering GIT Guide
- KAA-780 to KAA-784
- INPO ACAD 98-004

Assessment:

The current plant policy and role of plant management supports training needs and allocates sufficient resources.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Jarno Harker/Msi	**F2.9**
Functional Group:	Training	
Date Performed:	2015-08-31	

Item:

3.4.2.3 Bullets 9: *Check and verify if staff involved in LTO activities are well trained through on-job-training and other appropriate processes.*

Current status description and input document reference:

The plant processes for training (including on-job training) and assessment are described in applicable engineering training guides. The training assessment results are captured in competency indices for each area. The training processes follows both national and international guidance, for example The Process for Accreditation of Training in the Nuclear Power Industry INPO ACAD 02-001 Rev1, INPO ACAD 98-004 and Standard for qualification and certification of NDT personnel CP-189 of 1995 (ASME 11) and ISO-9712. On-job training is an integral part of the systematic training process for each of the training programmes. Oral Boards are used extensively to certify that incumbents have completed all the required training and can perform work as required.

INPUT DOCUMENT REFERENCE:

- INPO ACAD 02-001 Rev1: The Process for Accreditation of Training in the Nuclear Power Industry;
- INPO ACAD 98-004: Guidelines for Training and Qualification of Engineering Personnel
- CP-189 of 1995 (ASME 11): ASNT Standard for Qualification and Certification of Non-destructive Testing Personnel ASNT CP-189-1995 (formerly ANSI/ASNT CP-189-1995);
- ISO-9712: Non-destructive testing - Qualification and certification of NDT
- Personnel.

Assessment:

Training of staff including experiential learning is important to engineering line managers and is used effectively to execute the required engineering job functions. The training process is overseen by the engineering Curriculum Steering Committee. The current process adequately addresses this verification need.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

AREA F: HUMAN RESOURCES, COMPETENCE AND KNOWLEDGE MANAGEMENT FOR LTO.

Subsection 3.4.3: Knowledge management and knowledge transfer for LTO.

Functional Group: Knowledge Management **Functional Group Lead:** Nyameko Ntlokombini

Date Performed: September 2015

Ref	Expectations	Input Data Required	Documentation Reference
SPRG P3.4.3.1	In the plant knowledge should be managed as a resource. This should be applied to LTO as well. A knowledge management (KM) plan and processes should be in place to support the LTO activities. KM needs to be a part of the long term strategy of the operating organization. Especially when considering LTO of NPP's, the plant should include knowledge-loss risk management in its KM practices. The plant should ensure that all relevant design, modification and maintenance data is documented and accessible for the LTO. The plant should have systematic approaches for receiving and evaluating research findings and knowledge from the LTO related processes from other power plants. The plant should identify the organization's knowledge needs (i.e. internal and external knowledge sources, utilization of knowledge, knowledge sharing, and preservation of organizational knowledge and capture of tacit knowledge). The plant should ensure that there is a clear ownership and commitment of KM processes and issues. Management should communicate the KM policy and processes and involve individuals in implementation and improvement of the KM processes.	• KM policy and strategy; • Descriptions of KM process, procedures, guidelines and flowcharts; • Description of the process for collecting and distributing operational experience; • Documents related to knowledge-loss risk assessment; • Report on PSR assessment on use of experience from other plants and research findings (if exists); • Work processes, methodologies and procedures for life extension decision; • Descriptions of IT and IS processes; • Description of the process for managing records, reports and date related to maintenance, surveillance and inspections.	KAA-501: Process for Modifications at Koeberg KAA-830: Process for management of Quality Records KGA 035: Operating Experience from EDF KSA-038: Requirements for Quality Records KSA-140: Requirements for the Control & Management of SAP 238-186: Nuclear Support Benchmarking Program 238-6: KOU Documentation and Records Management Standard 238-66: Eskom-EdF Collaboration Manual (pending finalisation) 238-131: Operating Experience Programme 240-86502715: Process for Minor Modifications 32-6: Eskom Documentation and Records Management Procedure 32-83: Eskom Nuclear Management Policy 331- 102: ETMM TOR 331-121: Configuration Management at Koeberg 331-130: Controlling documentation and responsibilities for

			Configuration
			331-23: Processing of industry Operating Experience in Nuclear Engineering.
			331-24: Screening of Operating Experience for Applicability and Significance.
			331-143: The Equivalency Process to Change Plant
			331-146: The Obsolescence Process
			331-215: Nuclear Engineering Configuration Management Implementation Programme Exists
			331-275: Ageing Matrix
			331-280: Benchmarking with Reference Plants
			331-288: Hardware Breakdown Structure Process
			331-3: Nuclear Engineering Documentation and Records Management Work Instruction
			331-342: Integrated Plant Design Process for Changes to Systems, Structures or Components at Koeberg Operating Unit
			331-4 - Corrective and Preventive Action Procedure
			331-85: Design Basis Documentation Change Process
			331-88: Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base Management at KNPS

Functional Group Lead:	Morongwa Ngoepe-Ndou	**F3.1**
Functional Group:	PROCESS SUPPORT-OE MANAGEMENT	
Date Performed:	2015 JULY 29	

Item:

3.4.3.3 Bullets 1: *Check that an appropriate KM policy exists.*

Current status description and input document reference:

The Eskom Nuclear Management Policy, document 32-83, sets out the safety and quality principles. Section 2.2.4 states the Knowledge management Principle. The Nuclear Engineering (NE) policy document 331-280 outlines the approach of benchmarking Eskom's Nuclear installations with reference plants. Eskom follows a similar approach as the IAEA, which stipulates the Fundamental Safety Functions (FSF) as those functions that protect man and the environment from potential radiological effects, associated with nuclear installations' operations. Document 238-131 is a Koeberg Operating Unit (KOU) standard that provides requirements for the review; evaluation; dissemination and use of both internal and external operating experience. The NE process for knowledge management is documented in 331-23, which is a procedure for processing of industry operating experience. The NE guide for screening operating experience for applicability and significance is document 331-24.

INPUT DOCUMENT REFERENCE:

- 32-83: Eskom Nuclear Management Policy
- 331-280: Benchmarking with Reference Plants
- 238-131: Operating Experience Programme
- 331-23: Processing of industry Operating Experience in Nuclear Engineering.
- 331-24: Screening of Operating Experience for Applicability and Significance.

Assessment:

Knowledge management policy and processes do exist and cover most of the LTO expectations.

The Operating Experience Guide is overdue for review.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Document 238-131 (Operating Experience Programme) is overdue for review and must be reviewed. During the review, attention must be taken to ensure this document ready for LTO.	Nuclear Support	Q1 2017

Functional Group Lead:	Morongwa Ngoepe-Ndou	**F3.2**
Functional Group:	PROCESS SUPPORT-OE MANAGEMENT	
Date Performed:	2015 AUGUST 05	

Item:

3.4.3.3 Bullets 2: *Check that the KM principles and practices are embedded in the integrated management system.*

Current status description and input document reference:

The Nuclear Support group performs industry performance measurements and practices and the findings reviewed and analysed to optimise their use in the Koeberg Operating Unit. This process is defined in Document 238-186, Nuclear Support benchmarking program. Document 238-66 is an Eskom-EdF Collaboration Manual, which sets out to support continuous quality assurance monitoring of the objectives of the collaboration domains i.e. Plant operations; Engineering and Leadership. Long Term Operation is one of the Engineering objectives and is driven as a Top 10 issue on the Eskom EdF Engineering Committee (E3C) agenda. The Nuclear Engineering Management Manual, document 331-2, outlines the mandates for the different groups within NE, in support of the nuclear management and benchmarking policies.

The Koeberg Second Safety Assessment Report chapter 9(SRA2-9) describes the processes and measures in place to deal with OE from other plants, and research findings. The Operating Experience Program (238-131) was developed in accordance with the WANO GL-2003-01 May 2003 Guidelines for Operating Experience at Nuclear Power Plants. The NE procedure 331-4 describes the process on how we identify and capture data related to non-conformances; incidents and events; investigate the root-causes; record and track to completion, and perform effectiveness reviews of all actions taken.

INPUT DOCUMENT REFERENCE:

- 238-186: Nuclear Support Benchmarking Program
- 238-131: Operating Experience Program
- 238-66: Eskom-EdF Collaboration Manual (pending finalisation)
- 331—2: Nuclear Engineering Management Manual
- 331-4: Corrective and Preventive Action Procedure
- Safety Review Assessment 2: Chapter 9-OE Rev3

Assessment:

In accordance with these documents, knowledge management is embedded in the integrated management system.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Document 238-131 (Operating Experience Programme) is overdue for review and must be reviewed. During the review, attention must be taken to ensure this document ready for LTO.	Nuclear Support	Q1 2017

Functional Group Lead:	Morongwa Ngoepe-Ndou	**F3.3**
Functional Group:	PROCESS SUPPORT-OE MANAGEMENT	
Date Performed:	2015 AUGUST 07	

Item:

3.4.3.3 Bullets 3: *Verify that KM is a part of the operating organization's long term strategy.*

Current status description and input document reference:

A database of the EdF Engineering projects such as Affaire Parc; Affaire Technique; Affaire Engineerie and Analyse Parc was developed for alignment purposes, and the process for screening for applicability and significance is documented in 331-23 and 331-24. The projects that are applicable to Koeberg are presented at the Engineering Technical Management Meeting (ETMM), and actions tracked on EPMS, now DevonWay. Partnerships with organisations such as WANO; EPRI; INPO; FROG etc. are some of the tools employed for alignment with the nuclear industry. Knowledge management is also driven through the Top Ten Priorities as defined by the E3C/F of the collaboration agreement. As stipulated in Eskom's Nuclear Management policy, 32-83; the NE policy 331-280, Benchmarking with Reference Plants, and all the documents derived from these, the Long Term Strategy does address knowledge management.

INPUT DOCUMENT REFERENCE:

- 32-83: Eskom's Nuclear Management policy
- 331-280: Benchmarking with Reference Plants
- 331-23: Processing of industry Operating Experience in Nuclear Engineering.
- 331-24: Screening of Operating Experience for Applicability and Significance.
- 238-186: Nuclear Support Benchmarking Program
- 238-66: Eskom-EdF Collaboration Manual (pending finalisation)
- 331-4: Corrective and Preventive Action Procedure
- Safety Review Assessment2: Chapter 9-OE Rev3

Assessment:

Documents 331-23 and 331-24 to be revised. The collaboration Manual needs to be finalised and the contract concluded to enable implementation.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Revise documents 331-23 (Processing of industry Operating Experience in Nuclear Engineering) and 331-24 (Screening of Operating Experience for Applicability and Significance).	NE-PS-ROC	2016/11/30
2	Knowledge management is also driven through the Top Ten Priorities as defined by the E3C/F of the collaboration agreement. The Collaboration Contract is to be finalised.	Nuclear Support	Q4 2016

Functional Group Lead:	Morongwa Ngoepe-Ndou	**F3.4**
Functional Group:	PROCESS SUPPORT-OE MANAGEMENT	
Date Performed:	2015 AUGUST 07	

Item:

3.4.3.3 Bullets 4: *Check that there is a clear ownership of KM processes and issues.*

Current status description and input document reference:

Process Support's OE management group (PS-OE) tracks all the OE that is applicable to Nuclear Engineering. The EdF Engineering projects are captured on an excel spreadsheet that is accessible for viewing on the G-drive. All the actions from the ETMM presentations are also tracked on this spreadsheet. There is also an Eskom-EdF correspondence data sheet that is used to record all the exchanges (requests and responses). PS-OE is also responsible for tracking the E3C/F action to completion. The mandate, roles and responsibilities for each group are set-out in the Nuclear Engineering Management Manual, 331-2, and the Eskom/EdF collaboration Manual, 238-66.

INPUT DOCUMENT REFERENCE:

- 331-2: Nuclear Engineering Management Manual
- 238-66: Collaboration Manual (pending finalisation)
- 331-23: Processing of industry Operating Experience in Nuclear Engineering.
- 331-24: Screening of Operating Experience for Applicability and Significance.

Assessment:

There is clear ownership of the processes and issues.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	Morongwa Ngoepe-Ndou	**F3.5**
Functional Group:	PROCESS SUPPORT-OE MANAGEMENT	
Date Performed:	**2015-08-31**	

Item:

3.4.3.3 Bullets 5: *Confirm that KM principles and practices are embedded in the organization.*

Current status description and input document reference:

The KM principle as stipulated in the Eskom policy document 32-83 is clearly cascaded in the NE's Benchmarking policy, 331-280, and further in the lower tier documents. Document 331-83 is a standard that provides the requirements for changing the Structures, Systems and Components (SSCs) affecting the design of Koeberg Nuclear Power Station (KNPS). Section 5.1.1.1 of this standard stipulates the basis to justifying plant modifications as a mandatory requirement, i.e. OE, Benchmarking and assessment results. The same justifications are stipulated as mandatory requirements for the Nuclear Engineering Programmes' standards e.g. Standards 331-127; 331-173, and 331-186.

