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Attention: **The Programme Manager: Nuclear Power Plants**

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7 June 2024

**Re: SAFCEI – REPRESENTATIONS ON ESKOM KOBERG NUCLEAR POWER STATION (KNPS) LONG TERM OPERATION (LTO) APPLICATION – UNREDACTED LTO SAFETY CASE**

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SAFCEI makes this submission in response to the NNR stakeholder update<sup>1</sup> which gives notice of public hearings, discloses significant new information and invites stakeholders, including SAFCEI, to make further submissions by 7<sup>th</sup> June 2024. This submission has been endorsed by 350.org Africa, Laudato si' movement South Africa, the Green Connection and Project90by2030.

The new information disclosed is voluminous and contains a significant number of out-of-date documents, on which the Safety Case is based. Out-of-date information in licensing processes constitutes irrelevant considerations and its consideration will render the authorisation, if granted, unlawful. The late disclosure of information that is key to meaningful participation in a far-reaching process, such as the authorisation of a nuclear power plant to operate for a further 20 years, is contrary to the constitutional and regulatory scheme for procedurally fair administrative action. It is impossible to properly comment on these documents in the 35 days afforded for public comment when they could have been made available at the outset of the process, over a year ago.

Redactions initially placed on the Safety Case have been removed without explanation as to why they were ever necessary. There also remains a considerable quantity of information that has not been disclosed for public for comment without adequate justification.

The result is a flawed and procedurally unfair public participation process. SAFCEI makes these comments on the further disclosed documents as best as it can in the limited time available and reserves its rights to challenge the authorisation process at a later date in an appropriate forum, if the authorisation is granted.

## **1. Background**

On 10 May 2021, Eskom Holdings SOC Ltd (Eskom) submitted to the National Nuclear Regulator (NNR) a revised Long Term Operation (LTO) application to

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<sup>1</sup> NNR letter dated 3 May 2024 ref REF: k10001862N

operate the Koeberg Nuclear Power Station (KNPS) beyond the timeframe stipulated in its Nuclear Installation Licence<sup>2</sup> (NIL). Eskom seeks a variation to its NIL to operate the KNPS beyond 21 July 2024 for an additional 20 years.

SAFCEI responded to an invitation to make submissions relating to health, safety and environmental issues connected with the KNPS LTO on 16<sup>th</sup> March 2023.

We raised several serious concerns including that the document set made available for comment included a heavily redacted LTO Safety Case, and a number of important source documents relied upon by Eskom in the LTO Safety case had not been made available to I&APs. Furthermore, while some required safety improvements had been implemented, others remain planned for implementation either before LTO or during the period of the LTO. It was submitted that the LTO document set made available to SAFCEI did not address the health, safety and socio-economic consequences of a beyond-design catastrophic incident, such as a reactor core meltdown, or provide up-to-date information justifying the claim that the LTO is economically justifiable.

Significant further disclosure of information has taken place on 3<sup>rd</sup> May 2024, and includes most of the 299 documents that support Eskom Safety Case. The following are submissions relating to this further disclosure and should be read together with the previous two submissions made by SAFCEI to the LTO application process, which are attached.

## **2. The public participation process for the LTO has been procedurally unfair.**

### **2.1 Material non-disclosure of relevant information in the public participation process to date**

Subsequent to making the two previous submissions, an unredacted Safety Case was published for comment in November 2023. SAFCEI submitted comments on 30<sup>th</sup> January 2024, including concerns that defence-in-depth could not be assured as several programmes had not been implemented. Several applications for

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<sup>2</sup> NIL-01 (Variation 19)

access to information were also made by SAFCEI in regard to documents that were as yet unavailable relating to the LTO application. Many of these documents have now been disclosed on the NNR website.<sup>3</sup> The newly disclosed documentation runs into thousands of pages – the supporting reference documents for the Safety Case for LTO of Koeberg Rev.3 contains 228 documents in its 'Normative' sub-folder, and 71 document links in its 'Informative' sub-folder.

However, there remains a significant amount of information highly relevant to safety of the reactor which is still not available to the public. For example there are 41 references in the Safety Case to Koeberg Safety Analysis Report<sup>4</sup> which looks at severe nuclear accidents such as a meltdown. The public is advised that *"this document contains multiple instances of third-party confidential information and cannot be made available to the public"* – which, it is submitted, is insufficient information or justification for withholding disclosure given the inherently hazardous nature of nuclear power generation.

