



SOUTH AFRICA'S  
RESPONSE TO  
QUESTIONS  
ON THE 8<sup>TH</sup> CNS  
REPORT

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

22831	United Kingdom	2	Article 14	14.1.3	<p>The next periodic safety review (PSR) for KNPS will be over the period 2019-2022. The second PSR was over the period 2008-2021 and hence the latest one seems to be beyond the normal 10-year periodicity. The next PSR is against RG-0028, which the report says is in draft and no details are provided of its basis. Please clarify:</p> <ol style="list-style-type: none"> <li>1. The programme for formal issue of RG-0028;</li> <li>2. What international standards have been used in developing RG-0028; and</li> <li>3. How the proposed PSR programme is consistent with modern standards.</li> </ol>	<p>The 3rd PSR will be used as input for the safety case to apply for possible long term operation. The basis of RG-0028 is IAEA specific safety guide SSG-25. The requirement for the conduct of a PSR has been included as a condition in the operating licence, the guidance for the conduct is in RG-0028. The PSR will be augmented with inputs from the Ageing Management review performed as part of the separate SALTO project.</p>
-------	----------------	---	------------	--------	---	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

22832	United Kingdom	3	Article 14	17.1.2	<p>In March 2016, Eskom applied for licensing of the Thyspunt and Duyefontyn sites in a process that was stated to take up to 24 months. However, the regulatory review has yet to be completed on either site. What are the principal reasons for the delay and what will be the impact on the programme for new build?</p>	<p>The NNR appreciates this very relevant question. The NNR prefers not to address this question at this stage as the projects are currently on-going and the public participation process has not taken place yet. The NNR will share lessons learned from the projects more fully once the public participation process has taken place and the projects have been concluded. However, one way to look at the cause for the delay could be that the time period of 24 months specified in the NNR guidelines for processing of a site license application is perhaps overly optimistic and needs to be reviewed taking into account the nature of the licensing activity and the need for effective public engagement.</p> <p>Regarding the impact of the delays – The NNR has not evaluated the impact of the delays yet because the NNR's decision-making process is independent, not subject to cost, and time pressures. When making regulatory decisions in the face competing priorities the NNR prioritises safety and effective public consultation as overriding priorities.</p>
-------	----------------	---	------------	--------	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

23175	Argentina	4	Article 6	6.3 page 14	<p>Regarding the concept of “Reasonably practicable safety improvement”, what are the NNR’s regulatory expectations? What is considered as reasonably and practicable in South Africa?</p>	<p>The question relates to the following text from the South Africa CNS report:  "RG-0028 further requires that areas where either the licensing basis or current standards and practices are not achieved should be identified. A list of proposed safety improvements should be prepared for each negative finding, or, if no safety improvement can be identified that is reasonable and practicable, a justification for this should be provided. It is therefore expected that the periodic safety review should be performed against current standards, and that reasonably practicable improvement measures are identified and implemented in line with Principle 2 of the VDNS."</p> <p>The NNR approach to this is consistent with the following statements from IAEA Tendon 1894:  "Most regulatory frameworks do not prescribe a systematic approach for assessing what is reasonably practicable or reasonably achievable. Therefore, the process is normally considered on a case by case basis, in part by using engineering judgement. Since the responsibility for safety lies only on the licensee, it is the licensee’s responsibility to justify and convince the regulator that additional measures are either justified or not and that the available options are optimized.  Safety research and advances in science and technology, as well as revisions to international safety standards, support decisions on a specific solution as evaluated by the licensee. Insights from PSAs and PSRs, for example, may also bring new insights for safety improvement needs when looking at the overall picture of the plant safety."</p> <p>"Significant limitations leading to a conclusion that a particular solution is not “reasonably practicable” include the following:  – Technical infeasibility of implementing a solution (e.g. major plant layout changes);</p>
-------	-----------	---	-----------	-------------	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

						<ul style="list-style-type: none"><li>– Permanent worsening of operability of the plant (significantly longer outages, increase of collective and individual effective doses, decrease of robustness of existing barriers in defence in depth);</li><li>– For safety improvements that are not mandatory, efforts and implementation time to implement a safety improvement (e.g. feasibility to recover costs in the remaining plant lifetime) are not justified by the magnitude of the safety improvement that would result."</li></ul>
--	--	--	--	--	--	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

23176	Argentina	5	Article 7	7.2.2.1 page 25	<p>Plant Safety Factors of the Periodic Safety Review are normally enlarged for the development of the Program for LTO. Could you explain what NNR's approach in this sense is? Is it required to consider systems, structures and components for coping with the consequences of Design Extension Conditions?</p>	<p>We agree that Plant Safety Factors of the Periodic Safety Review are normally enlarged for the development of the Program for LTO. The NNR approach is aligned with IAEA SSG-48 on Ageing Management and LTO and with IAEA SSG-25 on Periodic Safety Review as reflected in NNR guidance documents RG-0027 and RG-0028, respectively. Components identified as used under Design Extension Conditions are included as part of the ageing management requirements documented in NNR guidance RG-0027 and classified as DER.</p>
23177	Argentina	6	Article 7	7.2.2.1 page 25	<p>Revalidation of Time Limited Ageing Analysis is done for the entire period of planned continued operation. Please, elaborate the position in South Africa regarding the time for continued operation.</p>	<p>Dependent on the outcome of the current studies associated with the programmes on Long Term Operation, Ageing Management, Time Limited Ageing Analysis and Periodic Safety Review, the NNR would consider a period of continued operation beyond the initial 40-year period of plant operation. The permitted period of continued operation would depend on the period applied for as well as the NNR assessment of the outcome of the above-mentioned studies. The reassessment being performed as part of the steam generator replacement project also informs these considerations. See also the statements in Section 6.5 of South Africa's 2019 CNS report on the NNR's position on the continued operation of nuclear installations.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