INPUT DOCUMENT REFERENCE:

- 331-280: Benchmarking with Reference Plants
- 331-83: Standard for Plant Changes Affecting the Design of Koeberg Nuclear Power Station
- 331-127: Cable Ageing Management Programme
- 331-173: Requirements for Flow Accelerated Corrosion Programme
- 331-186: Environmental Qualification at Koeberg Nuclear Power Station
- 331-23: Processing of Industry OE

Assessment:

The KM principles and practices are generally embedded in the wider organisation. However, some documents have past their review dates, and some are due in November 2015.

Results:	Meet		Don't Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	Review & update Document 331-127 (Cable Ageing Management Programme). Refer to WBS 20.	Koeberg SALTO	Q1 2020

Functional Group Lead:	Morongwa Ngoepe-Ndou	**F3.6**
Functional Group:	PROCESS SUPPORT-OE MANAGEMENT	
Date Performed:	2015-08-31	

Item:

3.4.3.3 Bullets 6: *Verify that the plant has embedded KM principles and practices in its process for collecting and using operating experience feedback.*

Current status description and input document reference:

KAD 025 and 331-23 are KNPS procedures that describe the process for evaluating and disseminating Operating Experience. The station has a designated OE function to analyse and co-ordinate all aspects of Operating Experience (internal and external). Operating Experience from WANO SOERs; EdF Affaire Parc and Eskom Events are reviewed for applicability to KNPS prior to being distributed to the relevant staff. The Corrective Action Process, KAA688 and 331-4, are administrative procedures that describe the process and responsibilities for identifying; reporting; investigating and trending occurrences; problems; events and near misses at KNPS. This process also aims to ensure that OE information is effectively identified; screened; classified; investigated, distributed and tracked in order to improve nuclear & conventional safety; health & the environment, and the recurrence of events. Operating Experience and all other events are captured on EPMS, now DevonWay.

INPUT DOCUMENT REFERENCE:

- KAD 025: Processing of Operating Experience
- KAA 688: Corrective Action Process
- 331-23: Processing of Industry OE
- 331-4 Nuclear Engineering Corrective and Preventive Action Process

Assessment:

The Plant has embedded KM principles & practices in its processes and OE feedback is utilised.

Results: Meet [X] Don't Meet [ ] Partially Met [ ] N/A [ ]

No	Action Description	Lead	Due Date

Functional Group Lead:	Archiebold Thabo Mthandi	**F3.7**
Functional Group:	Engineering Programmes	
Date Performed:	2015-09-02	

Item:

3.4.3.3 Bullets 7: *Verify that the plant has implemented adequate processes for learning from the LTO experiences of other plants.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

Currently collaboration exists between KOU and EDF to share operating experience including the LTO initiatives. This is achieved through EdF Engineering projects such as Affaire Parc; Affaire Technique; Affaire Engineerie and Analyse Parc. The process for screening the OE for applicability and significance is documented in 331-23 and 331-24. The projects that are applicable to Koeberg are presented at the Engineering Technical Management Meeting (ETMM), and actions tracked on DevonWay (previously known as EPMS). Knowledge management is also driven through the Top Ten Priorities as defined by the E3C/F of the collaboration agreement. As stipulated in Eskom's Nuclear Management policy, 32-83; the NE policy 331-280, Benchmarking with Reference Plants, and all the documents derived from these, the Long Term Strategy does address knowledge management.

Partnerships with organisations such as WANO; EPRI; INPO; FROG etc. are some of the tools employed for alignment with the nuclear industry.

Eskom has elected to implement the SALTO process at Koeberg which is informed by IAEA member organisation experiences. Eskom representatives were involved in the SALTO review of Laguna Verde in Mexico.

INPUT DOCUMENT REFERENCE:

- 32-83 - Eskom's Nuclear Management policy
- 331-280 - Benchmarking with Reference Plants
- 331-23 - Processing of industry Operating Experience in Nuclear Engineering.
- 331-24 - Screening of Operating Experience for Applicability and Significance.
- 238-186 - Nuclear Support Benchmarking Program
- 238-66 - Eskom-EdF Collaboration Manual (pending finalisation)
- 331-4 - Corrective and Preventive Action Procedure
- 331-275 – Ageing Matrix
- 331- 102 - ETMM TOR
- KGA 035 – E from EDF

Assessment:

A LTO benchmarking performed with EDF. Koeberg's Ageing Matrix was adopted from EDF.

Results:	Meet	X	Don't Meet		Partially Met		N/A	

No	Action Description	Lead	Due Date

Functional Group Lead:	Maxwell Msabala	**F3.8**
Functional Group:	Process Support	
Date Performed:	2015-08-31	

Item:

3.4.3.3 Bullets 7: *Verify that the plant has implemented adequate processes for learning from the LTO experiences of other plants.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The Koeberg Operating Unit (KOU) process for dealing with this is documented in 238-105: Nuclear Operating Unit Supplier Qualification & Audit Manual. PQE performs supplier capability assessments where they check technical competency of an organisation before it is qualified as a supplier to KOU.

During the Capability assessments, PQE also looks at skills lost and turnover in the organisation over a period of time. This is one of the criteria used to determine whether an organisation qualifies to be a supplier in KOU. Additionally once a supplier has been awarded a contract to deliver services or a product to KOU, Project Management is supposed to do performance audits which include assessing technical competence and skills turnover. A reference document stating the process for doing these performance audits and for ensuring that during execution the competencies of supplier staff are confirmed.

INPUT DOCUMENT REFERENCE:

- 238-105 – Nuclear Operating Unit Supplier Qualification & Audit Manual

Assessment:

From the assessment done, it is evident that the supplier qualification audits (pre-contract placement) also include checking competency levels of suppliers, but there seems to be a gap during execution (i.e. after contract award) as the process for confirming competency and skills levels of supplier staff assigned to the projects could not be found.

It is not clear if this confirmation of competency and skills is done consistently during execution of projects for all the suppliers, TSOs and outside service providers.

There is currently no long term strategy a process for knowledge-loss risk assessment and mitigation for suppliers, TSOs and outside service providers.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Document and implement an engineering monitoring process for checking/ confirming competency and skills levels of suppliers, TSOs and outside service during the execution and implementation of contracted work.	IPD-K	Q4 2017
2	Develop and implement a strategy for long term knowledge-loss risk assessment and mitigation for suppliers, TSOs and outside service providers. Refer to WBS 14	Koeberg SALTO	Q4 2020

Functional Group Lead:	Tiisetso Ntuli	**F3.9**
Functional Group:	**IPD-K**	
Date Performed:	**2015-09-02**	

Item:

<u>3.4.3.3 Bullets 9:</u> *Confirm that the plant has established adequate processes for transferring knowledge, information and data to/from the vendor, critical equipment/component suppliers, outsourced services and TSOs.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

KOU has managed to develop processes and guidelines that support the sharing and transferring of knowledge, information and data to/from vendor. Currently the following processes and guides exist to ensure optimal transfer of knowledge:

Screening of operating experience (OE) applicability and significance procedure and guide(331-24;331-23) and the processing of experience feedback received through EdF Co-operation agreement guide; KGA035 .

The above documents (331-24-Guide and 331-23 Procedure) provide guidance on how to evaluate the applicability of events that happened in other utilities to improve plant safety and reliability. The KGA 035 guide elaborates on the roles and responsibilities of the current dedicated Koeberg Integrated Team (KIT) responsible for evaluating applicability of events and communicating them to relevant departments. The OE program allows optimal information and data sharing and also provides KOU with the opportunity to align with other utilities.

Design processes and procedures (KAA815)

During the design process information is shared with the vendor by means of technical requirements specification (TRS) for the system or component in question.

The requirements also include training of the staff personnel to ensure knowledge transfer from vendor to KOU.

Then the vendor compiles and shares the design package that includes system design specifications, system design, maintenance, testing manuals and applicable training.

Assessment:

Koeberg Operating Unit (KOU) has established adequate processes, guides and procedures with regards to information, data and knowledge transfer. However an improvement is still required on how we share information with other vendors that are not necessarily the OEM of our current systems and components designs.

Sometimes the TRS documents are not always detailed and the current existing design documents are not detailed enough for usage by non-OEM vendors.

Eskom-EdF collaboration project management manual; 238-66

The new document 238-66, is still in the compilation phase and would be used to govern the relationship between Eskom and EdF. It has a much broader scope which will include collaboration with the EdF nuclear engineering division.

Results:	Meet		Don't Meet		Partially Met	X	N/A	

No	Action Description	Lead	Due Date
1	Consider updating the TRS template to include a section and/or possibly a checklist for "Information Expected from the Supplier" to ensure that all required information from suppliers are provided with new contracts	SDE	Q4 2017

Functional Group Lead:	ASTRID HOLLAND	**F3.10**
Functional Group:	Process Support – CM Group	
Date Performed:	2015-08-14	

Item:

3.4.3.3 Bullets 10: *Confirm that the IT/IS processes support managing information and records and their availability.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

SAP PM currently holds the Master of our plant breakdown structure.

The PIGO software system is currently used as the plant configuration tool to store and retrieve engineering documents and records.

Note: The term engineering / technical document includes plant drawings.

Non-technical documentation is stored in the Eskom Hyperwave software solution.

Current practices of the storage and retrieval of documents and record are aligned to the requirements of the Koeberg Standard, which stipulates how records are to be identified and classified. Once identification and classification of permanent and non-permanent records have been assessed, these records are captured in PIGO using the administrative procedure.

The Eskom Standard and Administrative Procedure describe how engineering information and the plant engineering Trigrammes hierarchy are to be complied to.

When a technical document is compiled and loaded onto the system, a relationship to the relevant plant breakdown structure item should be created.

INPUT DOCUMENT REFERENCE:

- KSA-038: Requirements for Quality Records
- KAA-830: Process for management of Quality Records
- KSA-140: Requirements for the Control and Management of SAP
- 32-6: Eskom Documentation and Records Management Procedure
- 238-6: KOU Documentation and Records Management Standard
- 331-3: Nuclear Engineering Documentation and Records Management Work Instruction
- 331-288: Hardware Breakdown Structure Process

Assessment:

- No audits exist for data management in SAP.
- The Standard KSA-140 does not reference the linking of the Bill of Materials (BOMS) or the Material Classification updates on BOMs, which are areas in which we experience challenges in accessing information within the SAP database.
- GGSS 1234 – Requirements for Data Integrity in SAP (Systems, Applications, and Products). This is not supported by the current systems that are in place.
- As Standard KSA-140 describes the requirements for the control and management of SAP information, it has bearing on the integration of all plant labelling information and work processes to ensure access to clear, valid and concise data and information. The current system does not support this.
- Also, information storage and accessibility in managed in the PIGO database and plant data is managed within the SAP database and there is no integration between the two systems.
- There are no relationships between the documentation and the plant breakdown structure.
- SAP does not have the capability to create relationships between technical documentation and the plant breakdown structure.
- Most KOU business areas use the two documentation management systems (PIGO and Hyperwave) correctly, however Koeberg Nuclear Power Station Business Area are using the PIGO database to store both Technical and non-technical documentation.

Results:	Meet		Don't Meet		Partially Met	**X**	N/A	

No	Action Description	Lead	Due Date
1	Verify the Plant Breakdown Structure is correct in the current Information Systems. Refer to WBS 12	Koeberg SALTO	Q4 2020
2	Verify all technical documentation is stored correctly to ensure easy retreievability. Refer to WBS 12	Koeberg SALTO	Q4 2020
3	Identify all design documentation that is not stored in the document management system (PIGO). Refer to WBS 12	Koeberg SALTO	Q4 2020
4	Ensure non-technical documents are not stored in the	TD&RM	Q4 2018

	document management system (PIGO). Remove these identified documents from the documentation management system.		
5	Create relationships between each technical document and the System, Structure or Component it is relevant to. Refer to WBS 12	Koeberg SALTO	Q4 2020
6	Implement a Design Base Information system that has the ability to store all technical documentation and create the required relationships between the documentation and the physical plant. Refer to WBS 12	Koeberg SALTO	Q4 2020

Functional Group Lead:	ASTRID HOLLAND	**F3.11**
Functional Group:	Process Support – CM Group	
Date Performed:	2015-08-14	

Item:

3.4.3.3 Bullets 11: *Confirm that the plant retains records of traceability, rationale and assumptions of why and how operational, maintenance and design changes (corporate memory) have been made.*

Current status description and input document reference:

(NOTE: This information will be copied & pasted into the AIP for the IAEA representatives)

The documentation management process followed at KOU cascades directly from the Eskom Documentation and Records Management Procedure.