Another example is the report entitled Equipment Qualification Master List (EQML) for Harsh Environment. This document, dated 2021 provides a list of electrical, instrumentation & control (I&C) equipment important to safety located in harsh plant environments (Equipment Qualification Master List (EQML) which must be qualified and remain qualified under normal, abnormal, design-basis accident and post-accident conditions. It is out of date, and was supposed to be reviewed April 2024. It also references a spreadsheet that was not disclosed.<sup>5</sup> The spreadsheet would give the list of the actual pieces of equipment, which would have been useful for SAFCEI to consider when making submissions.

The bulk of the over 300 documents on which the application for LTO is based were, therefore, not disclosed at the outset of the notice and comment process – a requirement envisaged in regulation 18 of the Regulations for Fair Administrative

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<sup>3</sup> via <https://www.eskom.co.za/eskomdivisions/gx/nuclear/#LongT>

<sup>4</sup> Koeberg\_Safety\_Analysis\_Report\_JS.pdf – Safety Case reference no178

<sup>5</sup> The filename of the spreadsheet is Nuclear Engineering\Engineering Prog\Equipment Qualification Programme\240-155832775 Equipment Qualification Master List(EQML).xlsx

Other information important for meaningful participation and not provided includes components and cables in the EQML that were verified for completeness as part of the Koeberg Safety Aspects of Long-Term Operation (SALTO) Assessment Project and results provided in the SALTO project deliverable L1124-EL-LIS-001, "List of in-scope items for SALTO EQ TLAA", L1124-EL-LIS-002, "SALTO TLAA Result List", and L1124-EL-LIS-004, "EQ Cables".

Procedures under the Promotion of Administrative Justice Act.<sup>6</sup> These regulations provide that sufficient information about the proposed administrative action must be contained in the notice announcing it to enable public to make meaningful comments.<sup>7</sup> And if a notice specifies where access to further information will be made available, such access must be made available from the date of publication of the notice.<sup>8</sup> The only reasonable inference that can be drawn from these regulations is that if the application relies on further information this should be disclosed at the outset of the process when public notice is issued, and access should be facilitated for public comment. If Eskom had made the information available from the start of the process there would have been in excess of a year for the public to respond to it. As it happens now there is a matter of 35 days to consider over 300 detailed technical documents. It goes without saying that sufficient time must be afforded to the public to consider (especially voluminous) information. See Department of Justice website<sup>9</sup> where it states:

Adequate notice of the nature and purpose of the administrative action:

"Adequate notice" means more than just informing a person that an administrative action is being proposed. The person must be given enough time to respond to the planned administrative action. The person also needs to know enough information about the proposed administrative action to be able to work out how to respond to the proposed action. They need to know the nature of the action (what is being proposed) and the purpose (why is the action being proposed).<sup>10</sup>

In the result, meaningful participation has been compromised by late and inadequate disclosure of information critical to the appraisal of safety of the reactor operating for a further 20 years. SAFCEI makes these comments reserving its right to challenge the lawfulness of the administrative action should the application for the LTO be granted.

## **2.2 The LTO application is based on out of date information**

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<sup>6</sup> Act 3 of 2000. See Regulations for Fair Administrative Procedures GN 1022 published in GG 23674 on 31 July 2002.

<sup>7</sup> Regulation 18(3)

<sup>8</sup> Id 18(5)

<sup>9</sup> <https://www.justice.gov.za/paja/about/procedure.htm>

<sup>10</sup> <https://www.justice.gov.za/paja/about/procedure.htm>

Eskom's document review mechanism provides dates for each document to be reviewed. The recent disclosures show that critical documents related to nuclear safety disclosed under the Safety Case have not been updated. Of 300 documents assessed, 55 are out of date (18%). See table below. One of these documents was supposed to be reviewed in 2016.<sup>11</sup> The result is that both the NNR and the IAEA have been or are assessing the LTO based on a significant number of out-of-date documents. One of these documents was updated in April 2024, indicating that Eskom can and has updated key documents after publication of the Safety Case. Continued reference to out of date documents in the safety assessment is unacceptable for the following reasons:

Eskom's document review process is outlined in its Nuclear Document and Records Management Requirements document,<sup>12</sup> which states:

"1. Introduction Nuclear Safety and Quality manual, 238-8 requires the establishment of measures to control preparation, distribution and changes to documents that specify requirements and prescribe how activities important to safety and quality are executed. This standard outlines the documentation and records management process to be followed in managing Nuclear Operating Unit management system documents and records in accordance with Eskom corporate and regulatory standards and policies.

Managers must ensure that documents are reviewed and revised when changes are submitted, or when the document is due for review and finalised within the review time frame.