23178	Argentina	7	Article 8	8.1.11 page 43	<p>The National Report mentions that despite there is not a permanent Technical Support Organization, for some specific activities NNR may be supported by external organization.</p> <p>Could you explain for these cases, how NNR's decision making process is? What arrangements are in place at NNR for being an "intelligent customer"?</p>	<p>Activities such as the review of Special Topical Areas for the Site Safety Report on the site application and oversight on the manufacturing of the SG were provide thru external Parties. The NNR assigned the overall review and management for each of these topics to a Technical Area Leader who ensured the suitability of work carried out by the TSOs</p>
23203	Iceland	8	General	General		We thank Iceland for the positive response to our NR
23239	Argentina	9	Article 12	12.3.1.3, page 71	<p>"HRA methods are applied at KNPS, as part of the probabilistic safety assessment (PSA) methodology, to identify human actions that can have an effect on system reliability or availability. Level 1 HRA deals with actions conducted Pre-Core Damage and Level 2</p>	Yes a full scope L2 PSA was conducted for internal and external events.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>HRA deals with the actions Post-Core Damage. The outcomes of the PSA are benchmarked against other international PSA studies.”</p> <p>Has KNPS conducted full scope L2 PSA? Otherwise, how are HRA lessons learned studied or implemented?</p>	
23240	Argentina	10	Article 14	14.1.2.3, page 83	<p>“For an authorization to manufacture components, the applicant is required to conform to quality and safety management requirements [4.5], and, with regard to safety assessment aspects, to provide the following:</p> <p>1) Safety assessment; ...”</p>	<p>The safety assessment referred to in Section 14.1.2.3 Authorization to manufacture does not refer to the safety assessment of the manufacturer but rather refers to safety a submission by the applicant whilst requesting authorisation to manufacture and includes some of the documents mentioned in the Section 14.1.2.3. Assessment of the manufacturer will be in the form of quality audits.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					What is meant by safety assessment of a manufacturer? Is it with regard to equipment product realization?	
23596	Luxembourg	11	Article 7.2.2	page 26	The report describes stakeholder involvement in case on a license application for a nuclear installation or vessel license. Please indicate if there are other regulatory decisions during the operation of an NPP where the public is given the opportunity to comment within the decision taking procedure?	The NNR Act places the responsibility on the licence holder to establish a Public Safety Information Forum in order to inform the persons living in the municipal area, for which an emergency plan has been established, on nuclear safety and radiation safety matters. This quarterly meeting is chaired by a member of the public and is attended by all major role players involved in the integrated nuclear emergency plan as well as members of the general public. The NNR participates in this forum. The NNR upholds the principles of regular, relevant, open and factually correct communication with stakeholders. Communication and interaction with stakeholders are an ongoing process, and is conducted through various channels (Described in Section 8.1.10 of the 2019 CNS report, "Openness and transparency of regulatory activities") based on the needs of the target audience. Public participation is sought on major projects such as Long Term Operation and new nuclear facilities, for example, the planned transient interim storage facility.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

23615	Argentina	12	Article 14	14.1.4.3, page 88	Taking into account the credible external events, what are the assumptions for the design conditions of portable equipment?	After the analysis of all credible external events for the Koeberg Nuclear Power Plant, a common outcome from these events was identified to be extended loss of all electrical power supply (ELAP). One of the solutions to ELAP is the use of portable electrical supply (diesel generators) and water supply (pumps) equipment. The portable equipment itself is off-the-shelf commercial grade.
23694	Pakistan	13	Article 8	8.1.6	Reference to section 8.1.6 (Fig 8-3), South Africa may like to share the experience of integrating career progression with SARCoN methodology.	The SARCoN methodology has been adopted by the NNR and incorporated into its recruitment, training and training gaps analysis, and promotion of staff. On an annual basis line manager are required to use the SARCoN method to assess the competency of their staff. They are required to create Training and Development Plans so that staff are capable of performing reviews, doing inspections, licensing actions requested by the licensee. When staff are ready to be promoted the SARCoN criteria are used to determines whether they have fulfilled the current competencies of the post, and are eligible to process to the next level within the NNR.
23695	Pakistan	14	Article 8	8.1.9	Reference to section 8.1.9, South Africa may please elaborate the methodology and experience of using Failure Mode and Effects Analysis to rank the risk associated with the processes.	In the methodology we perform the risk assessment, rank the risk, determine mitigation measures, and then prioritize the risk. We have integrated this with risk management and this system is mature. We use it on a regular basis. The FMEA is aligned with our risk assessment of processes and activities

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

23698	Pakistan	15	Article 12	12.3.1.3	Reference to section 12.3.1.3, South Africa may share experience of utilization of Level 2 HRA in HFE design of KNPS.	Utilized during the review of actions required to be implemented after core damage. Specifically, the impact on the operator where certain conditions have changed, i.e. possible changes in environmental and/or radiological conditions in the control room.
23699	Pakistan	16	Article 12	12.3.1.4	Reference section 12.3.1.4, South Africa may like to share improvements made as a result of periodic control room design review to overcome the discrepancies between human capabilities and demands of working environment.	Examples of control room upgrades completed that improved control room design included: - extra mimic and display for the spent fuel cooling system. - upgraded plant information system
23700	Pakistan	17	Article 16	16.1.5.2	Reference section 16.1.5.2, please share some examples of the corrective actions implemented to address the findings of emergency exercise at Koeberg NPP.	1. The operator omitted implementation of significant actions from a certain procedure because they used another procedure which was not aligned with that one (misalignment of procedures) ... the corrective action was to update the procedure to ensure they are aligned. 2. Lack of implementation of relevant procedure(s)... the corrective action was to update the emergency flow chart to direct the operator to correct procedure(s)