Each Business Area within the Koeberg Operating Unit also has its own documentation and Records Management Standard that cascades down from the KOU standard.

Operational, maintenance and design document changes are managed via Eskom Procedure 331-85 - The Design Basis Documentation Change Process for document changes impacted by Modifications, Equivalencies and Temporary Alteration Forms (TAF's).

The modification process KAA-501 identifies the changes required by a modification and the developed design uses a Design Change Identification Form (DCIF) to list all document required to be changed. The Electronic Change Process (ECP) within the PIGO database is then used to manage revision statuses of these changed documents. The new current version is then made available electronically via Excalibur and then filed and the previous revision is transmitted to Records Management as a record.

INPUT DOCUMENT REFERENCE:

- 32-6: Eskom Documentation and Records Management Procedure
- 238-6: KOU Documentation and Records Management Standard
- 331-3: Nuclear Engineering Documentation and Records Management Work Instruction
- 331-85: Design Basis Documentation Change Process
- 331-88: Temporary Alterations to Plant, Plant Structures or Operating Parameters that affect the Design Base
- 331-121: Configuration Management at Koeberg
- 331-130: Controlling documentation and responsibilities for Configuration Management at KNPS
- 331-143: The Equivalency Process to Change Plant
- 331-146: The Obsolescence Process
- 331-215: Nuclear Engineering Configuration Management Implementation Programme Exists
- 331-342: Integrated Plant Design Process for Changes to Systems, Structures or Components at Koeberg Operating Unit
- KAA-501: Process for Modifications at Koeberg
- 240-86502715: Process for Minor Modifications

Assessment:

- The current processes that manage plant design changes have recently undergone revision. This detail is available in CAP item CA30055.
- A review of the operational and maintenance processes has not recently been performed.
- All permanent records generated by KOU are declared on the Quality Records List (QRL), as permanent records, having a 40 year retention period. This will have to change to accommodate LTO.

Results: Meet [ ] Don't Meet [ ] Partially Met [X] N/A [ ]

No	Action Description	Lead	Due Date
1	Ensure that all KNPS groups (e.g. maintenance and operating) periodically review their processes and update the required records on their respective QRLs	TD&RM	Q1 2018
2	Review all Nuclear Engineering processes to ensure all records are on the relevant QRLs	NE-PS-CMG	Q1 2018
3	Review all Nuclear Project Management processes to ensure all records are on the relevant QRLs	NPM	Q1 2018
4	Review all Nuclear Commercial processes to ensure all records are on the relevant QRLs	Nuclear Commercial	Q1 2018
5	Revise the 40 year retention period defined for KOU to accommodate LTO Refer to WBS 12.	Koeberg SALTO	Q4 2020

Appendix A - Responsibility Mapping for the Pre-SALTO Self-Assessment

[R] = Responsible	Nuclear Engineering (NE)					Project Management	Nuclear Support (NS)		Plant Engineering (PE)					Plant (PL)		Business Support (BS)	Human Resources	Plant Training (PT)	Information Management (IM)
[S] = Support	Integrated Plant Design - Koeberg (IPD-K)	System Design Engineering (SDE)	Programme Science and Specifications (SPS)	Nuclear Analysis	Process Support (PS)	Nuclear Project Management (NPM)	Licensing	Nuclear Support	Component Engineering (CE)	Nuclear Systems Engineering (NSE)	Electrical Systems Engineering (ESE)	Reliability Engineering (RE)	Inspection & Test (I&T)	Chemistry	Maintenance	TD&RM	Human Resources	Training	IM
Area: A - Organization and functions, current licensing basis (CLB), configuration/ modification management (section 3.1): **Lead:** Darren Bissell																			
Related regulatory requirements, codes and standards. SPRG No: 26 Para: 3.1.1	[R]	[S]					[S]									[S]			
Organizational structure for LTO. SPRG No: 26 Para: 3.1.2	[S]					[R]											[S]		
Plant policy for LTO. SPRG No: 26 Para: 3.1.3	[R]					[S]													
LTO implementation programme. SPRG No: 26 Para: 3.1.4	[S]	[S]	[S]	[S]	[S]	[R]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	
Current safety analyses report and other current licensing basis documents. SPRG No: 26 Para: 3.1.5	[R]	[S]		[S]			[S]												
Configuration management and modification management including design basis documentation. SPRG No: 26 Para: 3.1.6	[S]	[S]			[R]	[S]										[S]			
Area: B - Scoping and screening and plant programmes relevant to LTO (section 3.2): **Lead:** Raymond Maapola																			
Methodology and criteria for scoping and screening of SSCs for LTO. SPRG No: 26 Para: 3.2.1		[R]		[S]					[S]	[S]	[S]								
Plant Programmes Relevant for LTO/Maintenance. SPRG No: 26 Para: 3.2.2.1		[S]	[R]						[S]			[S]			[S]				
Plant Programmes Relevant for LTO/Equipment qualification. SPRG No: 26 Para: 3.2.2.2		[S]	[R]																
Plant Programmes Relevant for LTO/In-service Inspection. SPRG No: 26 Para: 3.2.2.3			[R]						[S]				[S]						
Plant Programmes Relevant for LTO/Surveillance and Monitoring. SPRG No: 26 Para: 3.2.2.4		[S]	[R]						[S]	[S]	[S]		[S]		[S]				
Plant Programmes Relevant for LTO/Monitoring of chemical regimes. SPRG No: 26 Para: 3.2.2.5			[S]					[R]						[S]					
Area: C - Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for mechanical components (section 3.3): **Lead:** Andrew Ceto																			
Area-specific scoping and screening of SSCs for LTO. SPRG No: 26 Para: 3.3.1		[R]		[S]						[S]									
Ageing management review. SPRG No: 26 Para: 3.3.2			[R]										[S]		[S]				
Review of ageing management programmes. SPRG No: 26 Para: 3.3.3			[R]																
Obsolescence management programme. SPRG No: 26 Para: 3.3.4		[S]	[R]						[S]	[S]					[S]				
Existing time limited ageing analyses. SPRG No: 26 Para: 3.3.5		[R]	[S]						[S]	[S]			[S]		[S]				
Revalidation of time limited ageing analyses. SPRG No: 26 Para: 3.3.6		[R]	[S]																

Data collection and record keeping		[S]	[R]		[S]								[S]		[S]				
Area: D - Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for electrical and I&C components (section 3.3): **Lead:** Kabelo Moroka																			
Area-specific scoping and screening of SSCs for LTO. SPRG No: 26 Para: 3.3.1		[R]		[S]						[S]	[S]								
Ageing management review. SPRG No: 26 Para: 3.3.2			[R]										[S]		[S]				
Review of ageing management programmes. SPRG No: 26 Para: 3.3.3			[R]																
Obsolescence management programme. SPRG No: 26 Para: 3.3.4		[S]	[R]						[S]	[S]	[S]				[S]				
Existing time limited ageing analyses. SPRG No: 26 Para: 3.3.5		[R]	[S]						[S]	[S]	[S]		[S]		[S]				
Revalidation of time limited ageing analyses. SPRG No: 26 Para: 3.3.6		[R]	[S]																
Data collection and record keeping		[S]	[R]		[S]								[S]		[S]				
Area: E - Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for civil structures (section 3.3): **Lead:** Anton Kotze																			
Area-specific scoping and screening of SSCs for LTO. SPRG No: 26 Para: 3.3.1		[R]		[S]															
Ageing management review. SPRG No: 26 Para: 3.3.2		[R]	[S]										[S]		[S]				
Review of ageing management programmes. SPRG No: 26 Para: 3.3.3		[R]	[S]																
Obsolescence management programme. SPRG No: 26 Para: 3.3.4		[R]	[S]												[S]				
Existing time limited ageing analyses. SPRG No: 26 Para: 3.3.5		[R]	[S]										[S]		[S]				
Revalidation of time limited ageing analyses. SPRG No: 26 Para: 3.3.6		[R]	[S]																
Data collection and record keeping		[R]	[S]		[S]								[S]		[S]				
Area: F - Human resources, competence and knowledge management for LTO (section 3.4): **Lead:** Nyamie Ntlokombini																			
Human resources policy and strategy to support LTO. SPRG No: 26 Para: 3.4.1	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[R]	[S]	
Competence management for LTO and recruitment and training/ qualification processes for personnel involved in LTO activities. SPRG No: 26 Para: 3.4.2	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[R]	
Knowledge management and knowledge transfer for LTO. SPRG No: 26 Para: 3.4.3	[S]	[S]	[S]	[S]	[R]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]
Area: Z (NOT INCLUDED IN SALTO) Environmental programme **Lead:** Deon Jeannes																			

Appendix B – IAEA Supporting Documentation

IAEA Document	Area	A	B	C	D	E	F
REFERENCED IN IAEA SVS No. 26: SALTO Peer Review Guidelines							
[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Design, Specific Safety Requirements No. SSR-2/1, IAEA, Vienna (2012).	**A**	**X**					
[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Commissioning and Operation, Specific Safety Requirements No. SSR-2/2, IAEA, Vienna (2011).	**A**	**X**					
[3] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: The Management system for Facilities and Activities, Specific Safety Requirements No. GS-R-3, IAEA, Vienna (2006).	**A**	**X**					
[4] INTERNATIONAL ATOMIC ENERGY AGENCY, Application of Management system for Facilities and Activities, Safety Guide No. GS-G-3.1, IAEA, Vienna (2006).	**A**	**X**					
[5] INTERNATIONAL ATOMIC ENERGY AGENCY, Management System for Nuclear Installations, Safety Guide No. GS-G-3.5, IAEA, Vienna (2009)	**A**	**X**					
[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Managing Human Resources in the Field of Nuclear Energy, Nuclear Energy Guide No. NG-G-2.1, IAEA, Vienna (2000).	**F**						**X**
[7] INTERNATIONAL ATOMIC ENERGY AGENCY, Modifications to Nuclear Power Plants, Safety Guide No. NS-G-2.3, IAEA, Vienna (2001)	**A**	**X**					
[8] INTERNATIONAL ATOMIC ENERGY AGENCY, The Operating Organization for Nuclear Power Plants, Safety Guide No. NS-G-2.4, IAEA, Vienna (2001).	**A-F**	**X**	**X**	**X**	**X**	**X**	**X**
[9] INTERNATIONAL ATOMIC ENERGY AGENCY, Maintenance, Surveillance and In-service Inspection of Nuclear Power Plants, Safety Standards Series Safety Guide No. NS-G-2.6, IAEA, Vienna (2002).	**B**		**X**				
[10] INTERNATIONAL ATOMIC ENERGY AGENCY, Recruitment, Qualification and Training of Personnel for Nuclear Power Plants, Safety Guide No. NS-G-2.8, IAEA, Vienna (2002).	**F**						**X**
[11] INTERNATIONAL ATOMIC ENERGY AGENCY, Periodic Safety Review of Nuclear Power Plants, Safety Standards Series No. SSG-25, IAEA, Vienna (2013).	**B**		**X**				
[12] INTERNATIONAL ATOMIC ENERGY AGENCY, A system for the Feedback of Experience from Events in Nuclear Installations, Safety Guide No. NS-G-2.11, IAEA, Vienna (2006).	**A**	**X**					
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Appendix C - Summary of Self-Assessment Item Allocations and Outcomes