3.1 Principles a) Nuclear safety shall be the overriding factor in all aspects of documentation and records management within the NOU as defined in this document.<sup>13</sup>

The importance of up to date information in the evaluation of Long Term Operation is highlighted by Eskom in its Nuclear Safety and Quality Manual<sup>14</sup> where it states that nuclear safety is the prime objective in management at Koeberg:

This document promotes nuclear safety as the primary objective of the Integrated Management System overriding all other demands, and integrates the Safety Management System (SMS) and Quality Management System (QMS) into the framework of the Management System to ensure that Eskom's nuclear-related activities and the individuals involved achieve the required high standard of Nuclear Safety and Quality.<sup>15</sup>

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<sup>11</sup> KSM-LIC-001\_Requirements\_for the\_Control\_of\_Maintenance.pdf

<sup>12</sup> Document identifier: 238-6 Alternative Reference Number: KSA-011

<sup>13</sup> Eskom Nuclear document and records management requirement: Document Identifier: 238-6 Alternative Reference Number: KSA-011 dated 2023

<sup>14</sup> 238-8\_Nuclear\_Safety\_and\_Quality\_Management\_Manual.pdf 2020

<sup>15</sup> 238-8\_Nuclear\_Safety\_and\_Quality\_Management\_Manual.pdf 2020, Page 6

The public cannot comment effectively on out of date documents that are or could be critical to nuclear safety. It is also not clear how the NNR can make a decision on authorisation to extend the licence of a nuclear reactor, based on reports that are up to eight years out-of-date. There have been significant changes in the energy and economic sectors in South Africa in the last eight years including significant economic and other constraints on Eskom itself which may well impact on safety at the reactor, directly or indirectly. Out of date reports that form part of the Safety Case, if considered without being updated, will constitute irrelevant considerations in terms of the Promotion of Administrative Justice Act.<sup>16</sup> This principle, (in the context of an environmental impact assessment under the National Environmental Management Act<sup>17</sup>) was recognised in the case of *Seafront for all and Another vs MEC, Environmental and Development Planning, Western Cape Provincial Government and Others* ("Seafront")<sup>18</sup>. In that case, the MEC's decision was based primarily on information contained in the final scoping report some **4½ years** before the MEC took her decision. It was held that:

The information in the final scoping report ought to have been augmented by a comprehensive current environmental impact assessment. In failing to call for such updated assessment, the MEC took her decision on the basis of irrelevant considerations (information which was out of date and no longer correct), and failed to have regard to relevant considerations.

It is submitted that Eskom must update all documentation related to the safety case before an LTO can be granted.

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<sup>16</sup> Section 6(2)(e)(iii)

<sup>17</sup> 107 of 1998

<sup>18</sup> (2010) JOL 25602 (WCC).

The following is a list of 40 out of date documents submitted as part of Eskom's LTO application.

6		
7	Groundwater Protection Programme Requirements Manual (GPPRM)	240-148905483_Groundwater_Protection_Programme_Requirements_Manual.pdf
8	INTEGRATED EQUIPMENT RELIABILITY PROCESS	KAA-913_Integrated_Equipment_Reliability_Process.pdf
9	INTEGRATED EQUIPMENT RELIABILITY STANDARD	KSA-913_Integrated_Equipment_Reliability_Standard.pdf
10	CONTROL OF CHEMISTRY INSTRUMENTATION, ANALYSERS AND EQUIPMENT	KAA-595_Control_of_Chemistry_Instrumentation_Analysers_and_Equipment.pdf
11	THE CHEMISTRY PROGRAMME	KSC-003_The_Chemistry_Programme.pdf
12	REQUIREMENTS FOR THE CONTROL OF MAINTENANCE	KSM-LIC-001_Requirements_for_the_Control_of_Maintenance.pdf
13	Solid Radioactive Waste Management Plan for Koeberg Nuclear Power Station	240-113228853_Koeberg_Solid_Radioactive_Waste_Management_Plans.pdf
14	Radiation Protection and the Safety of Radiation Sources Standard	32-226_Requirement_and_Rules_for_Radiation_Protection_and_the_Safety_of_Radiation_Source.pdf
	Generation Division Radiation Protection Manual	238-19_Generation_Division_Radiation_Protection_Manual.pdf