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

24861	China	18	General	B/P9	<p>The middle section of B. SUMMARY "Future safety-related activities and programmes planned for the next period until the 9th Review Meeting" mentions that the Plant Life Extension business case will replace three main components, namely the steam generators, the Unit 2 reactor vessel head and the refuelling water storage tanks.</p> <p>Question: What should be considered in the determination of replacing main components? How to determine the requirements of replacement?</p>	<p>The consideration for replacement of SSCs involves several issues and would differ from plant to plant. For the Koeberg Nuclear Power Station the main consideration was related to extending the life of the plant, since these were old SGs and were due for replacement in their function and reliability. For the Reactor Vessel head, there was an onset of corrosion and the operational experience showed that this component is due for replacement. The requirements for replacement are informed by factors such as, mitigating ageing effects, ensuring the safety function, the maintenance basis, operational experience on similar components, safety assessment, Time Limiting Ageing Analysis, deterministic analyses, and insights from psa.</p>
24862	China	19	Article 17.3	17.1.1.2/P132	<p>Examples of external events in Section 17.1.1.2 Overview of design provisions against external events include fire, explosion, aircraft crash, external</p>	<p>The main improvements are: 1) updates of severe accident management procedures, 2) installation of hardened electrical connections for unit 1 and 2 (completed), 3) installation of hardened water connections (currently in design phase), 4) procurement of portable equipment (i.e. mobile generator sets), 5) building of storage warehouse for storage of portable equipment (currently in design phase).</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>flooding, severe weather conditions, etc.</p> <p>Question: Is there any improvement actions for NPPs in South Africa after the Fukushima nuclear accident? Could you provide the main improvements?</p>	
24863	China	20	Article 19.7	19.7.2 /P165	<p>It is stated that:" Eskom reports significant nuclear safety events to WANO."</p> <p>Question: How to define significant nuclear safety events? What else events reported to WANO?</p>	<p>Significant events are defined as: Any event that has significant negative impact on nuclear safety or plant reliability, or results in loss of life or negative public image.</p>
25279	Sweden	21	Article 6	6.2 Significant safety-related issues and events	<p>Page 13. In two of the three reported events the INES level of 1 was assigned to the event due to that no conclusion could be found for the cause of the event or due to reoccurrence, which was due to the failure to identify and resolve the cause of the</p>	<p>All events are submitted to the Regulator in accordance with a condition in the licence. The Regulator reviews the close out reports. Based on the review of these reports as well as the results from compliance assurance inspections, done against the requirements in the licence, the Regulator will take appropriate actions.</p> <p>In the case of the event that recurred due to inadequate root cause analyses, the Regulator issued measures to ensure that a proper analysis is done prior to allowing start-up of the unit. This also forced the utility to modify internal processes to prevent such events in the future.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>earlier event (trip).          QUESTION: How is the root cause analysis of events performed at Koeberg NPP? Is this procedure and the classification of events checked by NNR? How often is it not possible to find the root cause of an event?</p>	
25280	Sweden	22	Article 6	6.2 Significant safety-related issues and events	<p>Page 14. It is reported that upgrades underway both include the replacement of the steam generators for both units as well as the replacement of the reactor pressure vessel (RPV) head for unit 2. Under 18.1.6.3 it is further reported that the Unit 2 RPV head should be replaced despite that no degradation has been revealed. Under 14.2.3 it is furthermore reported that the RPV head of Koeberg 1 was replaced in 2007.</p>	<p>Koeberg Unit 1 head was replaced in 2007 when penetration nozzle cracks were identified. The currently installed RPV head on Koeberg Unit 2 is the last existing head of this type of PWR (Framatome design/fabrication) in the world that is still in use and there not any nozzle cracks have been identified. A conservative decision was made to replace the head with the proposed LTO in mind. Unit 2 head will have design differences to the unit 1 head due to upgraded control rod drive mechanisms and a design solution to the internationally reported thermal sleeve wear phenomena.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					QUESTION: How is replacement at Unit 2 motivated? When the RPV head of Koeberg 1 was replaced where their indications of degradations? Were there differences in the fabrication of the RPV heads between Koeberg 1 & 2?	
25281	Sweden	23	Article 7	7.2.1.3 Process of establishing and revising regulatory requirements	Page 24. It is reported that NNR has proposed amendments to the NNR Act to the Minister for consideration and developed a suite of regulations that have been submitted to the Minister for promulgation. Regulations have been revised and developed in order for nuclear installations to incorporate requirements presently referenced in the nuclear authorisations, to address gaps	The regulatory framework has been augmented as provided for in Section 7.2.1.2 of the 2019 CNS report. The amendments to the primary legislation have been delayed by the need to undergo a thorough legislative approval process which includes a social cost benefit analysis.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>identified during self-assessments and lessons learned with the licensing of the KNPS and the Pebble Bed Modular Reactor project, international developments and trains etc. QUESTION: What is the current status of these initiatives and proposals?</p>	
25282	Sweden	24	Article 7	7.2.1.3 Process of establishing and revising regulatory requirements	<p>Page 25. Following the post-Fukushima review the NNR has identified areas for the improvement of regulatory standards and regulatory practices. These improvements relate to, inter alia, - testing and inspection of equipment credited in accident management. QUESTION: Could you please tell us more about this and which tests and inspections that should be carried out? Should they all</p>	<p>The inspection and testing should be performed by the licensee to meet the requirements of the regulator. Currently all equipment credited in accident management, specifically equipment used during Design Extension Conditions are classified as Design Extension Related (DER) in addition to its normal classification used. This would enable identification and testing under the rules developed for the DER equipment. This process is not yet completed, however currently testing and inspection of plant equipment credited in accident management is performed as per normal for the original classification that exists. Once it has been officially credited as DER it will be inspected and tested under that classification grouping. This process is ongoing..</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					be performed by the licensee?	
25283	Sweden	25	Article 7	7.2.3.2 Overview of the regulatory inspection and assessment process	Page 28. It is listed which safety assessments the applicant or holder is required to submit. (This list is repeated under 14.1.2.1!). This is required in regulations, requirement documents, nuclear licences, position papers and guidelines. It is furthermore stated that for large projects, a detailed licensing schedule is developed in conjunction with the	The NNR requires that the licensee submit a Licensing Framework for large or important projects to the NNR for review and acceptance. The licensing schedule proposed by the licensee forms part of the Licensing Framework submitted to the NNR. In NNR regulatory guides RG-0011 and RG-0012 on the siting of nuclear facilities and on construction management, respectively, typical timelines for applications are indicated. The NNR interacts with the holder (applicant) in this regard through correspondence on the above-mentioned licensing schedule as well as in meetings with the holder (applicant) in forums ranging from the licensing strategy level down to the working group level.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>holder, which includes timelines for the preparation and review of documents by the holder and the Regulator, and the overall context in the safety case.</p> <p>QUESTION: Could you tell us more about how such scheduling is performed in practice and how NNR interacts with the holder (applicant) in this regard?</p>	