#	Reference	Description	Item Lead	Group	Assessment Outcome
A	**AREA A:**	**ORGANIZATION AND FUNCTIONS, CURRENT LICENSING BASIS, CONFIGURATION/ MODIFICATION MANAGEMENT**	**Darren Bissell**		
A1	Subsection 3.1.1:	Related regulatory requirements, codes and standards	Darren Bissell		
A1.1	3.1.1.3 Bullet 1	Verify if a complete and consistent set of regulatory requirements, codes and standards related to LTO and ageing management have been identified.	Haco Nicholson	NE	Meet
A1.2	3.1.1.3 Bullet 2	Check if the regulatory requirements, codes and standards are consistent with the IAEA requirements and recommendations and whether the gaps, if applicable, are addressed by the plant in the LTO programme.	Haco Nicholson	NE	Partially Meet
A1.3	3.1.1.3 Bullet 3	Verify if the LTO programme meets the intent of the applicable regulatory requirements, codes and standards, IAEA requirements and recommendations, and best international practices.	Haco Nicholson	NE	Do Not Meet
A2	Subsection 3.1.2:	Organizational structure for LTO.	Darren Bissell		
A2.1	3.1.2.3 Bullet 1	Whether the responsibility for LTO preparation is well defined.	Johann Austin	IPD-K	Partially Meet
A2.2	3.1.2.3 Bullet 2	Whether the plant has adopted suitable organizational structure for preparation and implementation of LTO programme.	Hilton Roos	NPM	Meet
A2.3	3.1.2.3 Bullet 3	Whether the plant has established a special LTO oriented project team or similar organizational arrangements dealing with LTO activities and that it has responsibilities and duties as well as authorities defined within organizational policy and quality assurance system (including control of contractors and TSOs).	Hilton Roos	NPM	Do Not Meet
A2.4	3.1.2.3 Bullet 4	Whether the number of staff and their required qualifications are adequate for the scope of work and the assigned duties.	Hilton Roos	NPM	Do Not Meet
A2.5	3.1.2.3 Bullet 5	Whether staff involved in LTO activities have specific job descriptions/task responsibilities.	Hilton Roos	NPM	Do Not Meet
A2.6	3.1.2.3 Bullet 6	Whether the plant managers have the appropriate resources to carry out their assigned responsibilities and accountabilities regarding LTO preparations.	Darren Bissell	IPD-K	Partially Meet
A2.7	3.1.2.3 Bullet 7	Whether the organizational structure has capability to manage LTO programme with long term perspective.	Darren Bissell	IPD-K	Partially Meet
A2.8	3.1.2.3 Bullet 8	Whether the management system and organizational matters address the necessary quality assurance of processes related to long term operation and ageing management.	Haco Nicholson	NE	Meet
A3	Subsection 3.1.3:	Plant level documentation for LTO.	Darren Bissell		
A3.1	3.1.3.3 Bullets 1	Verify if a clear policy exists for activities related to long term operation and ageing management.	Haco Nicholson	NE	Do Not Meet
A3.2	3.1.3.3 Bullets 2	Whether the plant has plant level documentation covering LTO concept and approach.	Haco Nicholson	NE	Do Not Meet
A3.3	3.1.3.3 Bullets 3	Whether the plant policy is consistent with and meets the intent of related IAEA Safety Standards	Haco Nicholson	NE	Do Not Meet
A3.4	3.1.3.3 Bullets 4	Whether the plant staff is familiar with and understands the policy.	Johann Austin	IPD-K	Partially Meet
A4	Subsection 3.1.4:	LTO implementation programme	Darren Bissell		
A4.1	3.1.4.3 Bullets 1	Whether the plant has programme(s) or action plan for the resolution of issues identified during the development of AMPs, EQ programme and time limited ageing analyses	Archiebold Mthandi	SPS	Partially Meet
A4.2	3.1.4.3 Bullets 2	Whether the plant has programmes for major modifications, reconstructions and replacements.	Rida Cassim	IPD-K	Partially Meet
A4.3	3.1.4.3 Bullets 3	Verify that evaluation of the plant programmes and documentation was performed. Confirm that evaluation results are a sound basis for successful LTO and will remain effective for the planned period of LTO. This evaluation would determine if modifications or new plant programmes are necessary to ensure that SSCs are available and qualified to perform their intended function for the planned period of LTO.	Mvuseleli Hermanus	IPD-K	Do Not Meet
A4.4	3.1.4.3 Bullets 4	Check how the plant had applied the measures taken in connection with identified issues and how they are incorporated into a relevant plant programme. Verify if the LTO implementation programme covers activities such as modifications, major reconstructions and scheduled replacements, and other plant commitments needed for assuring plant safety during LTO.	Mvuseleli Hermanus	IPD-K	Do Not Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
A4.5	3.1.5.3 Bullets 5	Review how and to what extent the LTO implementation programme is supported by safety analyses and if applicable by business evaluations, and how coordination of the plant activities is done in respect to an overall programme for LTO.	Johann Austin	IPD-K	Meet
A4.6	3.1.5.3 Bullets 6	Verify that relevant operating experience and research findings are taken into account.	Johann Austin	IPD-K	Partially Meet
A4.7	3.1.5.3 Bullets 7	Verify if recommendations and other suggestions arising from different types of reviews are incorporated into the plan activities.	Archiebold Mthandi	SPS	Meet
A5	Subsection 3.1.5:	Current safety analyses report and other current licensing basis documents.	Darren Bissell		
A5.1	3.1.5.3 Bullets 1	Whether the justification for plant safety during the planned period of LTO is properly documented in e.g. FSAR and/or PSR report.	Khaliel Isaacs	IPD-K	Partially Meet
A5.2	3.1.5.3 Bullets 2	If available, review the results of the PSR report or similar safety assessment with focus on chapters relevant to LTO and ageing management.	Haco Nicholson	NE	Meet
A5.3	3.1.5.3 Bullets 3	Review trends of reported events in PSR and assess their possible connection with degradation of SSCs.	Khaliel Isaacs	IPD-K	Partially Meet
A5.4	3.1.5.3 Bullets 4	Whether the FSAR is updated to reflect the results of activities to justify safe LTO (preconditions for LTO, AMR, review of AMPs, TLAAs).	Khaliel Isaacs	IPD-K	Do Not Meet
A6	Subsection 3.1.6:	Configuration management and modification management including design basis documentation.	Darren Bissell		
A6.1	3.1.6.3 Bullets 1	Whether the plant activities are effectively managed to verify that the plant physical configuration and operation conform to design requirements and to design documents all the time.	Johann Austin	IPD-K	Partially Meet
A6.2	3.1.6.3 Bullets 2	Whether the configuration management programme is established and implemented at the plant.	Astrid Holland	PS	Partially Meet
A6.3	3.1.6.3 Bullets 3	Whether the design authority exists.	Darren Bissell	IPD-K	Meet
A6.4	3.1.6.3 Bullets 4	Whether the plant has design basis documentation.	Neil Boonzaier	SDE	Partially Meet
A6.5	3.1.6.3 Bullets 5	Whether the plant launched a design basis reconstitution programme, if necessary.	Deon Kruger	SDE	Partially Meet
A6.6	3.1.6.3 Bullets 6	Whether the responsibility for plant modifications and set-points are well defined.	Johann Austin	IPD-K	Meet
A6.7	3.1.6.3 Bullets 7	Whether the impact of the modification on plant safety is properly assessed.	Khaliel Isaacs	IPD-K	Meet
A6.8	3.1.6.3 Bullets 8	Whether the operational limits and conditions are reassessed and revised, as necessary, following any safety related modifications at the plant or any changes to the safety analyses report, and also on the basis of accumulated experience and technological developments.	Evan Kerr	SDE	Meet
A6.9	3.1.6.3 Bullets 9	Whether QA involvement is in place during the modification process to ensure that all updating of controlled drawings, documents and required training was completed before the actual operation of the modified system or equipment.	Peter Harrisanker	SDE	Meet
A6.10	3.1.6.3 Bullets 10	Determine if QA programme deals with configuration management issues to the extent necessary for assurance of all plant modifications and design changes during the current operational period as well as period of LTO.	Sanet Kiewitt	SDE	Partially Meet
A6.11	3.1.6.3 Bullets 11	Determine specifically that plant quality assurance plan is dealing with configuration management to an extent that assures availability of the necessary input for LTO analyses.	Nyamie Ntlokombini	PS	Partially Meet
A6.12	3.1.6.3 Bullets 12	Whether the plant has design basis documentation which contains design basis requirements and supporting design information or if alternative arrangements are in place, which compensate for the lack of complete design basis documentation at the plant.	Johann Austin	IPD-K	Partially Meet
A6.13	3.1.6.3 Bullets 13	Whether design basis also contains design requirements and supporting design information.	Andrias Mgulwa	SDE	Partially Meet
B	**AREA B:**	**SCOPING AND SCREENING AND PLANT PROGRAMMES RELEVANT TO LTO**	**Raymond Maapola**		
B1	Subsection 3.2.1:	Methodology and criteria for scoping and screening of SSCs for LTO.	Raymond Maapola		
B1.1	3.2.1.3 Bullets 1	Whether the plant has a clear policy on the scope of LTO which includes: - Relation to safety classification system; - Criteria for scoping including boundary conditions; - Definition of SCs not important to safety within the scope.	Earvine Cornelissen	SDE	Do Not Meet
B1.2	3.2.1.3 Bullets 2	Whether the plant includes SCs to prevent/ mitigate design extension conditions in the scope of LTO.	Alan Lawrence	IPD-K	Do Not Meet
B1.3	3.2.1.3 Bullets 3	Whether an appropriate method has been used for identifying SCs within the scope of LTO, especially for identifying SCs not important to safety within the scope.	Riana Aschmann	SDE	Partially Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
B1.4	3.2.1.3 Bullets 4	Whether this method meets the intent of the recommendations provided in or is in line with other proven best international practices.	Neil Boonzaier	SDE	Partially Meet
B1.5	3.2.1.3 Bullets 5	Whether the scoping method and SCs within the scope are properly documented, and relevant data are accessible (indicating e.g. intended function, safety class, other scoping criteria, etc.).	Deon Kruger	SDE	Partially Meet