15	Optimisation of Radiation Protection	238-34_Optimisation_of_Radiation_Protection.pdf
16	Radiation Protection Dose and Risk Limits	238-35_Radiation_Protection_Dose_and_Risk_Limits.pdf
17	Operational Radiation Protection Requirements	238-36_Operational_Radiation_Protection_Requirement.pdf
18	Radiation Protection requirements inspection X-Ray devices for baggage	238-38_Radiation_Protection_Requirements_for_Baggage_Inspection_X-Ray_Devices.pdf
19	Radiation Protection Requirements for Industrial Radiography	238-40_Radiation_Protection_Requirements_for_Industrial_Radiography.pdf
20	Nuclear Division Requirements for Radiation Workers	238-43_Requirements_for_Radiation_Workers.pdf
21	Requirements for Radiological Surveillance Instrumentation	238-44_Requirements_for_Radiological_Surveillance_Instrumentation.pdf
22	Thermoluminescence Dosimetry Requirements	238-48_Thermoluminescence_Dosimetry_Requirements.pdf
23	Radiation Protection Licensing Requirements for Koeberg Nuclear Power Station	238-54_Radiation_Protection_Licensing_Requirements_for_Koeberg_Nuclear_Power_Station.pdf

24		
25	RADIATION INSTRUMENT MANAGEMENT	KAA-584_Radiation_Instrument_Management.pdf
26	RESPONSIBILITIES FOR THE RADIOACTIVE MATERIAL AND RADIOACTIVE WASTE CONTROL PROGRAMME	KAA-634_Responsibilities_for_the_Radioactive_Material_Control_Programme.pdf
27	ACCESS CONTROL TO RADIOLOGICAL CONTROLLED ZONES	KAA-637_Access_Control_to_Radiological_Controlled_Zones.pdf
28	RADIATION PROTECTION MANAGEMENT OF OPERATING EXPERIENCE FEEDBACK	KGH-004_Radiation_Protection_Management_of_Operating_Experience_Feedback.pdf
29	RADIATION SURVEILLANCE PROGRAMME	KAH-002_Radiation_Surveillance_Programme.pdf
30	FUNCTIONAL RESPONSIBILITIES FOR RADIATION PROTECTION AT KOEBERG OPERATING UNIT	KSH-010_Functional_Responsibilities_for_Radiation_Protection_at_Koeberg_Operating_Unit.pdf
31	RADIATION PROTECTION STANDARDS AND EXPECTATIONS	KSH-012_Radiation_Protection_Standards_and_Expectations.pdf
32	RADIATION PROTECTION FORMAL ALARA PROGRAMME CRITERIA, ACTIONS AND DOCUMENTATION	KWH-AL-004_Radiation_Protection_Formal_ALARA_Programme_Criteria_Actions_and_Documentation.pdf
33	LEAKAGE TESTS ON SEALED RADIOACTIVE SOURCES	KWH-S-007_Leakage_Tests_on_Sealed_Radioactive_Sources.pdf
	IMPLEMENTATION OF THE RADIOACTIVE MATERIAL CONTROL PROGRAMME	KWH-S-047_Implementation_of_the_Radioactive_Material_Control_Programme.p

34		df
35	SIGNPOSTING AND BARRICADING IN RADIOLOGICAL CONTROLLED ZONES	KWH-S-048_Signposting_and_Barricading_in_Radiological_Controlled_Zones.pdf
36	ENCAPSULATION OF RADIOACTIVE WATER FILTERS IN CONCRETE DRUMS	KWW-TES-003_Encapsulation_of_Radioactive_Water_Filters_in_Concrete_Drums.pdf
37	RISK ASSESSMENT REPORT	PSA-R-T19-01_Risk_Assessment_Report.pdf
38	Impact of 60 years of KNPS operation life with projected population to year 2046 on NNR average public risk margin	PSA22-0010_Impact_of_60_Years_of_KNPS_Operation_Life_with_Projected_Population_to_the_Year_2046_on_NNR.pdf
39	Nuclear Safety and Quality Manual	238-8_Nuclear_Safety_and_Quality_Management_Manual.pdf
40	Requirements for Safety, Security and Control of Radioactive Sources	238-46_Requirements_for_the_Safety_Security_and_Control_of_Radioactive_Sources.pdf
41	Quality and Safety Management Requirements for Nuclear Suppliers Level 1	238-101_Quality_and_Safety_Management_Requirements_for_Nuclear_Supplier_Level_1.pdf
42	Level-1 Supplier Safety Culture Enhancement Programme (SCEP) Requirements	238-219_Level_1_Supplier_Safety_Culture_Enhancement_Programme_SCEP_Requirements.pdf