--	--	--	--	--	---	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25284	Sweden	26	Article 7	7.2.4.1 to 7.2.4.3	<p>Page 29. It is stated that the NNR Act confers "the necessary powers" on the NNR to take legal action. It is furthermore reported under 7.2.4.2 that appropriate sanctions for the commission of offences include fines and imprisonment. NNR is also empowered to revoke a nuclear authorisation at any time. QUESTION: The text is not fully clear. It seems that imprisonment should not be regarded as a regulatory enforcement measure (as indicated by the title of 7.2.4.2), but rather as a possible outcome after legal actions being taken (prosecution and court procedures)? Furthermore, does the section 27 of the NNR Act detail</p>	<p>The NNR agrees that imprisonment should not be regarded as a regulatory enforcement measure (as indicated by the title of 7.2.4.2), but rather as a possible outcome after legal actions being taken (prosecution and court procedures). However, the enforcement process may lead to such a route.</p> <p>Section 27 of the NNR Act does not detail prerequisites for NNR to revoke a nuclear authorisation. Such details are contained in lower tier documents of the NNR. For example, the NNR regulatory philosophy and policy document states: "Enforcement actions consider:</p> <ul style="list-style-type: none"> <li>a) The nature of the non-compliance (repeat event, wilful, etc.);</li> <li>b) Operator's compliance history;</li> <li>c) Potential impact on safety, i.e. severity; and</li> <li>d) Significance of the deficiency of the corrective action.</li> </ul> <p>4) Enforcement actions may result from non-compliance with the conditions of nuclear authorisations, regulations, directives, approved operational procedures as well as any condition imposed by the Regulator as required."</p> <p>Yes, NNR decisions can be appealed as described in Chapter 6 of the NNR Act.</p>
-------	--------	----	-----------	-----------------------	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					prerequisites for NNR to revoke a nuclear authorisation? Can the decision be appealed?	
25285	Sweden	27	Article 7	7.2.1.2	QUESTION: Does your national framework contain mandatory requirements for nuclear power plant design, e.g. corresponding to IAEA SSR 2/1, rev. 1?	In delivering and carrying out its mandate emanating from its regulatory framework the NNR has adopted a performance/process-based approach as described in the response to a previous Article 7 question from Sweden. As part of this transition from a non-prescriptive to a performance-based licensing regime, the NNR has drafted General Nuclear Safety Regulations and Specific Nuclear Safety Regulations: Nuclear Facilities, which contain many more explicit mandatory requirements for nuclear power plant design aligned with IAEA safety standards, including with IAEA SSR 2/1, rev. 1.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25286	Sweden	28	Article 7	7.2.1.2	<p>QUESTION: Does your national framework address questions about safety-security interface in nuclear facilities? If so, how is this done?</p>	<p>As part of the NNR's transition from a non-prescriptive to a performance-based licensing regime, the NNR has drafted General Nuclear Safety Regulations and Specific Nuclear Safety Regulations: Nuclear Facilities, which contain requirements related to the safety-security interface in nuclear facilities under headings such as: Management systems, Resource management, Document and records management, Event management, Nuclear vessel licence, Requirements for a site safety report, Radioactive waste management plan, transportation of radioactive material, Managing emergency response operations, Organisational structure, Training and qualification of reactor operators. The drafted Specific Nuclear Safety Regulations: Nuclear Facilities also requires that the authoratsion holder (applicant) submit a Nuclear security plan.</p> <p>The NNR has also developed General Regulations on Nuclear Security.</p>
25287	Sweden	29	Article 7	7.2.1.2	<p>QUESTION: Does the requirement document RD-0016 mean that a formal authority's approval is required for the models and software used in safety analyses? If so, what is the reason for this?</p>	<p>The 2nd last paragraph of Section 1 of RD-0016 states:          "The NNR will not provide a general approval for specific computer software, but will only state its acceptance of the software for specific or similar types of applications in the safety analysis under specific conditions as justified in the verification and validation report. For specific applications an independent assessment involving separate calculation models and software programs may also be required."          It is should be noted that RD-0016 has been superseded by RG-0016 "Guidance on the Verification and Validation of Evaluation and Calculation Models used in Safety and Design Analyses" and that the same text quoted above appears in Section 1 of RG-0016.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25288	Sweden	30	Article 7	7.2.1.2	<p>QUESTION: Does the requirement document RD-0034 include quality and safety management requirements for all phases during the lifetime of a nuclear plant?</p>	<p>Yes. Examples of statements in RD-0034 that emphasises this point are as follows:</p> <p>From Section 2 of RD-0034: "This document details the requirements of the NNR for quality and safety management systems for licensees, applicants of a nuclear license, as well as for designers and suppliers involved in the design, manufacturing, construction, commissioning, operation, modification and potential decommissioning for a nuclear installation in South Africa ..."</p> <p>From Section 3 of RD-0034: "The objectives of this document are to:</p> <ul style="list-style-type: none"> <li>- Define the relevant quality and safety management requirements to ensure that safety is appropriately taken into account in all activities and decisions by licensees and suppliers involved in the life cycle of a nuclear installation.</li> <li>- ..."</li> </ul> <p>From Section 4 of RD-0034: "All parties and organisations that are in any way involved in activities important to nuclear safety related to siting, design, manufacture, construction, operation, modification, and eventual decommissioning of a nuclear installation ... are required to develop, introduce and maintain Management Systems that appropriately comply with the applicable requirements of this document."</p> <p>From Section 7 of RD-0034: "(1) The licensee must ensure for its own organisation and for all suppliers of products important to nuclear safety that a QMS is implemented during all stages of the life cycle of the nuclear installation considering the respective requirements as specified in this RD.</p> <p>(2) The licensee must ensure for its own organisation and for all suppliers of products of high importance to nuclear safety and with a direct influence in the design of the product that a SM system, including SC aspects, is implemented as part of an IMS during all stages of the life cycle of the nuclear installation considering the respective requirements as specified in this RD."</p>
-------	--------	----	-----------	---------	--	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25289	Sweden	31	Article 7	7.2.3	<p>QUESTION: How would you characterize your main regulatory strategy? Case- and facility-based approach, or outcome-based approach or risk-informed and hazard-informed approach? What are the main benefits of the chosen strategy, and what do you see as difficulties with this strategy?</p>	<p>In addition to the description of the regulatory strategy as provided in Section 7.2.3.1 of the 2019 CNS report, the following is stated:          In delivering and carrying out its mandate emanating from its regulatory framework the NNR has adopted a performance/process-based approach.          Benefits:          A process-based approach highlights the fundamental principle that the authorisation holder takes the primary responsibility for safety of its facilities and activities. While using this approach the NNR requires authorisation holders to identify key processes that lead to safe performance and requires licensees to establish and implement these processes effectively. This approach is supported by the NNR requiring the use of a risk analysis which is used for regulatory decision making related to events that impact adversely on nuclear safety of facilities. The NNR has also introduced performance based licensing in order to focus on safety objectives and key safety issues arising at facilities. The regulatory philosophy adopted by the NNR is a hybrid employing methodologies and principles based on the approach taken in the regulatory framework, the maturity of the licensee, and international developments related to regulation and emerging safety standards.          Difficulties:          A performance/process-based approach is not as clear and definitive as a prescriptive licensing approach for which compliance is more readily determined, greater regulatory stability may be achieved and resource needs more easily established. From NNR experience it has the following drawbacks however:          a) It places the onus on the regulator to identify such detailed licence binding requirements. The regulator is effectively implicated in the technical details in the event of an accident.          b) There is a tendency for the Licensee to become reliant on the regulator to bear responsibility for details relating to plant safety and to identify technical errors.          c) The requirement for regulatory approval of changes to all licence</p>
-------	--------	----	-----------	-------	---	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