B1.6	3.2.1.3 Bullets 6	Whether the plant has a clear division of SCs which include interfaces between different areas (mechanical, electrical, I&C and civil structures) like control valves.	Evan Kerr	SDE	Meet
B1.7	3.2.1.3 Bullets 7	Whether the plant has prepared a procedure on screening of SCs within the scope of LTO.	Peter Harrisanker	SDE	Do Not Meet
B1.8	3.2.1.3 Bullets 8	Whether and how the SC commodity groups (group of components/ structures which have similar functions, similar materials or are in similar environment) have been defined.	Sanet Kiewitt	SDE	Partially Meet
B1.9	3.2.1.3 Bullets 9	Whether the results of the scoping and screening processes are documented, in a manner that complies with the requirements of the quality assurance programme.	Andrias Mgulwa	SDE	Do Not Meet
B1.10	3.2.1.3 Bullets 10:	Whether the plant has verified if SCs within the scope of LTO are subjected to appropriate programmes such as AMPs, revalidation of time limited ageing analyses or other plant programmes.	Earvine Cornelissen	SDE	Do Not Meet
B1.11	3.2.1.3 Bullets 11	Verify if the plant uses risk based information (e.g. PSA) to extend the scope for LTO (PSA results should not be used to exclude SCs from the scope of LTO.).	Tjaart Van Der Walt	SDE	Meet
B2	Subsection 3.2.2.1:	Plant Programmes Relevant for LTO/Maintenance.	Susan Van Wyk		
B2.1	3.2.2.1.3 Bullets 1	Whether an appropriate maintenance programme, e.g. preventive, predictive and corrective maintenance, is applied to each SC taking its safety class and past maintenance history into account.	Rob Moloney	RE	Partially Meet
B2.2	3.2.2.1.3 Bullets 2	Whether actual and potential ageing mechanisms are taken into account in preventive and predictive maintenance programmes for SCs important to safety to determine a suitable maintenance method, e.g. overhaul maintenance and condition based maintenance, and interval frequency for the maintenance.	Rob Moloney	RE	Partially Meet
B2.3	3.2.2.1.3 Bullets 3	Whether the plant has a systematic approach to maintenance addressing technical aspects such as development of acceptance criteria, reliability centred maintenance, condition based maintenance and risk informed methods.	Liezl Hugo	RE	Partially Meet
B2.4	3.2.2.1.3 Bullets 4	Whether preventive and predictive maintenance programmes are periodically evaluated based on past maintenance history and new knowledge and research findings.	Liezl Hugo	RE	Partially Meet
B2.5	3.2.2.1.3 Bullets 5	Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing preventive and predictive maintenance programmes	Rob Moloney	RE	Do Not Meet
B2.6	3.2.2.1.3 Bullets 6	Whether the plant has a process to evaluate existing preventive and predictive maintenance programmes used to manage ageing of SCs within the scope of LTO against the nine attributes.	Liezl Hugo	RE	Do Not Meet
B2.7	3.2.2.1.3 Bullets 7	Whether plant maintenance programmes consider regulatory requirements, suppliers' recommendations, feedback from related operational experience and research results and findings. Also investigate to what extent the programmes are supporting safe operation of NPPs in the current operating period as well as in the period of LTO.	Liezl Hugo	RE	Partially Meet
B2.8	3.2.2.1.3 Bullets 8	Whether maintenance programmes for SSCs in the scope of LTO clearly identify the type of maintenance, the links with ageing management programmes, the frequency, tasks, records and storage.	Rob Moloney	RE	Partially Meet
B2.9	3.2.2.1.3 Bullets 9	Whether the evaluation of the collected data also includes trend analysis. Whether maintenance programmes also addresses obsolescence of SSCs including the proposed period of LTO.	Rob Moloney	RE	Partially Meet
B2.10	3.2.2.1.3 Bullets 10	Whether maintenance programmes also addresses obsolescence of SSCs including the proposed period of LTO.	Rob Moloney	RE	N/A
B2.11	3.2.2.1.3 Bullets 11	Whether a process and a database exist that support the evaluation of effectiveness of maintenance programmes in detecting and characterizing degradation mechanisms, and provide technical references to support findings and conclusions. The documentation should include records of maintenance activities of components.	Rob Moloney	RE	Partially Meet
B3	Subsection 3.2.2.2:	Plant Programmes Relevant for LTO/Equipment qualification.	Raymond Maapola		
B3.1	3.2.2.2.3 Bullets 1	Verify that the results of the ageing management review, scoping and screening and TLAA revalidations for LTO are adequately used to update EQ programmes.	Kabelo Moroka	SPS	Partially Meet
B3.2	3.2.2.2.3	Verify that all environmentally qualified equipment to be addressed in the	Kabelo Moroka	SPS	Partially Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
	Bullets 2	frame of LTO is included in the existing plant EQ programme.			
B3.3	3.2.2.2.3 Bullets 3	Whether the plant has evaluated the EQ programme for LTO for consistency with the nine attributes.	Kabelo Moroka	SPS	Partially Meet
B3.4	3.2.2.2.3 Bullets 4	Whether environmental and seismic qualification will remain valid over the expected period of LTO or whether corrective measures have been developed and implemented. The conclusion should support the technical justification that the material degradation ageing effects will be managed effectively.	Kabelo Moroka	SPS	Partially Meet
B3.5	3.2.2.2.3 Bullets 5	Verify if EQ status is preserved and updated through surveillance, maintenance, modifications and replacement, environment and equipment condition monitoring and configuration management and that adequate interfaces with related programmes are in place.	Kabelo Moroka	SPS	Partially Meet
B3.6	3.2.2.2.3 Bullets 6	Check that the re-qualification programme for equipment within the scope of LTO, which was designed to earlier standards is focused on ensuring that the equipment can perform its function under current design basis condition.	Alan Lawrence	IPD-K	Partially Meet
B3.7	3.2.2.2.3 Bullets 7	Verify if timely replacement of equipment that cannot be qualified for the planned period of LTO is adequately considered. Verify if a specific programme for replacement of mechanical, electrical and I&C equipment with qualified or stated lifetimes less than the planned LTO period has been developed and is implemented.	Alan Lawrence	IPD-K	Partially Meet
B3.8	3.2.2.2.3 Bullets 8	Check that the availability of qualified manufacturers and products needed for plant modifications for LTO has been considered.	Lumkile Jibiliza	SPS	Meet
B3.9	3.2.2.2.3 Bullets 9	Qualification results on safety related electric and I&C equipment located in the containment should be verified. The qualification results should specify whether the equipment has been qualified to perform its safety functions in environmental conditions equivalent to DBA conditions for the planned period of LTO.	Kabelo Moroka	SPS	Partially Meet
B3.10	3.2.2.2.3 Bullets 10	A plant specific list that specifies environmentally qualified cables and connectors on safety related equipment, as well as cables and connectors on non-safety related equipment that has an impact on performance of safety related systems, should be updated regularly.	Nozipho Bongelo	SDE	Partially Meet
B3.11	3.2.2.2.3 Bullets 11	Verify the availability and retrieving ability of the EQ documentation, which should be ensured for the whole period of LTO.	Maxwell Msabala	PS	Partially Meet
B3.12	3.2.2.2.3 Bullets 12	As to the seismic qualification, whether the plant uses appropriate seismic motions based on the latest knowledge, operational experience and research findings. Verify that possible ageing effects are taken into account in the seismic qualification.	Andre Nel	Nuclear Sites	Partially Meet
B4	Subsection 3.2.2.3:	Plant Programmes Relevant for LTO/In-Service Inspection.	Andrew Ceto		
B4.1	3.2.2.3.3 Bullets 1	Check if the plant has a process to ensure that ageing mechanisms identified from operating experience and research findings are considered to determine a suitable ISI method in the ISI programmes for SCs important to safety.	Andrew Ceto	SPS	Partially Meet
B4.2	3.2.2.3.3 Bullets 2	Check if ISI programmes are periodically evaluated based on past ISI results, operating experience, new knowledge and research findings.	Andrew Ceto	SPS	Meet
B4.3	3.2.2.3.3 Bullets 3	Verify that the results of the scoping and screening and review of ageing management for LTO are adequately reflected into the existing ISI programmes.	Andrew Ceto	SPS	Do Not Meet
B4.4	3.2.2.3.3 Bullets 4	Whether the plant has evaluated the existing ISI programme for LTO for consistency with the nine attributes.	Andrew Ceto	SPS	Partially Meet
B4.5	3.2.2.3.3 Bullets 5	Whether the ISI results are correctly documented (e.g. in a properly maintained database) and provide the technical bases to support the justification for LTO.	Andrew Ceto	SPS	Meet
B4.6	3.2.2.3.3 Bullets 6	Check that ISI programme for SSCs in the scope of LTO clearly identifies the inspection method, the links with ageing management programmes, the frequency, tasks, records and storage.	Andrew Ceto	SPS	Do Not Meet
B4.7	3.2.2.3.3 Bullets 7	Verify that the ISI programme has been reviewed and evaluated for effectiveness in detecting and characterizing the degradation mechanisms for SSCs within the scope of LTO. The evaluation should provide a technical basis to justify that the ageing phenomena will be detected in a timely manner with the proposed inspection.	Andrew Ceto	SPS	Do Not Meet
B4.8	3.2.2.3.3 Bullets 8	Verify that the methodology, equipment, and personnel, which are part of the ISI process, have been qualified according to national standards, regulatory requirements, and IAEA recommendations where applicable.	Andrew Ceto	SPS	Meet
B4.9	3.2.2.3.3 Bullets 9	If the plant is using risk informed ISI, verify the related justification. Check if the effectiveness of risk informed ISI has been evaluated, considering limited operational experience of risk informed ISI programmes, and the limitations of the underlying probabilistic analyses of risk informed ISI.	Andrew Ceto	SPS	Meet
B5	Subsection 3.2.2.4:	Plant Programmes Relevant for LTO/Surveillance and Monitoring.	Garetshose Mdluli		