42		EP_Requirements.pdf
43	Standard for the In-Service Inspection Programme at Koeberg Nuclear Power Station	240-110745414_Standard_for_the_In-Service_Inspection_Programme_at_Koeberg_Nuclear_Power_Station.pdf
44	Fourth Interval In-Service Inspection Programme Requirements Manual (ISIPRM) for Koeberg Nuclear Power Station	240-119362012_Fourth_Interval_In-Service_Inspection_Programme_Requirements_Manual_ISIPRM_for_Koeberg_Nuclear_Power_Stat.pdf
45	Control of the Safety Analysis Report	240-119744497_Control_of_the_Safety_Analysis_Report_KAA-697.pdf
46	Safety Evaluation Process	240-143604773_Safety_Screening_and_Evaluation_Process_KAA-709.pdf
47	Structure and Content of the LTO Safety Case	240-157754316_Structure_and_Content_of_the_Safety_Case.pdf
48		

### 3. Unacceptable delays

#### **Defence-in-depth and aging management: containment, monitoring and cooling**

In its submission on the unredacted safety case SAFCEI highlighted three concerns critical to safety of the reactor, that had not been addressed at the time of submission. Although the LTO Safety Case revealed extensive details of the defence-in-depth program at the Koeberg NPS, in a number of critical safety respects Eskom has failed to make the necessary preparations which would enable its defence-in-depth programme beyond the current licence which expires in June 2024. These failures relate to three main areas of defence-in-depth namely integrity of the containment buildings, pressure monitoring inside the reactor vessel, and cooling of the reactor. The three safety issues are integrally interlinked. Inadequate monitoring of pressure inside the reactor vessel could result in a failure to mitigate the build-up of pressure inside the reactor, caused by abnormal conditions. If appropriate releases of pressure do not take place

timeously, and if the reactor containment structure is compromised the last line of defence against catastrophic escalation of accident conditions might occur.

The recent disclosures show that the LTO project was approved as far back as 2010. Therefore Eskom has had 14 years to prepare for the LTO authorisation.<sup>19</sup> The failures referred to were evident to the IAEA in its 2022 SALTO mission. They require analysis, rectification, and independent validation before a licence can be lawfully granted as envisaged the regulations for LTO. However, this has not been done to date. Eskom has proposed that most of these upgrades be delayed to after the licence is granted, which is legally untenable. An extension of the licence should not be granted until the necessary rectifications have taken place and been validated given that they are critical to defence-in-depth.

#### **4. Containment and the state of concrete structures**

The need for impressed current cathodic protection (ICCP) to deal with concrete cracking on the containment building is common cause and is a significant concern. The IAEA, Eskom and Eskom's own expert panel have acknowledged this. As far back as 2015 the expert panel met and recommended a solution.<sup>20</sup> The urgency of the situation is highlighted by the following statement at the beginning of the expert panel report after a workshop of the expert panel was held in Cape Town during the week of 03 – 07 November 2014. During the workshop the Panel performed a site visit at KNPS, met with Eskom representatives to discuss project requirements and developed a suitable repair system solution which would protect the containment structures over the extended life of the power station, calculated to be 40 years from 2015.

It was concluded that:

- The containment structures are at a very advanced state of reinforcement corrosion damage and future reinforcement corrosion damage in presently unrepaired areas is expected to develop exponentially with time and result in more widespread delamination.
- The end of the operational service life of the containment structures may be reached soon if future corrosion damage is not prevented through the application of a long-term repair solution.

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<sup>19</sup> K08016VAR\_Koeberg\_Plant\_Life\_Extension\_PLEX.pdf

<sup>20</sup> Long Term Repair Strategies for the Containment Buildings - Expert panel report 2015: JN465-NSENSE ESKB-R-5704 at page 2.

- The presently specified patch repair methodology follows state-of-the-art procedures and good practice for localised zones of degradation but will not provide protection to the overall containment structures for the required remaining service life of 40 years.
  - The only available repair method identified which can meet the defined performance criteria for the containment structures is cathodic protection using impressed current. Design and implementation of a CP system for such important structures should only be undertaken by internationally qualified companies.
  - Routine monitoring and periodical testing of the cathodic protection system must be carried out. Maintenance and possible replacement of the system over the extended lifespan will be required.
  - The repair strategies developed for the containment structures may or may not be suitable for other structures at KNPS. Suitable repair strategies should be developed for each individual structure based on individual condition assessments and performance requirements.
- It is strongly recommended that a long term protection system, in the form of impressed current cathodic protection, be implemented on both containment structures immediately after completion of local repairs.

The report recommended the following steps to be taken soon thereafter:<sup>21</sup>

16. RECOMMENDATIONS The expert panel is unable to provide any estimation as to the period that the containment buildings will still be able to meet their design basis due to the advanced state of chloride ingress and rebar corrosion measured and observed on Unit 2. These measurements and local repairs must still be undertaken on Unit 1 containment. It is therefore strongly recommended that a long term protection system, in the form of impressed current cathodic protection, be implemented on both containment structures immediately after completion of local repairs.