						<p>binding documents, particularly when the changes are trivial or not safety related, leads to a large administrative and technical assessment burden on both the regulator and the licensee.</p> <p>d) There is a tendency for the licensee to work around changes at a technical level which would have led to formal approval by the regulator.</p> <p>e) This often results in insufficient time being available for in-depth technical inspections or pro-active assessments by the regulator, which could provide more meaningful assurance of safety.</p> <p>f) The definition of "licence violation" becomes too broad, as a violation of any of the referenced documents (however trivial) is technically a license violation.</p>
--	--	--	--	--	--	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25290	Sweden	32	Article 7	7.2.3	<p>QUESTION: Is it part of your regulatory strategies to also follow up the licensee's work on safety and security culture within their organizations? If so, how is this supervision done?</p>	<p>As indicated in Article 9, the NNR has moved to a more process-orientated licensing approach, which demands increased discipline and safety and security culture from the staff of the nuclear installation and increased vigilance from the NNR to detect incipient weaknesses or any deterioration of the safety and security culture.</p> <p>The NNR requires that the licensee submit a Security Culture Enhancement Plan and an annual Safety Culture report to the NNR. The licensee is requested to respond to the NNR review comments thereon. NNR inspections are also used to monitor signs of possible deterioration of safety and security culture.</p> <p>See also Section 10.2.2.1 of the 8th CNS RSA report for more information on NNR involvement with the development of safety culture programmes of the licensee.</p>
25291	Sweden	33	Article 7	7.2.3.3	<p>Page 28. According to the report, the annual baseline Compliance Assurance Plans (CAPs) include to take into account trending and grading of inspection findings. QUESTION: Are there any specific safety aspects that are being trended? What principles are used as a basis for grading of inspection findings? Are combined or integrated</p>	<p>NNR keeps a non-compliance register which keeps track of areas with the most non-compliances /trending areas. The results thereof are reported to the nuclear authorisation holder on a quarterly basis. The non-compliances are graded according to their level of risk to nuclear safety. NNR is currently developing a grading methodology for non-compliances using impact to nuclear safety and frequency of that non-compliance as cornerstone principles. It is through this process that the inspections CAP for the following year takes into account the areas with non-compliances with the highest risk and gives more focus.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					assessments of inspection findings also carried out?	
25292	Sweden	34	Article 8	8.1.4.3 The staff of the NNR	Page 35. It is reported that the Centre for Nuclear Safety and Security (CNSS), under RITS, was established to develop capabilities in order to improve regulatory practices related to nuclear safety and security. It is furthermore stated that the CNSS will attempt to address the anticipated nuclear safety and security needs of the regulatory body as well as those of the nuclear industry at large. QUESTION: Could this aspiration	We acknowledge that are choice of words are misleading on this aspect. However, the CNSS will provide services in line with our regulatory mandate. The needs made reference to contribute to our mission to protection persons and the environment.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					be seen as conflicting with the effective separation of the functions of the regulatory body and those of organisations concerned with promotion or utilisation of nuclear energy?	
25293	Sweden	35	Article 8	8.1.8 Statement of Adequacy of resources	Page 40. An independent consultant has indicated that the NNR should increase its staffing levels. The NNR will require additional resources to cope with upcoming projects such as thermal power uprating, the spent fuel dry storage facility project at KNPS, and capacitating the CNSS. QUESTION: Has any prioritisation been done? What can be put on hold due to staff shortage?	Yes, prioritisation has been done taken into account the operational requirements of the NPP. We have quarterly meetings with Eskom where they inform us of the priorities with regard to their major projects. Once we have written commitment that these project will have carried out, we then add resources with a view to cope with the projects.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25294	Sweden	36	Article 8	6) Communication with the media during a nuclear or radiological emergency	Page 43. The NNR has developed a procedure PR-ASS-21 about Communication to the Media during a Nuclear and Radiological Emergency which will ensure that communication is timely, accurate, consistent and credible. QUESTION: Could you please tell us more about the content of this communication procedure and outline its main ideas and strategical elements in order to achieve its set objectives?	In the event of an Radiological Emergency (RE), The Public Information Officer works directly with our Regulatory Emergency Response Centre to disseminate information. We have a sample statements that ensure information is factual and timely with regard t the evolution of the RE. The content of PRO-ASS-21 provides a workflow for media interactions, press conferences, and a process for monitoring and control the quality of information. An expert may be designated to speak about the RE.
-------	--------	----	-----------	---	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25295	Sweden	37	Article 8	8.2.3 Effective separation between the NNR and any other body.	<p>Page 45. The Article 8.2 states that each contracting party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any organisation concerned with the promotion or utilisation of nuclear energy. The section 8.2.3 explains the separation between NNR and any other body. It is further stated that the Minister of Mineral Resources and Energy, must, on the recommendation of the board, make regulations regarding standards and regulatory practices.</p> <p>QUESTION: As we understand, in many decisions the board has to be heard before the CEO of NNR can make decisions? What</p>	<p>The statement that emphasises that "The Minister must make regulations on the recommendation from the Board," entrenches the independence of the NNR. The NNR is the competent authority on nuclear safety, so the Minister may not exercise discretion once the recommendation has been submitted to the DMRE from the Board. Yes, this long terms structure is very difficult to change in our context. However we have imbedded the principles of independence in are Amendments to the Nuclear Safety Legislation</p>
-------	--------	----	-----------	--	--	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>does it mean that the Minister must make regulations on recommendations from the board? Is the Ministry of Mineral Resources and Energy involved in the promotion or use of nuclear energy?</p>	
25296	Sweden	38	Article 9	Holder's prime responsibility for safety - implementation	<p>Pages 50-51. Eskom is the owner and operator of the KNPS in South Africa. Eskom has developed a document called the Koeberg Licensing Basis Manual (KLBM). This document defines the licensing basis and provides the key mandatory nuclear safety documents that must be complied with to control and demonstrate the nuclear safety of KNPS. QUESTION: This</p>	<p>Safety culture is a requirement documented in the NNR requirements document on Quality and Safety Management. To comply with this requirement, Eskom has established Nuclear Safety Culture policy documents that include safety culture enhancement programme. Under the enhancement programme, Eskom performs nuclear safety culture assessment at KNPS on a three-year cycle basis. This takes the form of self-assessment on an annual basis for two years and an independent survey for the third year. The results of the assessments detailing conformances, non-conformances and action plans for corrections are submitted to NNR for review. The NNR also performs independent safety culture audits through the compliance assurance inspections department.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>information, and other text of this section shows clearly how Eskom (the licensee of KLBM) makes sure that the interface with NNR and the process to ensure that it follows all the regulatory requirements is fulfilled. However, to have the prime responsibility means that one is proactive and takes the lead in the safety work and development of the safety culture, even for issues which are not regulated. How is the licensee performing in this regard?</p>	
--	--	--	--	--	---	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25297	Sweden	39	Article 9	9.2 Holder's prime responsibility for safety – implementation	<p>Page 51. "In this manner the responsibilities, accountabilities and assurance mechanisms for the nuclear installation licence are documented and incorporated into an approved process, with independent assurance that the nuclear installation licence requirements are complied with and that the ultimate responsibility for radiation protection and nuclear safety rests with the licence holder."</p> <p>QUESTION: Could you please give more information about basic steps of this process, and distribution of the tasks and responsibilities, i.e. how this work is practically carried out?</p>	<p>There is a documented change control process for activities or plant conditions with consequences that can have impact on the Koeberg Licensing Basis. For every activity occurring at KNPS (i.e. plant changes, changes to procedures, changes to set points, etc.), Eskom performs safety screening, safety evaluation, safety justification and safety case for such activities as per the change control process requirements. The outcomes of the process identify activities that impact on the license conditions and therefore require NNR approval. Such activities are then submitted to NNR for review and approval.</p>
-------	--------	----	-----------	---	---	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25298	Sweden	40	Article 9	Holder's prime responsibility for safety – implementation	QUESTION: How often are there changes in the Koeberg Licensing Basis Manual (KLBM)? What is the status of the document?	The KLBM is reviewed every two years. The document is currently at revision 2
25299	Sweden	41	Article 9	Holder's public communication processes	Page 52. The Koeberg PSIF meetings take place on a quarterly basis and address concerns by the public. QUESTION: How is the interest from the public to participate in these meetings?	Public interest and participation varies based on the nature of nuclear safety issues in the operating environment. Locally and internationally
25300	Sweden	42	Article 10	Summary of changes		Acknowledged