#	Reference	Description	Item Lead	Group	Assessment Outcome
B5.1	3.2.2.4.3 Bullets 1	Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing surveillance and monitoring programmes.	Garetshose Mdluli	IST	Partially Meet
B5.2	3.2.2.3.3 Bullets 2	Whether the plant has evaluated the existing surveillance and monitoring programme for LTO for consistency with the nine attributes.	Garetshose Mdluli	IST	Partially Meet
B5.3	3.2.2.4.3 Bullets 3	Whether the programmes confirm the provisions for safe operation that were considered in design.	Garetshose Mdluli	IST	Meet
B5.4	3.2.2.4.3 Bullets 4	Whether the surveillance and monitoring programmes remain effective for assessing the service life of SSCs and supporting safe LTO.	Garetshose Mdluli	IST	Meet
B5.5	3.2.2.4.3 Bullets 5	Review if plant surveillance and monitoring programmes consider feedback on operating experience and research results and findings.	Garetshose Mdluli	IST	Meet
B5.6	3.2.2.4.3 Bullets 6	Whether the plant implemented supplementary LTO related surveillance programme, such as reactor pressure vessel supplementary surveillance programme, controlled ageing management programmes for cables, surveillance programme of concrete etc.	Andrew Ceto	SPS	Partially Meet
B6	Subsection 3.2.2.5:	Plant Programmes Relevant for LTO/Monitoring of Chemical regimes.	Nestor Van Eeden		
B6.1	3.2.2.5.3 Bullets 1	Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing chemistry programme.	Nestor Van Eeden	Nuclear Services	Do Not Meet
B6.2	3.2.2.5.3 Bullets 2	Whether the plant has evaluated the chemistry programme for LTO for consistency with the nine attributes.	Nestor Van Eeden	Nuclear Services	Do Not Meet
B6.3	3.2.2.5.3 Bullets 3	Whether feedback of operational experience and research results / findings justifies the chemistry programme.	Nestor Van Eeden	Nuclear Services	Meet
B6.4	3.2.2.5.3 Bullets 4	Check if the plant chemistry programme has been reviewed with respect to LTO and modified if applicable.	Nestor Van Eeden	Nuclear Services	Partially Meet
B6.5	3.2.2.5.3 Bullets 5	Verify that chemistry staff is aware of implications of chemistry parameters on known aspects which could adversely impact safety during LTO (such as corrosion, erosion, inter-granular stress corrosion cracking, primary water stress corrosion cracking of SCs within the scope of LTO).	Nestor Van Eeden	Nuclear Services	Meet
B6.6	3.2.2.5.3 Bullets 6	Whether new findings and conclusions coming from e.g. surveillance and ageing management are being considered in updating plant chemistry programme and appropriate interface is established.	Nestor Van Eeden	Nuclear Services	Partially Meet
B6.7	3.2.2.5.3 Bullets 7	Whether the chemistry practices are in compliance with technical specifications, consistent with international good practices and take into account the materials concept appropriately.	Nestor Van Eeden	Nuclear Services	Meet
B6.8	3.2.2.5.3 Bullets 8	Confirm that the chemistry programme includes the diagnostic parameters that provide useful information for determining and preventing the cause of unexpected ageing.	Nestor Van Eeden	Nuclear Services	Meet
C	**AREA C:**	**AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR MECHANICAL COMPONENTS**	**Andrew Ceto**		
C1	Subsection 3.3.1:	Area-specific scoping and screening of SSCs for LTO.	Raymond Maapola		
C1.1	3.3.1.3 Bullets 1	Verify if the master list of plant SCs is available and identify all items in scope of LTO and out of scope of LTO.	John Venter	SDE	Partially Meet
C1.2	3.3.1.3 Bullets 2	Verify if the scope of SCs for LTO is complete, documented and fulfilling scoping criteria.	Kababula Lukusa	SDE	Partially Meet
C1.3	3.3.1.3 Bullets 3	Verify if SCs to prevent/ mitigate design extension conditions are within the scope of LTO.	Alan Lawrence	IPD-K	Meet
C1.4	3.3.1.3 Bullets 4	If scoping and screening data is distributed into more than one database, check that the data consistency is assured.	Louis Uys	SDE	Partially Meet
C1.5	3.3.1.3 Bullets 5	Whether SCs not important to safety which may impact on safety functions are in the scope.	Raymond Maapola	SDE	Meet
C1.6	3.3.1.3 Bullets 6	Whether and how the SCs commodity groups (group of components and structures which have similar functions and similar materials) have been defined.	Andrew Ceto	SPS	Partially Meet
C1.7	3.3.1.3 Bullets 7	Verify if SCs within the scope of LTO are subjected to an appropriate ageing management review and evaluation of time limited ageing analyses.	Andrew Ceto	SPS	Partially Meet
C1.8	3.3.1.3 Bullets 8	Whether there is a documented and verifiable methodology for the screening of SCs for ageing management review.	Andrew Ceto	SPS	Partially Meet
C2	Subsection 3.3.2:	Ageing management review.	Anton Kotze		
C2.1	3.3.2.3 Bullets 1.1	Assessment of the current physical status of the plant - Confirm that appropriate ageing management reviews and condition assessments have been performed for SCs subject to ageing management review.	Anton Kotze	NE	Meet
C2.2	3.3.2.3 Bullets 1.2	Assessment of the current physical status of the plant. - Determine if all the important input design data such as design description, design basis including	Anton Kotze	NE	Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
		loads and other parameters necessary for evaluation of safety are available or accessible for the plant.			
C2.3	3.3.2.3 Bullets 1.3	Assessment of the current physical status of the plant. - Check that information on maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept and managed in a proper way.	Anton Kotze	NE	Partially Meet
C2.4	3.3.2.3 Bullets 1.4	Assessment of the current physical status of the plant. - Confirm that review and assessment of the operating and maintenance history for each structure or component is part of the analyses accounting for such parameters as operational transients, past failures, or unusual conditions that affected the performance or condition of the structure or component. Confirm that examination of repairs, modifications or replacements relevant to ageing considerations are included in the analysis of the SCs	Anton Kotze	NE	Meet
C2.5	3.3.2.3 Bullets 1.5	Assessment of the current physical status of the plant. Determine that operational data are collected with a focus on transients and events and on generic operating experience. Also information relevant to power uprating, modification and replacement, surveillance and any trend curves are important to be available for the overall assessment.	Anton Kotze	NE	Meet
C2.6	3.3.2.3 Bullets 2.1	Identification of ageing effects and degradation mechanisms. - Check that a procedure exists for the structure, component or commodity grouping to assess ageing effects in detail.	Anton Kotze	NE	Partially Meet
C2.7	3.3.2.3 Bullets 2.2	Identification of ageing effects and degradation mechanisms. - Verify the plant ageing management review process identifies possible ageing effects/mechanisms, critical locations/ parts, material, environment and ageing management programmes addressing these subjects for SCs in the scope of LTO.	Anton Kotze	NE	Partially Meet
C2.8	3.3.2.3 Bullets 2.3	Identification of ageing effects and degradation mechanisms. - Determine if materials, environment and stressors that are associated with each, component, or commodity grouping were considered in the process of identification of ageing effects.	Anton Kotze	NE	Meet
C2.9	3.3.2.3 Bullets 2.4	Identification of ageing effects and degradation mechanisms. - Check if operating experience and research findings and results were adequately considered.	Anton Kotze	NE	Meet
C2.10	3.3.2.3 Bullets 2.5	Identification of ageing effects and degradation mechanisms. - For selected examples, check consistency with IGALL AMR tables.	Anton Kotze	NE	Do Not Meet
C2.11	3.3.2.3 Bullets 3.1	Documentation of the evaluation and demonstration for management of ageing effects. - Verify if demonstration was done that the effects of ageing will continue to be identified and managed such that the intended function of the SC will be maintained throughout the planned period of LTO.	Anton Kotze	NE	Partially Meet
C2.12	3.3.2.3 Bullets 3.2	Documentation of the evaluation and demonstration for management of ageing effects. - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for effective management of ageing effects.	Anton Kotze	NE	Meet
C2.13	3.3.2.3 Bullets 3.3	Documentation of the evaluation and demonstration for management of ageing effects. - Confirm that efficient data collection and record-keeping systems are in place so that trend analyses can readily be performed to predict SSC performance.	Anton Kotze	NE	Partially Meet
C2.14	3.3.2.3 Bullets 3.4	Documentation of the evaluation and demonstration for management of ageing effects. - Verify that the following information is available in the documents demonstrating management of the ageing effects: o Clear identification of the ageing effects requiring management; o Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed; o Description of how the programmes and activities will manage the effects of ageing; o List of substantiating references and source documents; o Discussion of any assumptions or special conditions used in applying or interpreting the source documents; o Description of existing and new programmes for LTO.	Anton Kotze	NE	Do Not Meet
C3	Subsection 3.3.3:	Review of ageing management programmes	Archiebold Mthandi		
C3.1	3.3.3.3 Bullets 1	Verify that existing and proposed plant programmes that supports LTO were reviewed for meeting the nine attributes.	Archiebold Mthandi	SPS	Partially Meet
C3.2	3.3.3.3 Bullets 2	Verify/ review specific sample of existing and new AMPs for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs, i.e. meeting the SC-specific nine attributes.	Archiebold Mthandi	SPS	Do Not Meet
C3.3	3.3.3.3 Bullets 3	Whether the plant concludes, after reviewing the existing plant programmes and/or ageing management programmes, that the management of ageing	Archiebold Mthandi	SPS	Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
		effects is not adequate in some cases. In this case, whether the plant modifies the existing programme or develops a new programme for the purpose of LTO.			
C3.4	3.3.3.3 Bullets 4	Confirm that operation, inspection/monitoring and maintenance programmes are well-coordinated by AMPs.	Archiebold Mthandi	SPS	Partially Meet
C4	Subsection 3.3.4:	Obsolescence management programme.	Lumkile Jibiliza		
C4.1	3.3.4.3 Bullets 1	Confirm that appropriate technological obsolescence management reviews and assessments have been performed for SCs.	Lumkile Jibiliza	SPS	Meet
C4.2	3.3.4.3 Bullets 2	Verify if demonstration was done that the effects of obsolescence will be continuously identified and managed such that the intended function of SCs will be maintained throughout the planned period of LTO.	Lumkile Jibiliza	SPS	Meet
C4.3	3.3.4.3 Bullets 3	Whether the plant is reviewing efficiency of the existing obsolescence programmes on a regular basis.	Lumkile Jibiliza	SPS	Partially Meet
C4.4	3.3.4.3 Bullets 4	Whether management of technological obsolescence of SSCs such as I&C equipment and systems, sensors, medium voltage cables, uninterruptable emergency power supply (UPS) is in place.	Lumkile Jibiliza	SPS	Meet
C5	Subsection 3.3.5:	Existing time limited ageing analyses.	Raymond Maapola		
C5.1	3.3.5.3 Bullets 1	Whether the existing time limited ageing analyses (e.g. from FSAR) are properly documented in the current safety analyses report or other licensing basis documents and clearly and adequately describe the current licensing basis or the current design basis requirements for plant operation.	Raymond Maapola	SDE	Meet
C5.2	3.3.5.3 Bullets 2	Whether the plant identified list of existing time limited ageing analyses.	Raymond Maapola	SDE	Do Not Meet
C5.3	3.3.5.3 Bullets 3	Whether the plant identified missing time limited ageing analyses based on results of screening.	Raymond Maapola	SDE	Do Not Meet
C5.4	3.3.5.3 Bullets 4	Whether the plant has launched time limited ageing analyses reconstitutions if needed.	Raymond Maapola	SDE	Do Not Meet
C6	Subsection 3.3.6:	Revalidation of time limited ageing analyses.	Raymond Maapola		
C6.1	3.3.6.3 Bullets 1	Whether all necessary design basis information, applicable codes and regulatory requirements, fabrication records, operational and maintenance history and results of inspections are accessible.	Yolandi Koeberg	PS	Partially Meet
C6.2	3.3.6.3 Bullets 2	Whether these calculations/ analyses are properly documented.	John Venter	SDE	Do Not Meet
C6.3	3.3.6.3 Bullets 3	Which kind of methods and criteria have been used for revalidation of time limited ageing analyses.	Kababula Lukusa	SDE	Do Not Meet
C6.4	3.3.6.3 Bullets 4	Whether the reviewed time limited ageing analyses justify safe operation for LTO.	Louis Uys	SDE	Do Not Meet
C6.5	3.3.6.3 Bullets 5	Whether the implications of revalidation are considered in the plant operational limits and conditions.	Alan Lawrence	IPD-K	Do Not Meet
C6.6	3.3.6.3 Bullets 6	Whether the qualification of SCs covered by the EQ programme has been satisfactorily established and maintained for LTO.	Kabelo Moroka	SPS	Do Not Meet
C6.7	3.3.6.3 Bullets 7	What corrective or compensatory measures are taken, if the analyses cannot be revalidated.	Alan Lawrence	IPD-K	Do Not Meet
C6.8	3.3.6.3 Bullets 8	Verify if evaluation was done to demonstrate that the safety analyses meet one of the following criteria: o The analysis remains valid for the intended period of LTO; o The analysis has been projected to the end of the intended period of LTO; and o The effects of ageing on the intended function(s) of the structure or component will be adequately managed for the intended period of LTO.	Raymond Maapola	SDE	Do Not Meet
C6.9	3.3.6.3 Bullets 9	Check if the revalidation of time limited ageing analyses is documented in an update to the safety analyses report.	Khaliel Isaacs	IPD-K	Do Not Meet
C6.10	3.3.6.3 Bullets 10	Also check if typical time limited ageing analyses are part of the safety analyses such as: o Irradiation embrittlement of the reactor pressure vessel; o Thermal and mechanical fatigue; o o Thermal ageing; o Loss of preload; o o Loss of material.	Khaliel Isaacs	IPD-K	Do Not Meet
C6.11	3.3.6.3 Bullets 11	Verify that selected plant TLAAs are consistent with and meet the intent of the IGALL TLAAs.	Raymond Maapola	SDE	Do Not Meet
C6.12	3.3.6.3 Bullets 12.1	Operational limits and conditions. - Determine if the stressors given in the design specifications or Current Licensing Basis have been used for assessment of SCs and their supports.	John Venter	SDE	Do Not Meet
C6.13	3.3.6.3 Bullets 12.2	Operational limits and conditions. - Check if data from surveillance programmes and diagnostic systems were applied in the analyses.	Kababula Lukusa	SDE	Do Not Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
C6.14	3.3.6.3 Bullets 12.3	Operational limits and conditions. - Verify if limits established in the design specifications or current licensing basis were used.	Louis Uys	SDE	Do Not Meet