However the Safety report<sup>22</sup> appears to contradict these recommendations:

The LTO assessment identified some SSCs important to safety with ageing mechanisms that posed a risk if not treated in a timely manner, namely, containment buildings, aseismic bearings, cables, and switchboards. The containment buildings are subject to chloride-induced reinforcement corrosion. The proposed solution is to implement an impressed current cathodic protection (ICCP) system into the concrete of the containment buildings to neutralise the corrosion effects of chlorides. The containment buildings are acceptable for operation at present based on current surveillance monitoring results. An integrated leak rate test (ILRT) was completed in 2015 (on both units), and the containment buildings' safety analysis (time-limited ageing analysis) determined that the structural integrity of the containment buildings was ensured for the planned LTO period. The ILRT will continue to be conducted in line with the requirements of the ageing management programme **for** the buildings. The ICCP modification and the next scheduled ILRT are included in the LTO Implementation Plan (IP).

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<sup>21</sup> Id page 41

<sup>22</sup> Safety Case for Long-Term Operation of Koeberg Nuclear Power Station Unique Identifier: 331-618 Revision: 3 Page: 10 of 295

The report also flies in the face of an updated Plant Engineering Life of Plant Plan<sup>23</sup> dated 2022 which describes the dire threat posed by the state of chloride induced corrosion, and the condition of several main structural components as extreme and urgent.

8 CONCLUSION 8.1 Structural Integrity. The containment structures recently underwent large scale patch repairs to address chloride induced rebar corrosion defects. The quality report for the first part of the project is captured in reference [3]. The report for the remainder of the works' is still in progress, however both Non-Conformances of these structures have been closed out.

The main structural threat for the buildings (Chloride induced corrosion), is a known and active threat. This will lead to the degradation of the structures to a point where they have to be decommissioned, if no long-term modifications are implemented. ICCP has to be implemented as a matter of urgency to ensure the structures remain functional for the remainder of the power station life plus plant life extension<sup>24</sup>

In 2024 the Plant Engineering Life of Plant Plan (PLOPP) shows that the situation has not changed. It once again depicts the required maintenance situation, as presented in the 2022 PLOPP report in the following table. Several aspects of the maintenance required for the structure are referred to as "extreme" or in an "urgent" condition and highlighted in red, as they were two years previously.

### 9.1 Maintenance Required and Notifications

	Component	Condition	Planned Rehabilitation	Notification/Project
Main Structural Components	Base Mat	None	-	
	Gusset	None	-	
	Cylindrical Wall	Extreme	ICCP Required to ensure continuous operation of KNPS	Mod 16002
	Ring Beam	Urgent	ICCP required to protect embedded tendon heads	Mod 16002
	Dome	Extreme	ICCP Required to ensure continuous operation of KNPS	Mod 16002

<sup>23</sup> KBA 0022 N NEPO LOPP 164 Rev 3 (2022). (updated from 2017) 8\_KBA0022NNEPOLOPP164\_Containment\_building.pdf by version 3)

<sup>24</sup> Paragraph 8.1 page 35

Nine years after being described by Eskom's own expert panel as being "very advanced state of reinforcement corrosion damage" and a strong recommendation that "a long term protection system, in the form of impressed current cathodic protection, be implemented on both containment structures immediately after completion of local repairs" these repairs have not been implemented.

The 2024 Plant Engineering Life of Plant plan states:

The main structural threat for the buildings is chloride induced corrosion. Without a permanent intervention the delamination on the structures will continue until they are degraded thus needing to be decommissioned. Therefore the implementation of ICCP is necessary so as to protect the post-tensioning cables from degradation ensuring structural integrity for long term operation.

The 2024 Eskom Plant Engineering Life of Plant Plan has removed references to urgency, without explanation, in the conclusion of the 2022 version referred to above. The 2024 version recommends the implementation date remains as November 2024.<sup>25</sup> This is after its current licence expires. There is as yet no assurance that the ICCP will be implemented by any specified date, if the LTO application is granted. Given the nine-year delay to date this is unacceptable from a safety point of view.

SAFCEI reiterates its submission that without immediate implementation of ICCP defence-in-depth cannot be assured. Accordingly, before granting any extended licence by the NNR ICCP must be completed as recommended by these reports.