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25301	Sweden	43	Article 10	10.2.2.2 Safety culture monitoring and feedback	<p>Page 56. The principle that safety is the overriding priority is clearly stated in nuclear installation directives on the responsibility and accountability for nuclear safety. However, NNR has moved to a more process-oriented licensing approach, which demands increased discipline and safety culture from the staff of the nuclear installation and increased vigilance from the NNR to detect incipient weaknesses or any deterioration of the safety commitment.</p> <p>QUESTION: Could you please inform us if this change of NNR: s approach in licensing is due to experience feed-back? Has "pressing demands for productions and cost</p>	<p>The NNR's approach to the regulation of nuclear safety and security takes into consideration, among others, the potential hazards associated with the facility or activity, safety related programmes, the importance of the authorisation holder's safety related processes as well as the need to exercise regulatory control over technical aspects such as the design and operation of a nuclear facility. On this basis, the NNR's approach is partly performance based by setting overall safety limits and criteria, and partly prescriptive by holding the licensee to the regulatory requirements and the licensing basis approved by the Regulator. The approach is also process based in the sense that the licensee is held responsible for various processes, in particular a safety screening and evaluation process that identifies which modifications or changes require regulatory approval.</p> <p>South Africa does not have national nuclear industry codes and standards. The NNR is therefore non-prescriptive when considering the use of industry codes and standards. In respect of the principle of good engineering practice, the NNR requires, as a general rule for nuclear facilities of standard design, that well recognised proven codes and standards, preferably those of the vendor country, are complied with and augmented where necessary to address NNR requirements and local conditions. It is expected that regulated entities establish, promote, support, and maintain a positive and strong safety and security culture commensurate with the safety and security significance of their activities, and the nature and complexity of their organisations and functions.</p>
-------	--------	----	------------	---	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					savings" influenced the safety work of the operator?	
--	--	--	--	--	--	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25302	Sweden	44	Article 10	10.2.4.2 Safety engineer function	<p>Page 59. Under the header 3) Technical advice and recommendations it is stated that the "safety engineer function" should a) During normal operations, provide advice to the shift manager on operability determinations, suitable responses to potential unsafe conditions and similar conditions of uncertainty and ambiguity and e) Provide the Operational Shift and Technical Support Centre with expert assistance regarding beyond design basis phenomena and recommend actions.</p> <p>QUESTION: Could you explain a bit how the roles and responsibilities are divided between the shift manager and this safety engineer</p>	<p>Section 10.2.4.2 outlines the function of the Safety Engineer and the interaction with the shift manager. Section 16.1.3.2.3 states that, the KNPS operating shift manager and/or the standby emergency controller recommend protective actions to the DCT.</p>
-------	--------	----	------------	-----------------------------------	---	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					function? Are advice given after request or how is this expected to work in a crisis situation?	
25303	Sweden	45	Article 10	10.2.1 Safety policies	Page 54. "Within the generation department of the utility, a policy statement has been drawn up committing to manage the nuclear installation in line with national regulatory and corporate requirements, and complying with IAEA standards for quality management. The policy requires that functional responsibilities will be assigned and that all employees should have a clear	The licensee's induction programmes for employees include a section on safety management and safety culture, to ensure that all personnel have the same understanding of their personal accountability and responsibility for safety. Safety culture training interventions are conducted by the licensee on the basis of feedback from surveys, problem investigations, audits, operating experience and reviews. Additional safety assurance through adherence to Koeberg Licensing Basis Manual and Quality Assurance programme. The Utility also conducts annual seminar on safety for all personnel and NNR is invited to this event.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>understanding of their responsibilities, the expectations placed on them and the potential impacts of their function. This policy is manifested in obligations to meet job requirements, systems for error prevention and corrective action, a performance standard of zero deviation and a systematic improvement process."</p> <p>QUESTION: How does the license holder ensure that the safety policy is understood and implemented by all employees?</p>	
--	--	--	--	--	--	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25304	Sweden	46	Article 10	10.2.2.1 Safety culture programmes at the nuclear installation	<p>Page 55. "The licence holder, Eskom, with involvement of the NNR, developed a safety culture survey tool, partially based on the IAEA INSAG-4 publication, the Institute of Nuclear Power Operators (INPO) TECDOC-1329 and the INPO Principles for a Strong Nuclear Safety Culture. Surveys were conducted in 2006, 2007, 2009 and 2011, involving utility personnel and contracting staff. The results and recommendations of the surveys were shared openly with the installation staff and the NNR."</p> <p>QUESTION: What were the results of the surveys? Has the safety culture developed/improved?</p>	<p>The licensee's management systems and process, like the Corrective Action Program, Nuclear Safety Concern Process, the Nuclear Safety Assurance Evaluation process, External Body Reviews and the Safety Culture Plan are in place to continuously monitor for any emerging nuclear safety culture concerns. In addition, the licensee's management continues to engage staff on current licensee challenges that lead to staff morale challenges. This has been escalated, with increased engagement of the licensee's management with staff.</p>
-------	--------	----	------------	--	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25305	Sweden	47	Article 10	Safety culture assessment	<p>Pages 55-56. TEPCO Fukushima Dai-ichi NPP accident has highlighted the importance of safety culture and its continuous assessment and improvement. The "Diet report" in 2012 concluded that "fundamental causes of the accident are to be found in the ingrained conventions of Japanese culture; our reflexive obedience; our reluctance to question authority; our devotion to 'sticking with the program'; our groups; and our insularity".</p> <p>QUESTION: Regarding the background given, what is a potential safety risk in the South African national culture if not handled?</p>	<p>The South African culture is diverse and complex. In our new democracy the ideology of "ubuntu" which promotes the importance of human dignity and kindness. South Africans are generally relaxed yet hard working. Most institution have high quality management systems that require adherence to proven processes and systems of management inclusive of safety. Since the national culture is not homogeneous we can only reflect on safety culture risk. In this regard there may be a tendency to ensure production capacity of a NPP as opposed to the emphasis of safety at all times.</p>
-------	--------	----	------------	---------------------------	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25306	Sweden	48	Article 11	11.1.3 Contracting party's processes to assess the financial provisions	It is reported that the holder of a licence is required, by condition of the licence to provide proof to the NNR that any claim for compensation, to an amount contemplated in section 30 (2) of the NNR Act can be met. QUESTION: What is the typical amount or level of financial security "contemplated in the section 30 (2)" of the NNR Act?	The amount for Koeberg Nuclear Power station is 367 million Special Drawing Rights (SDRs)
25307	Sweden	49	Article 11	11.2.11 Analysis of competencies for severe accident management	It is reported that the emergency plan is staffed by people who are qualified in the associated area of expertise within the organisational structure. Their normal job output is therefore the same as their responsibilities in the emergency plan of the organisation. In their normal functions they receive retraining and qualification	Station personnel who fulfil roles in the emergency response organisation are placed in emergency positions closest to their operational expertise. However, as mentioned in the question, some emergency response activities will not be expected to be performed during normal operation. The emergency response organisation members who perform these activities are specifically trained and exercised on these activities above and beyond their normal operational training and work. For example control room operators routine undergo training and drills on shutting down the plant from the emergency shutdown panel (alternative control room) and radiation protection and emergency preparedness staff members are specifically trained to perform dose assessment of potential radioactive releases during nuclear emergencies.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					through rigorous processes. QUESTION: Could you please explain how for example work in an alternative control room, prognosis of releases of radioactive substances to the environment and communication with off- and on-site responders are skills trained in their normal job functions?	
25308	Sweden	50	Article 11	Assessment of a contractor's personnel	QUESTION: Has the fit-for-duty test been benchmarked?	The practise is referenced within the South African context. It may not be meaningful to look at international practice
25309	Sweden	51	Article 12	12.1.		The reference to Management of Safety (Section 13) is referring to the Regulatory Requirements on Management of Safety.
25310	Sweden	52	Article 13	13.4 Audit programmes of the licence holders	Page 78. Eskom has established a comprehensive audit programme. It is reported that the audit program is discussed with the NNR and takes into account Regulators' planned audit and inspection programme to ensure that an	The ESKOM QA audit programme is independent to that of the NNR. ESKOM only uses the audit findings for identification of gaps in their approach (programme and contents). From the monitoring, QA evaluates that all the management systems from 238-8 to Business Unit Manual and their supporting processes are assessed for compliance through the monitoring programme.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>integrated monitoring programme is established.</p> <p>QUESTION: Please explain why the licence holder, having the prime responsibility for safety, should have an integrated monitoring programme with the regulator. Would this not be seen as being in conflict with Article 8.2 of Convention or at least be perceived as improper? Please explain?</p>	