C6.15	3.3.6.3 Bullets 13	Documentation of revalidation - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for revalidation of time limited ageing analyses.	Astrid Holland	PS	Partially Meet
D	**AREA D:**	**AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR ELECTRICAL AND I&C COMPONENTS**	**Kabelo Moroka**		
D1	Subsection 3.3.1:	Area-specific scoping and screening of SSCs for LTO.	Raymond Maapola		
D1.1	3.3.1.3 Bullets 1	Verify if the master list of plant SCs is available and identify all items in scope of LTO and out of scope of LTO.	Neil Boonzaier	SDE	Partially Meet
D1.2	3.3.1.3 Bullets 2	Verify if the scope of SCs for LTO is complete, documented and fulfilling scoping criteria.	Deon Kruger	SDE	Partially Meet
D1.3	3.3.1.3 Bullets 3	Verify if SCs to prevent/ mitigate design extension conditions are within the scope of LTO.	Alan Lawrence	IPD-K	Meet
D1.4	3.3.1.3 Bullets 4	If scoping and screening data is distributed into more than one database, check that the data consistency is assured.	Evan Kerr	SDE	Partially Meet
D1.5	3.3.1.3 Bullets 5	Whether SCs not important to safety which may impact on safety functions are in the scope.	Abu-bakr Jakoet	SPS	Meet
D1.6	3.3.1.3 Bullets 6	Whether and how the SCs commodity groups (group of components and structures which have similar functions and similar materials) have been defined.	Abu-bakr Jakoet	SPS	Partially Meet
D1.7	3.3.1.3 Bullets 7	Verify if SCs within the scope of LTO are subjected to an appropriate ageing management review and evaluation of time limited ageing analyses.	Abu-bakr Jakoet	SPS	Partially Meet
D1.8	3.3.1.3 Bullets 8	Whether there is a documented and verifiable methodology for the screening of SCs for ageing management review.	Abu-bakr Jakoet	SPS	Partially Meet
D2	Subsection 3.3.2:	Ageing management review.	Anton Kotze		
D2.1	3.3.2.3 Bullets 1.1	Assessment of the current physical status of the plant - Confirm that appropriate ageing management reviews and condition assessments have been performed for SCs subject to ageing management review.	Anton Kotze	NE	Partially Meet
D2.2	3.3.2.3 Bullets 1.2	Assessment of the current physical status of the plant. - Determine if all the important input design data such as design description, design basis including loads and other parameters necessary for evaluation of safety are available or accessible for the plant.	Anton Kotze	NE	Partially Meet
D2.3	3.3.2.3 Bullets 1.3	Assessment of the current physical status of the plant. - Check that information on maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept and managed in a proper way.	Anton Kotze	NE	Partially Meet
D2.4	3.3.2.3 Bullets 1.4	Assessment of the current physical status of the plant. - Confirm that review and assessment of the operating and maintenance history for each structure or component is part of the analyses accounting for such parameters as operational transients, past failures, or unusual conditions that affected the performance or condition of the structure or component. Confirm that examination of repairs, modifications or replacements relevant to ageing considerations are included in the analysis of the SCs	Anton Kotze	NE	Partially Meet
D2.5	3.3.2.3 Bullets 1.5	Assessment of the current physical status of the plant. Determine that operational data are collected with a focus on transients and events and on generic operating experience. Also information relevant to power uprating, modification and replacement, surveillance and any trend curves are important to be available for the overall assessment.	Anton Kotze	NE	Partially Meet
D2.6	3.3.2.3 Bullets 2.1	Identification of ageing effects and degradation mechanisms. - Check that a procedure exists for the structure, component or commodity grouping to assess ageing effects in detail.	Anton Kotze	NE	Partially Meet
D2.7	3.3.2.3 Bullets 2.2	Identification of ageing effects and degradation mechanisms. - Verify the plant ageing management review process identifies possible ageing effects/mechanisms, critical locations/ parts, material, environment and ageing management programmes addressing these subjects for SCs in the scope of LTO.	Anton Kotze	NE	Partially Meet
D2.8	3.3.2.3 Bullets 2.3	Identification of ageing effects and degradation mechanisms. - Determine if materials, environment and stressors that are associated with each, component, or commodity grouping were considered in the process of identification of ageing effects.	Anton Kotze	NE	Meet
D2.9	3.3.2.3 Bullets 2.4	Identification of ageing effects and degradation mechanisms. - Check if operating experience and research findings and results were adequately considered.	Anton Kotze	NE	Meet
D2.10	3.3.2.3	Identification of ageing effects and degradation mechanisms. - For selected	Anton Kotze	NE	Do Not Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
	Bullets 2.5	examples, check consistency with IGALL AMR tables.			
D2.11	3.3.2.3 Bullets 3.1	Documentation of the evaluation and demonstration for management of ageing effects. - Verify if demonstration was done that the effects of ageing will continue to be identified and managed such that the intended function of the SC will be maintained throughout the planned period of LTO.	Anton Kotze	NE	Partially Meet
D2.12	3.3.2.3 Bullets 3.2	Documentation of the evaluation and demonstration for management of ageing effects. - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for effective management of ageing effects.	Anton Kotze	NE	Meet
D2.13	3.3.2.3 Bullets 3.3	Documentation of the evaluation and demonstration for management of ageing effects. - Confirm that efficient data collection and record-keeping systems are in place so that trend analyses can readily be performed to predict SSC performance.	Anton Kotze	NE	Partially Meet
D2.14	3.3.2.3 Bullets 3.4	Documentation of the evaluation and demonstration for management of ageing effects. - Verify that the following information is available in the documents demonstrating management of the ageing effects: o Clear identification of the ageing effects requiring management; o Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed; o Description of how the programmes and activities will manage the effects of ageing; o List of substantiating references and source documents; o Discussion of any assumptions or special conditions used in applying or interpreting the source documents; o Description of existing and new programmes for LTO.	Anton Kotze	NE	Do Not Meet
D3	Subsection 3.3.3:	Review of ageing management programmes	Archiebold Mthandi		
D3.1	3.3.3.3 Bullets 1	Verify that existing and proposed plant programmes that supports LTO were reviewed for meeting the nine attributes.	Archiebold Mthandi	SPS	Partially Meet
D3.2	3.3.3.3 Bullets 2	Verify/ review specific sample of existing and new AMPs for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs, i.e. meeting the SC-specific nine attributes.	Archiebold Mthandi	SPS	Do Not Meet
D3.3	3.3.3.3 Bullets 3	Whether the plant concludes, after reviewing the existing plant programmes and/or ageing management programmes, that the management of ageing effects is not adequate in some cases. In this case, whether the plant modifies the existing programme or develops a new programme for the purpose of LTO.	Archiebold Mthandi	SPS	Meet
D3.4	3.3.3.3 Bullets 4	Confirm that operation, inspection/monitoring and maintenance programmes are well-coordinated by AMPs.	Archiebold Mthandi	SPS	Partially Meet
D4	Subsection 3.3.4:	Obsolescence management programme.	Lumkile Jibiliza		
D4.1	3.3.4.3 Bullets 1	Confirm that appropriate technological obsolescence management reviews and assessments have been performed for SCs.	Lumkile Jibiliza	SPS	Meet
D4.2	3.3.4.3 Bullets 2	Verify if demonstration was done that the effects of obsolescence will be continuously identified and managed such that the intended function of SCs will be maintained throughout the planned period of LTO.	Lumkile Jibiliza	SPS	Meet
D4.3	3.3.4.3 Bullets 3	Whether the plant is reviewing efficiency of the existing obsolescence programmes on a regular basis.	Lumkile Jibiliza	SPS	Partially Meet
D4.4	3.3.4.3 Bullets 4	Whether management of technological obsolescence of SSCs such as I&C equipment and systems, sensors, medium voltage cables, uninterruptable emergency power supply (UPS) is in place.	Lumkile Jibiliza	SPS	Meet
D5	Subsection 3.3.5:	Existing time limited ageing analyses.	Raymond Maapola		
D5.1	3.3.5.3 Bullets 1	Whether the existing time limited ageing analyses (e.g. from FSAR) are properly documented in the current safety analyses report or other licensing basis documents and clearly and adequately describe the current licensing basis or the current design basis requirements for plant operation.	Raymond Maapola	SDE	Meet
D5.2	3.3.5.3 Bullets 2	Whether the plant identified list of existing time limited ageing analyses.	Raymond Maapola	SDE	Meet
D5.3	3.3.5.3 Bullets 3	Whether the plant identified missing time limited ageing analyses based on results of screening.	Raymond Maapola	SDE	Meet
D5.4	3.3.5.3 Bullets 4	Whether the plant has launched time limited ageing analyses reconstitutions if needed.	Raymond Maapola	SDE	Meet
D6	Subsection 3.3.6:	Revalidation of time limited ageing analyses.	Raymond Maapola		
D6.1	3.3.6.3 Bullets 1	Whether all necessary design basis information, applicable codes and regulatory requirements, fabrication records, operational and maintenance history and results of inspections are accessible.	Astrid Holland	PS	Partially Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
D6.2	3.3.6.3 Bullets 2	Whether these calculations/ analyses are properly documented.	Peter Harrisankar	SDE	Do Not Meet
D6.3	3.3.6.3 Bullets 3	Which kind of methods and criteria have been used for revalidation of time limited ageing analyses.	Sanet Kiewitt	SDE	Do Not Meet
D6.4	3.3.6.3 Bullets 4	Whether the reviewed time limited ageing analyses justify safe operation for LTO.	Andrias Mgulwa	SDE	Do Not Meet
D6.5	3.3.6.3 Bullets 5	Whether the implications of revalidation are considered in the plant operational limits and conditions.	Brian Trautmann	IPD-K	Do Not Meet
D6.6	3.3.6.3 Bullets 6	Whether the qualification of SCs covered by the EQ programme has been satisfactorily established and maintained for LTO.	Kabelo Moroka	SPS	Partially Meet
D6.7	3.3.6.3 Bullets 7	What corrective or compensatory measures are taken, if the analyses cannot be revalidated.	Brian Trautmann	IPD-K	Do Not Meet
D6.8	3.3.6.3 Bullets 8	Verify if evaluation was done to demonstrate that the safety analyses meet one of the following criteria: o The analysis remains valid for the intended period of LTO; o The analysis has been projected to the end of the intended period of LTO; and o The effects of ageing on the intended function(s) of the structure or component will be adequately managed for the intended period of LTO.	Raymond Maapola	SDE	Do Not Meet
D6.9	3.3.6.3 Bullets 9	Check if the revalidation of time limited ageing analyses is documented in an update to the safety analyses report.	Khaliel Isaacs	IPD-K	Do Not Meet
D6.10	3.3.6.3 Bullets 10	Also check if typical time limited ageing analyses are part of the safety analyses such as: o Irradiation embrittlement of the reactor pressure vessel; o Thermal and mechanical fatigue; o o Thermal ageing; o Loss of preload; o o Loss of material.	Khaliel Isaacs	IPD-K	Do Not Meet
D6.11	3.3.6.3 Bullets 11	Verify that selected plant TLAAs are consistent with and meet the intent of the IGALL TLAAs.	Raymond Maapola	SDE	Do Not Meet
D6.12	3.3.6.3 Bullets 12.1	Operational limits and conditions. - Determine if the stressors given in the design specifications or Current Licensing Basis have been used for assessment of SCs and their supports.	Earvine Cornelissen	SDE	Do Not Meet
D6.13	3.3.6.3 Bullets 12.2	Operational limits and conditions. - Check if data from surveillance programmes and diagnostic systems were applied in the analyses.	Tjaart Van Der Walt	SDE	Do Not Meet
D6.14	3.3.6.3 Bullets 12.3	Operational limits and conditions. - Verify if limits established in the design specifications or current licensing basis were used.	Riana Aschmann	SDE	Do Not Meet
D6.15	3.3.6.3 Bullets 13	Documentation of revalidation - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for revalidation of time limited ageing analyses.	Astrid Holland	PS	Partially Meet
E	**AREA E:**	**AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES FOR CIVIL STRUCTURES**	**Anton Kotze**		
E1	Subsection 3.3.1:	Area-specific scoping and screening of SSCs for LTO.	Anton Kotze		
E1.1	3.3.1.3 Bullets 1	Verify if the master list of plant SCs is available and identify all items in scope of LTO and out of scope of LTO.	Anton Kotze	SDE	Meet
E1.2	3.3.1.3 Bullets 2	Verify if the scope of SCs for LTO is complete, documented and fulfilling scoping criteria.	Anton Kotze	SDE	Meet
E1.3	3.3.1.3 Bullets 3	Verify if SCs to prevent/ mitigate design extension conditions are within the scope of LTO.	Anton Kotze	SDE	Do Not Meet
E1.4	3.3.1.3 Bullets 4	If scoping and screening data is distributed into more than one database, check that the data consistency is assured.	Anton Kotze	SDE	Do Not Meet
E1.5	3.3.1.3 Bullets 5	Whether SCs not important to safety which may impact on safety functions are in the scope.	Anton Kotze	SDE	Do Not Meet
E1.6	3.3.1.3 Bullets 6	Whether and how the SCs commodity groups (group of components and structures which have similar functions and similar materials) have been defined.	Anton Kotze	SDE	Do Not Meet
E1.7	3.3.1.3 Bullets 7	Verify if SCs within the scope of LTO are subjected to an appropriate ageing management review and evaluation of time limited ageing analyses.	Anton Kotze	SDE	Do Not Meet
E1.8	3.3.1.3 Bullets 8	Whether there is a documented and verifiable methodology for the screening of SCs for ageing management review.	Anton Kotze	SDE	Do Not Meet
E2	Subsection 3.3.2:	Ageing management review.	Anton Kotze		
E2.1	3.3.2.3 Bullets 1.1	Assessment of the current physical status of the plant - Confirm that appropriate ageing management reviews and condition assessments have been performed for SCs subject to ageing management review.	Anton Kotze	SDE	Partially Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
E2.2	3.3.2.3 Bullets 1.2	Assessment of the current physical status of the plant. - Determine if all the important input design data such as design description, design basis including loads and other parameters necessary for evaluation of safety are available or accessible for the plant.	Anton Kotze	SDE	Partially Meet
E2.3	3.3.2.3 Bullets 1.3	Assessment of the current physical status of the plant. - Check that information on maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept and managed in a proper way.	Anton Kotze	SDE	Partially Meet