## **5. Emergency planning and Re-assessment of Current Koeberg Emergency Planning Technical Basis (EPTB) for Long Term Operation**

The KNPS emergency plan<sup>26</sup> technical basis (EPTB) was reassessed in 2022.<sup>27</sup> This re-assessment has been submitted for review and acceptance to the NNR. However, it is not clear from the documentation disclosed to date whether it has been reviewed and accepted.

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<sup>25</sup> KBA 0022 N NEPO LOPP 164 Rev 4 (2024). Id Paragraph 4.7

<sup>26</sup> KAA-811\_Integrated\_Koeberg\_Nuclear\_Emergency\_Plan\_IKNEP.pdf

<sup>27</sup> PSA-R-T-16-23\_Reassessment\_of\_Current\_Koeberg\_Emergency\_Planning\_Technical\_Basis\_EPTB\_for\_Long-Term\_Ope.pdf



Eskom is required for LTO to re-affirm that the current Koeberg Emergency Planning Technical Basis (EPTB) and existing Emergency Planning (EP) zone sizes remain adequate and will provide sufficient protection to the public during a nuclear or radiological emergency. The EPTB reassessment contains extensive technical data on dosages of radioactive material, and the Safety Case states its basis as follows:

The EPTB needed to be reassessed to consider the impact of the significant safety improvements made at the facility in recent years, the pursuit of LTO, the impact of new regulatory guidance on the EP, and new international EP requirements published by the IAEA in recent years incorporating OE and lessons learnt from the accident at Fukushima Daiichi nuclear power plant (NPP). The EPTB update has been completed and submitted to NNR.<sup>28</sup>

The reassessment concluded that:

The re-assessed results of the Koeberg EPTB in accordance the current NNR approved EPTB methodology and approach ([9] and [10]) with the same selection of reference accidents from the 2011 Koeberg PSA baseline (i.e., RC-3 and RC-6 transients) show and conclude that the current PAZ of 5 km and UPZ of 16 km remains adequate and does not provide compelling evidence to justify or support a change in zone radii.<sup>29</sup>

The Safety Case, which was signed off in October 2023 should have indicated whether this re-assessment has been accepted or not, and if it has not yet been approved, then the granting of a licence for LTO is not acceptable and is opposed by SAFCEI.

## **6. Internal pressure monitoring**

The document entitled *Engineering Position on Containment Structures for Long-Term Operation* dated 2022<sup>30</sup> refers to several significant shortcomings in the monitoring of the Koeberg nuclear reactor.

These deficiencies are set out in this report as follows:

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<sup>28</sup> Safety Case page 97

<sup>29</sup> PSA-R-T-16-23\_Reassessment\_of\_Current\_Koeberg\_Emergency\_Planning\_Technical\_Basis\_EPTB\_for\_Long-Term\_Ope.pdf

Id page 47

<sup>30</sup> 331-623 Engineering Position on Containment Structures for Long-Term Operation 2022.

### 3.2 Functionality of the monitoring system

The TLAA highlights shortcomings in the condition of the on-line monitoring equipment.

The following recommendations are made in the TLAA:

- 3.2.1 The number of dome monitoring sensors is at the lower limit and leading to less reliable analysis results than the data for the cylindrical part,
- 3.2.2 There is a possibility of failure of the remaining functioning strain gauges over the next 20 years (LTO). It is thus recommended to install additional strain gauges fixed to the exterior surface of both domes.
- 3.2.3 The assumed erratic behaviour of load cell (dynamometer) number 152 shall be observed.
- 3.2.4 In case of further erratic behaviour of load cell number 152, it is recommended to recalibrate the load cell or to exchange it, if damaged.
- 3.2.5 It is recommended to perform the outstanding repair of the 4 erratic pendulums in Unit 1.
- 3.2.6 It is recommended to install additional temperature gauges to improve the temperature monitoring.

The above are significant challenges in the functionality of the monitoring system. They confirm and amplify what is clear from the IAEA 2022 SALTO report<sup>31</sup> and the LTO Safety Case. The SALTO report observed the fundamental overall problem that the “containment structure monitoring system is not fully functional” and paints a concerning picture.<sup>32</sup>

As stated in the submission by SAFCEI on the unredacted safety case, this demonstrates that information critical to defence-in-depth will therefore not emerge until after the LTO authorisation. The requirements of regulation 4(b) and (c) of the regulations promulgated under the Act for the Long Term Operation of Nuclear Installations Regulations<sup>33</sup> (LTO regulations) are thus not met and the LTO authorisation cannot be lawfully granted.<sup>34</sup>

Eskom states that it is currently busy with repairs:

3.2.1 Eskom Comment: The Responsible Engineer concurs with the TLAA findings and supports their recommendations made with respect to the monitoring equipment. Eskom is currently addressing the issues relating to the on-line monitoring of the containment structures.<sup>35</sup>