--	--	--	--	--	--	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25311	Sweden	53	Article 13	13.6 Regulatory review and control activities	<p>Page 79. It is reported that the NNR-appointed inspectors are required to be trained and certificated (this should perhaps better be reported under the Article 8 and not Article 13 that refers to nuclear installations). The training and certification are carried out according to a modular Inspector Training and Qualification Programme.</p> <p>QUESTION: Could you please inform a bit more about this Training and Qualification Programme?</p>	<p>The NNR is in the process of formally documenting the training and qualification of inspectors. This process outlines the steps to be followed from recruitment to the qualification of the inspector where the CEO approves appointment as per section 41 of the South African National Nuclear Regulatory Act. It is anticipated that it will be a 2-year programme delivered in a modular fashion, following the SARCON 4 quadrant model of competences combined with On the Job training. These modules will be covered by more experienced NNR staff members and external service providers.</p> <p>Currently NNR appoints inspectors with a University degree in Physics, Chemistry or an Engineering degree. Inspectors attend training provided by different organisations including Authorisation holders. They also undergo self-study and OTJ Training that is technology specific</p>
-------	--------	----	------------	---	---	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25312	Sweden	54	Article 14	14.1.1.		With regard to section 14.1.1 & 14.1.2.2. The texts are the same but they are also relevant in both sections and serve to provide context to both. Section 14.1.1 provides an overview of the requirements on safety assessments and this includes the submission of the SSR to support an application for a new Nuclear Installations license as stated in the text. Section 14.1.2.2. puts the safety assessments in context with the different licensing stages, hence the text is repeated. A similar reason for the duplication in Sections 14.1.2.1. & 7.2.3.2.
25313	Sweden	55	Article 14	14.1.3.3 Koeberg second periodic safety review	It is reported that modifications and procedural updates are (were?) recommended to mitigate the risk of hydrogen explosions. The assessment was completed in 2011 and Eskom is reported to have started the implementation of some of these recommendations and modifications. QUESTION: Has Eskom installed passive autocatalytic recombiners to remove hydrogen or in some other way acted on the issue of risk of	Yes, Eskom has installed 24 passive autocatalytic recombiners (PAR) per unit.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					hydrogen explosions during an accident?	
25314	Sweden	56	Article 14	14.1.3.3 Koeberg second periodic safety review	Page 87. Significant hardware modifications include the replacement of safety injection system valves to alleviate a risk of blockage of the high head safety injection system due to possible debris present in the containment sump... QUESTION: Have you replaced, or considered to replace mineral wool insulation in order to decrease the risk of blockage of the high head safety injection system?	With the current information available the replacement of the insulation material has not been considered. However, with the installation of the new steam generators on both units the insulation material fitment will be changed, the material used will be "glass wool". The evaluations has shown that the insulation replacement due to SGR has no impact on the sumps strainers performance and on the downstream parts of safety injection and containment spray systems.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25315	Sweden	57	Article 14	14.1.4.3 Review of KNPS following the Fukushima accident	Page 90. Overall, long-term external event related projects are expected to be completed by 2022. QUESTION: Could you please give a short description of these projects?	Multiple modifications has been identified that are currently at various stages of implementation and included but not limited to: <ul style="list-style-type: none"> <li>- Acquisition of mobile and portable equipment</li> <li>- Hardened water external connection points</li> <li>- Hardened storage building</li> <li>- Hardened electrical external connection points</li> <li>- Installation of hardened instrumentation</li> <li>- Hardened water supply</li> </ul>
25316	Sweden	58	Article 15	15.1.3 Public Exposure	Page 101. It is reported that for the KNPS, the dose constraint, applicable to the average member of the critical group within the exposed population, is 0.25 mSv per year. QUESTION: Is this dose constraint also taking direct exposure into account? The exposures from discharges are low (as can be seen from Table 15.3-2) and the average monthly TLD exposure measurements are displayed in Table 15.3.4. Are these	Yes, 250 µSv/a is applicable to all release pathways to the public. TLDs are used to quantify dose at a particular point in the environment and are placed to verify that the assumptions made in public exposure calculations are not exceeded. Reported numbers are corrected for background.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					average monthly exposures given without background values being subtracted?	
25317	Sweden	59	Article 15	15.3.1 Dose limits, main results for doses to exposed workers	Page 103. It is reported that the general reductions in the average annual dose to the occupationally exposed workers over the years, are mainly due to the integration of dose management in the work management programme and performance management system at KNPS. QUESTION 1: How is work with source term reduction progressing at the station? As reported under 15.3.3 at page 108, operation at high pH reduces corrosion and therefore the	Zn injection was implemented removed a lot of crud, which reduced source term significantly. It is expected that a combination of new SGs and improved water chemistry will significantly reduce the source term.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>formation of activated corrosion product in the primary circuit.</p> <p>QUESTION 2:After the exchange of the steam generators (Alloy 600?), is it expected that the water chemistry can be further improved?</p>	
25318	Sweden	60	Article 15	15.3.1 Dose limits, main results for doses to exposed workers	<p>It is reported that one numerical objective is that the average annual dose to the occupationally exposed workers does not exceed the 4 mSv ALARA target.</p> <p>QUESTION: From Table 15.3-1 it is evident that the average annual dose to the occupationally exposed worker has never ever exceeded 1.1 mSv. Should not a more challenging target be used in the ALARA-work? Could you please explain your view on this?</p>	<p>In order to keep the ALARA principles in force, the 4 mSv/a average individual dose was originally implemented. In order to optimise protection, this value should be re-evaluated.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25319	Sweden	61	Article 15	15.3.3 Release of radioactive material to the environment	Page 106. The annual dose estimated from effluent discharges is compared with the NNR dose limit. QUESTION: Please clarify if this limit is the same as the dose constraint mentioned in 15.1.3.?	Yes, the comparison is done in terms of the 250 µSv/a dose constraint. The wording in the report was a typo. (This should perhaps be corrected by the NNR in the report).
25320	Sweden	62	Article 15	15.3.3 Release of radioactive material to the environment	When the annual doses from liquid discharges are compared with the liquid discharges in total activity, some questions can be raised. E.g. the highest dose from liquid discharges is reported in 2003 (11.874 microsievert)- the corresponding activity reported is 2.1 E4 GBq. In 2016, the liquid discharges are 2.99 E4 GBq and the corresponding dose is reported as 0.399 microsievert. QUESTION: What is the reason behind this? Other	Dose conversion factors (DCF) are derived on a nuclide specific basis. Therefore, in the example more of high DCF nuclides were released in the 2.14e4 GBq year and more of the low DCF nuclides were released in the 2.99e4 GBq year.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					radionuclides or updated dose models for the calculation of dose to the public? Could you please explain this?	
25321	Sweden	63	Article 15	15.3.3 Release of radioactive material to the environment	Page 106. The reason for decrease in dose in recent years is according to the report the application of the ALARA principles in effluent management. Please expand a bit further on this. QUESTION: Which measures have been taken to reduce the discharges in order to reduce the dose to the public?	Trending of historical releases is used to inspire further reduction on releases. Also, pre-job and post job briefings are used to improve dose saving. One example of plant modification, which resulted in a dose saving is given on page 105. There were several other initiatives implemented including administrative operational controls implemented.
25322	Sweden	64	Article 16	16.1.32. main elements of the emergency plans and resources	Page 120. When a nuclear accident is reported, it is stated that the NNR, inter alia, is required to direct the holder of the nuclear authorisation in	The evacuees from the affected areas will be taken to the Mass Care Centre where accounting of persons will take place. NNR shall also publish by notice in the Gazette and in two publications of the daily newspapers in circulation in that area, the fact that a nuclear accident has occurred during that period within that area. Following the notice, all who were in the area must respond to the authorisation holder.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>question to obtain the names, addresses and identification numbers of all persons who were within that area during that period. QUESTION: Could you explain how this would be done in practice, especially if the area would be a sizeable one?</p>	
25323	Sweden	65	Article 16	Implementation of protective actions	<p>Page 123. It is reported that in principle, the head of the Disaster Management Centre may implement the recommendations from the Koeberg emergency controller in the absence of representatives from the national and provincial government. QUESTION: What does the "In principle" mean in this context? Is there a legal basis for this and would otherwise protective actions be delayed?</p>	<p>In principle refers to the situation whereby the Head of the Disaster management Centre implements protective actions in the event of the fast evolving emergency, which could be too late to wait for activation of the entire centre and thus delay protection of the public. This is based on procedures which have derived from nuclear safety point of view.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25324	Sweden	66	Article 16	16.2 Information of the public and neighbouring states	<p>It is reported that the public warning system are controlled from one of five locations. It is not totally clear who declares general emergency.</p> <p>QUESTION: Regarding the time limits given on page 127 for notification to be affected within at least 15 minutes, 30 minutes, 45 minutes depending on distance from the site and wind direction - from which "zero time" is this to be calculated?</p>	Time zero after classification of General emergency
25325	Sweden	67	Article 16	16.1.2.2 Overall national emergency preparedness	<p>Page 117. Necsa has been designated as the national competent authority and national warning point.</p> <p>QUESTION: Is it correct that a company (Necsa) is designated as the national competent authority and national warning point? Would it not be more suitable</p>	Yes, Necsa is currently the NCA and NWP. However, it has been recommended that responsibility of NCA be transferred to the NNR and Necsa will continue with the role of NWP as it possesses the capability to operate a 24-hour national warning point, of which the NNR does not possess.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					if these functions were assigned to an authority, e.g. the NNR.	
25326	Sweden	68	Article 16	16.1.3.2 Main elements of the emergency plans and resources	<p>Page 120. The NNR Act is in the process of being updated and one of the proposed additional responsibilities of the NNR is for it to act, upon request, as an adviser to emergency response organisations and government organs, other than an authorisation holder in terms of the Act, in the case of a nuclear or radiological emergency. This will include verification of protective actions for members of the public as recommended by the operator.</p> <p>QUESTION: It is mentioned that the NNR Act is in the process of being</p>	There is no authority currently playing the role of advisor to the government. However, the NNR currently performs this role