E2.4	3.3.2.3 Bullets 1.4	Assessment of the current physical status of the plant. - Confirm that review and assessment of the operating and maintenance history for each structure or component is part of the analyses accounting for such parameters as operational transients, past failures, or unusual conditions that affected the performance or condition of the structure or component. Confirm that examination of repairs, modifications or replacements relevant to ageing considerations are included in the analysis of the SCs	Anton Kotze	SDE	Do Not Meet
E2.5	3.3.2.3 Bullets 1.5	Assessment of the current physical status of the plant. Determine that operational data are collected with a focus on transients and events and on generic operating experience. Also information relevant to power uprating, modification and replacement, surveillance and any trend curves are important to be available for the overall assessment.	Anton Kotze	SDE	Meet
E2.6	3.3.2.3 Bullets 2.1	Identification of ageing effects and degradation mechanisms. - Check that a procedure exists for the structure, component or commodity grouping to assess ageing effects in detail.	Anton Kotze	SDE	Partially Meet
E2.7	3.3.2.3 Bullets 2.2	Identification of ageing effects and degradation mechanisms. - Verify the plant ageing management review process identifies possible ageing effects/mechanisms, critical locations/ parts, material, environment and ageing management programmes addressing these subjects for SCs in the scope of LTO.	Anton Kotze	SDE	Partially Meet
E2.8	3.3.2.3 Bullets 2.3	Identification of ageing effects and degradation mechanisms. - Determine if materials, environment and stressors that are associated with each, component, or commodity grouping were considered in the process of identification of ageing effects.	Anton Kotze	SDE	Partially Meet
E2.9	3.3.2.3 Bullets 2.4	Identification of ageing effects and degradation mechanisms. - Check if operating experience and research findings and results were adequately considered.	Anton Kotze	SDE	Partially Meet
E2.10	3.3.2.3 Bullets 2.5	Identification of ageing effects and degradation mechanisms. - For selected examples, check consistency with IGALL AMR tables.	Anton Kotze	SDE	Do Not Meet
E2.11	3.3.2.3 Bullets 3.1	Documentation of the evaluation and demonstration for management of ageing effects. - Verify if demonstration was done that the effects of ageing will continue to be identified and managed such that the intended function of the SC will be maintained throughout the planned period of LTO.	Anton Kotze	SDE	Partially Meet
E2.12	3.3.2.3 Bullets 3.2	Documentation of the evaluation and demonstration for management of ageing effects. - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for effective management of ageing effects.	Anton Kotze	SDE	Meet
E2.13	3.3.2.3 Bullets 3.3	Documentation of the evaluation and demonstration for management of ageing effects. - Confirm that efficient data collection and record-keeping systems are in place so that trend analyses can readily be performed to predict SSC performance.	Anton Kotze	SDE	Partially Meet
E2.14	3.3.2.3 Bullets 3.4	Documentation of the evaluation and demonstration for management of ageing effects. - Verify that the following information is available in the documents demonstrating management of the ageing effects: o Clear identification of the ageing effects requiring management; o Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed; o Description of how the programmes and activities will manage the effects of ageing; o List of substantiating references and source documents; o Discussion of any assumptions or special conditions used in applying or interpreting the source documents; o Description of existing and new programmes for LTO.	Anton Kotze	SDE	Do Not Meet
E3	Subsection 3.3.3:	Review of ageing management programmes	Anton Kotze		
E3.1	3.3.3.3 Bullets 1	Verify that existing and proposed plant programmes that supports LTO were reviewed for meeting the nine attributes.	Anton Kotze	SDE	Do Not Meet
E3.2	3.3.3.3 Bullets 2	Verify/ review specific sample of existing and new AMPs for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs, i.e. meeting the SC-specific nine attributes.	Anton Kotze	SDE	Do Not Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
E3.3	3.3.3.3 Bullets 3	Whether the plant concludes, after reviewing the existing plant programmes and/or ageing management programmes, that the management of ageing effects is not adequate in some cases. In this case, whether the plant modifies the existing programme or develops a new programme for the purpose of LTO.	Anton Kotze	SDE	Do Not Meet
E3.4	3.3.3.3 Bullets 4	Confirm that operation, inspection/monitoring and maintenance programmes are well-coordinated by AMPs.	Anton Kotze	SDE	Partially Meet
E4	Subsection 3.3.4:	Obsolescence management programme.	Anton Kotze		
E4.1	3.3.4.3 Bullets 1	Confirm that appropriate technological obsolescence management reviews and assessments have been performed for SCs.	Anton Kotze	SDE	Meet
E4.2	3.3.4.3 Bullets 2	Verify if demonstration was done that the effects of obsolescence will be continuously identified and managed such that the intended function of SCs will be maintained throughout the planned period of LTO.	Anton Kotze	SDE	Meet
E4.3	3.3.4.3 Bullets 3	Whether the plant is reviewing efficiency of the existing obsolescence programmes on a regular basis.	Anton Kotze	SDE	Partially Meet
E4.4	3.3.4.3 Bullets 4	Whether management of technological obsolescence of SSCs such as I&C equipment and systems, sensors, medium voltage cables, uninterruptable emergency power supply (UPS) is in place.	Anton Kotze	SDE	Meet
E5	Subsection 3.3.5:	Existing time limited ageing analyses.	Anton Kotze		
E5.1	3.3.5.3 Bullets 1	Whether the existing time limited ageing analyses (e.g. from FSAR) are properly documented in the current safety analyses report or other licensing basis documents and clearly and adequately describe the current licensing basis or the current design basis requirements for plant operation.	Anton Kotze	SDE	Do Not Meet
E5.2	3.3.5.3 Bullets 2	Whether the plant identified list of existing time limited ageing analyses.	Anton Kotze	SDE	Do Not Meet
E5.3	3.3.5.3 Bullets 3	Whether the plant identified missing time limited ageing analyses based on results of screening.	Anton Kotze	SDE	Do Not Meet
E5.4	3.3.5.3 Bullets 4	Whether the plant has launched time limited ageing analyses reconstitutions if needed.	Anton Kotze	SDE	Do Not Meet
E6	Subsection 3.3.6:	Revalidation of time limited ageing analyses.	Anton Kotze		
E6.1	3.3.6.3 Bullets 1	Whether all necessary design basis information, applicable codes and regulatory requirements, fabrication records, operational and maintenance history and results of inspections are accessible.	Anton Kotze	SDE	Meet
E6.2	3.3.6.3 Bullets 2	Whether these calculations/ analyses are properly documented.	Anton Kotze	SDE	Partially Meet
E6.3	3.3.6.3 Bullets 3	Which kind of methods and criteria have been used for revalidation of time limited ageing analyses.	Anton Kotze	SDE	Do Not Meet
E6.4	3.3.6.3 Bullets 4	Whether the reviewed time limited ageing analyses justify safe operation for LTO.	Anton Kotze	SDE	Do Not Meet
E6.5	3.3.6.3 Bullets 5	Whether the implications of revalidation are considered in the plant operational limits and conditions.	Anton Kotze	SDE	Do Not Meet
E6.6	3.3.6.3 Bullets 6	Whether the qualification of SCs covered by the EQ programme has been satisfactorily established and maintained for LTO.	Anton Kotze	SDE	N/A
E6.7	3.3.6.3 Bullets 7	What corrective or compensatory measures are taken, if the analyses cannot be revalidated.	Anton Kotze	SDE	Do Not Meet
E6.8	3.3.6.3 Bullets 8	Verify if evaluation was done to demonstrate that the safety analyses meet one of the following criteria: o The analysis remains valid for the intended period of LTO; o The analysis has been projected to the end of the intended period of LTO; and o The effects of ageing on the intended function(s) of the structure or component will be adequately managed for the intended period of LTO.	Anton Kotze	SDE	Do Not Meet
E6.9	3.3.6.3 Bullets 9	Check if the revalidation of time limited ageing analyses is documented in an update to the safety analyses report.	Anton Kotze	SDE	Do Not Meet
E6.10	3.3.6.3 Bullets 10	Also check if typical time limited ageing analyses are part of the safety analyses such as: o Irradiation embrittlement of the reactor pressure vessel; o Thermal and mechanical fatigue; o o Thermal ageing; o Loss of preload; o o Loss of material.	Anton Kotze	SDE	Partially Meet
E6.11	3.3.6.3 Bullets 11	Verify that selected plant TLAAs are consistent with and meet the intent of the IGALL TLAAs.	Anton Kotze	SDE	Do Not Meet
E6.12	3.3.6.3 Bullets 12.1	Operational limits and conditions. - Determine if the stressors given in the design specifications or Current Licensing Basis have been used for assessment of SCs and their supports.	Anton Kotze	SDE	Do Not Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
E6.13	3.3.6.3 Bullets 12.2	Operational limits and conditions. - Check if data from surveillance programmes and diagnostic systems were applied in the analyses.	Anton Kotze	SDE	Do Not Meet
E6.14	3.3.6.3 Bullets 12.3	Operational limits and conditions. - Verify if limits established in the design specifications or current licensing basis were used.	Anton Kotze	SDE	Do Not Meet
E6.15	3.3.6.3 Bullets 13	Documentation of revalidation - Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for revalidation of time limited ageing analyses.	Anton Kotze	SDE	Do Not Meet
F	**AREA F:**	**HUMAN RESOURCES, COMPETENCE AND KNOWLEDGE MANAGEMENT FOR LTO.**	**Nyamie Ntlokombini**		
F1	Subsection 3.4.1:	Human resources policy and strategy to support LTO.	Jabulile Mpongoshe		
F1.1	3.4.1.3 Bullets 1	Check if the plant human resources policy and strategy reflects LTO requirements.	Jabulile Mpongoshe	HR	Partially Meet
F1.2	3.4.1.3 Bullets 2	Check and verify whether the management manuals and job descriptions determine roles, responsibilities and delegations of authority for all managers in key positions related to LTO.	Jabulile Mpongoshe	HR	Partially Meet
F1.3	3.4.1.3 Bullets 3	Find out if good coordination is maintained among different plant groups, among the site organizations and contractors involved in LTO.	Jabulile Mpongoshe	HR	Partially Meet
F1.4	3.4.1.3 Bullets 4	Check whether the staffing and resources are sufficient to accomplish the tasks assigned.	Jabulile Mpongoshe	HR	Partially Meet
F1.5	3.4.1.3 Bullets 5	Check whether the staffing policy is directed to retaining a pool of experienced and knowledgeable staff.	Jabulile Mpongoshe	HR	Partially Meet
F1.6	3.4.1.3 Bullets 6	Check whether the long-term staffing policy objectives for human resources are established and maintained.	Jabulile Mpongoshe	HR	Partially Meet
F1.7	3.4.1.3 Bullets 7	Confirm that specific competence requirements for LTO related positions have been identified and these are used in the recruitment/selection process for these positions.	Jabulile Mpongoshe	HR	Partially Meet
F1.8	3.4.1.3 Bullets 8	Check whether the long term succession planning is established and implemented.	Jabulile Mpongoshe	HR	Partially Meet
F1.9	3.4.1.3 Bullets 9	Check and verify whether the plant managers have the appropriate resources to carry out their assigned LTO responsibilities and accountabilities.	Loyiso Tyabashe	NE	Partially Meet
F2	Subsection 3.4.2:	Competence management for LTO and recruitment and training/ qualification processes for personnel involved in LTO activities.	Msimelelo Ntlonze		
F2.1	3.4.2.3 Bullets 1	Check if the plant has process to ensure competent human resources for LTO including external support.	Jarno Harker	Training	Meet
F2.2	3.4.2.3 Bullets 2	Verify that the plant has adequate process for assessing and meeting the organizational competency requirements to support LTO.	Jarno Harker	Training	Partially Meet
F2.3	3.4.2.3 Bullets 3	Confirm that all key technical competences for LTO activities have been identified and all involved staff meet these requirements.	Jarno Harker	Training	Partially Meet
F2.4	3.4.2.3 Bullets 4	Check if personnel assigned to LTO duties that can affect safety has a sufficient understanding of the plant and its safety features.	Jarno Harker	Training	Meet
F2.5	3.4.2.3 Bullets 5	Check and verify if plant management have the necessary management skills, experience and knowledge needed to manage the safe LTO.	Msimelelo Ntlonze	Nuclear Training	Partially Meet
F2.6	3.4.2.3 Bullets 6	Check and verify if the opportunity is given to the managers and plant personnel to learn from external peer organizations and their lessons learned.	Msimelelo Ntlonze	Nuclear Training	Meet
F2.7	3.4.2.3 Bullets 7	Check if the plant has appropriate plant recruitment policy for LTO;	Jabulile Mpongoshe	HR	Meet
F2.8	3.4.2.3 Bullets 8	Whether the policy and role of plant management supports training needs and allocates sufficient resources.	Msimelelo Ntlonze	Nuclear Training	Meet
F2.9	3.4.2.3 Bullets 9	Check and verify if staff involved in LTO activities are well trained through onjob-training and other appropriate processes.	Jarno Harker	Training	Meet
F3	Subsection 3.4.3:	Knowledge management and knowledge transfer for LTO.	Morongwa Ngoepe-Ndou		
F3.1	3.4.3.3 Bullets 1	Check that an appropriate KM policy exists.	Morongwa Ngoepe-Ndou	PS	Partially Meet
F3.2	3.4.3.3 Bullets 2	Check that the KM principles and practices are embedded in the integrated management system.	Morongwa Ngoepe-Ndou	PS	Partially Meet
F3.3	3.4.3.3 Bullets 3	Verify that KM is a part of the operating organization's long term strategy.	Morongwa Ngoepe-Ndou	PS	Partially Meet
F3.4	3.4.3.3 Bullets 4	Check that there is a clear ownership of KM processes and issues.	Morongwa Ngoepe-Ndou	PS	Meet
F3.5	3.4.3.3 Bullets 5	Confirm that KM principles and practices are embedded in the organization.	Morongwa Ngoepe-Ndou	PS	Partially Meet
F3.6	3.4.3.3 Bullets 6	Verify that the plant has embedded KM principles and practices in its process for collecting and using operating experience feedback.	Morongwa Ngoepe-Ndou	PS	Meet
F3.7	3.4.3.3 Bullets 7	Verify that the plant has implemented adequate processes for learning from the LTO experiences of other plants.	Archiebold Mthandi	SPS	Meet

#	Reference	Description	Item Lead	Group	Assessment Outcome
F3.8	3.4.3.3 Bullets 8	Confirm that the plant has a process for knowledge-loss risk assessment and mitigation for suppliers, TSOs and outside service providers.	Maxwell Msabala	PS	Partially Meet
F3.9	3.4.3.3 Bullets 9	Confirm that the plant has established adequate processes for transferring knowledge, information and data to/from the vendor, critical equipment/component suppliers, outsourced services and TSOs.	Tiisetso Ntuli	IPD-K	Partially Meet
F3.10	3.4.3.3 Bullets 10	Confirm that the IT/IS processes support managing information and records and their availability.	Michelle Heugh	PS	Partially Meet
F3.11	3.4.3.3 Bullets 11	Confirm that the plant retains records of traceability, rationale and assumptions of why and how operational, maintenance and design changes (corporate memory) have been made.	Michelle Heugh	PS	Partially Meet