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<sup>31</sup> IAEA REPORT OF THE SAFETY ASPECTS OF THE LONG-TERM OPERATION MISSION(SALTO) TO THE KOEBERG NUCLEAR POWER PLANT UNITS 1 AND 2 SOUTH AFRICA 22-31MARCH 2022

<sup>32</sup> International Atomic Energy Agency, SALTO, pg. 61;

<sup>33</sup> National Nuclear Regulator Act, 1999 (Act No.47 Of 1999): Regulations On The Long Term Operation Of Nuclear Installations NO. R. 266 26 March 2021 published in No. 44394 GOVERNMENT GAZETTE, 26 March 2021

<sup>34</sup> (b) be prepared using the results of safety analyses, with due consideration of the ageing of structures, systems and components and the periodic safety review;

(c) provide an overall assessment of the safety of the nuclear installation and justification for continued safe operation for the intended period of Long Term

<sup>35</sup> 331-623 Engineering Position on Containment Structures for Long-Term Operation 2022.

It is not clear when these repairs will be completed.

We refer to Chapter C of the detailed submission of SAFCEI dated 30 January 2024 on the issue of internal monitoring at the KNPS. We reiterate that long term authorisation should not be granted until the recommendations of the IAEA regarding fully functional containment structure monitoring system have been implemented. Eskom cannot present an analysis of containment safety to the NNR without this system and hence the LTO Safety Case is not yet compliant with regulation 4(b) and (c) as is abundantly clear from the SALTO statement on safety consequences of inadequate monitoring and the above report.

## **7. Hydrazine discharges**

The documents disclosed include a Feasibility Study for Hydrazine reduction at KNPS.<sup>36</sup> Eskom admits that its discharges hydrazine, a dangerous and corrosive substance, into the ocean, at levels higher than limits set out in law. In 2021, Eskom decided that Framatome was the preferred contractor to implement hydrazine reduction at a cost of R17 million. However this project has not been completed to date. It is submitted that the LTO should not be granted until the issue of hydrazine has been brought into compliance and the hydrazine discharges are reduced to legally permissible levels.

## **8. Tsunami and earthquake risks**

The Earthquake and Tsunami with Induced Events report<sup>37</sup> is only referred to once in the Safety Case.<sup>38</sup> It states the potential consequences of earthquakes and tsunamis more severe than design as follows:

- A review of the earthquake and tsunami external event EERT-12-024-RPT (*Earthquake and Tsunami with Induced Events*) [130] confirmed that the SFP structural integrity, SFP cooling and SFP emergency makeup (via JPP) remains available following a design basis earthquake and tsunami.
- However, earthquakes and tsunami more severe than design may result in loss of all cooling and emergency make-up to the SFP. Cooling via bulk boiling can be preserved if sufficient make-up water can be provided as planned by the implementation of modifications 12008 and 12004.

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<sup>36</sup> Safety Case Reference document no [60]

<sup>37</sup> EERT-12-024-RPT\_

<sup>38</sup> Safety Case page 234

The Safety Case lists several activities related to *Interim Seismic Hazard Analysis Strategy* for implementation after the LTO is granted.<sup>39</sup> These include Modification 12008, which it describes as being in the design and procurement stage with expected completion January 2025.<sup>40</sup> Modification 12004 is described as "Compilation of concept design is in progress. Procurement of long lead items in progress." Completion date October 2025.<sup>41</sup>

No justification has been given for why these activities should be undertaken after the LTO licence is granted given the safety consequences discussed above. SAFCEI demands that these projects are completed before the LTO application is considered.

## **Conclusion**

The additional documents disclosed reveal that there have been unacceptable delays in maintenance and safety upgrades at the Koeberg nuclear power plant. Based largely on the observations of the SALTO mission of 2022 and work done in the interim, the conclusion is inescapable that the plant is not ready from a safety point of view for the authorisation to continue beyond its current licence.

The long term extension of licence application process thus far has been marred by significant procedural unfairness, mainly as a result of the failure to disclose information critical to meaningful participation timeously. As a result those most likely to be affected by a nuclear accident have been deprived of the right to properly participate in decisions about the future of the reactor.

For the reasons set out in these representations above, SAFCEI submits that the NNR should refuse Eskom's LTO application.

**Signed at Westlake on 7 June 2024**



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**Francesca de Gasparis**  
Executive Director, SAFCEI

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<sup>39</sup> Id Table A.2-3

<sup>40</sup> Id page 213

<sup>41</sup> Id