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					updated in order for the NNR to act, upon request, as an adviser to emergency response organisations and government organisations. Does any other authority have this role today?	
25327	Sweden	69	Article 16	-	QUESTION: Are iodine profylax pre-distributed in the vicinity of NPP? Are there plans in place for distribution of iodine profylax in case of a imminent radioactive release?	Iodine profylax is available on site of the NPP, at Fire Stations in the vicinity of the NPP, schools, churches, hospitals etc. Iodine profylax will be promptly distributed in case of imminent radioactive release. Pre-distribution of Iodine Prophylaxis strategy is currently being developed at Emergency Planning Committee level.
25328	Sweden	70	Article 17	17.1.1.1 Overview of assessments and criteria	In the chapter 17 there is a text of: "Review of the SSR submitted by ESKOM for the Thyspunt site is currently in progress... In Chapter 18 Summary changes describes for Section 18.1.5: "...remained the same as there are	There is no contradiction - Eskom has not chosen a specific technology design for the new site(s) i.e while plans for a new nuclear power plant site(s) have been submitted, design plans for a new nuclear power plant have not been submitted yet.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					no new plans for a new nuclear power plant." QUESTION: Are there contradictions in these two parts?	
25329	Sweden	71	Article 18	18.1.1 Regulatory requirements on design and construction	<p>Page 138. A list of what an applicant for a construction licence must provide is repeated here. A similar list is also given on pages 83-84 (14.1.2.4 Design and construction). However, the requirements about a) a project plan, including licensing schedule, vendor and suppliers; and b) Safety management during construction are not mentioned under Article 14. QUESTION: Please explain the difference, if any, or if we have missed something?</p>	<p>Article 14 deals with safety assessments to be performed and as such focus on the relevant safety assessments to be performed for different licensing stages. The Regulatory framework allows for combined or multi-phase licensing. As such as part of the application it is imperative that the project plan and associated documents be submitted and accepted by the Regulator. Article 18 deals with Design and Construction in general whilst Article 14 deals only with the safety assessments to be performed.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25330	Sweden	72	Article 18	18.1.2 Status of application of the defence in depth	Page 140. It is reported that the probabilistic risk approach required by NNR has significantly enhanced the implementation of the "defence in depth" and identify important improvements in safety at the nuclear installation. QUESTION: What does the "Fast dilution modification" listed as item 4 refers to (boron concentration)?	The modification protects against a possible reactivity excursion caused by the introduction of a water "slug" from the boron and water make up system and injected into the core by the restarting of the corresponding Primary Pump.
25331	Sweden	73	Article 18	18.1.2 Status of the application of the defence in depth	Page 141. It is reported that another important aspect of ensuring the defence in depth in the operation of the KNPS, is the comprehensive independent surveillance and compliance inspection programme, implemented by the NNR, to verify compliance with the nuclear installation licence requirements	The intention of the section in the report was to indicate that over and above the licensee's monitoring programme the Regulator has an inspection programme that could detect any potential safety concerns and thus ensuring that the licensee's programmes and monitoring is effective. It does not replace the licensee's responsibility for the safe operation of the facility.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					and to identify any potential safety concerns. QUESTION: We do not see how the work of the independent authority should be part of the safe operation of the power plant? Please explain this in more detail?	
25332	Sweden	74	Article 18	18.1.4 Implementation of design measures for beyond design basis accidents	How are the number points 14-19 measures for beyond design basis accidents? In our view scope these measures are projects for modernization. QUESTION: Can you specify the improvements of the functions for beyond design accident?	The modifications were done with the objective of preventing beyond design basis accidents, as example, the spent fuel boiling has been dispositioned as a design basis accident but additional measures has however been installed, ie additional make-up capability and extra cooling train.
25333	Sweden	75	Article 18	Table 18.1.6 Quantitative risk criteria for the public and the workers	Page 144. The table contains risk assessment for fatalities of workers and of public. There is no evaluation in the table or in the chapter of risk assessment of destruction of land. QUESTION: Has an	No. The term Land destruction is not used within South Africa, but we do have guidance for remediation of land

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					assessment of land destruction been considered?	
25334	Sweden	76	Article 18	18.1.6.1	<p>Page 144. Steam generator replacement of two units in a few years seems to be a demanding project. It is mentioned that " Manufacturing has progressed well at various facilities with most of the components being delivered to Shanghai Electric Nuclear Power Equipment Company in China for the final assembly of the steam generators. The first set of three steam generators are expected for delivery in December 2019". That means various suppliers are used for delivery of components to be assembled to the final product. QUESTION:</p>	<p>One of the regulatory prerequisites is the submission of an acceptable Integrated Management System that combines the elements of Safety management with a Quality management system. Capability Assessments have been undertaken in Framatome premises to gauge the compliance status of its processes and systems to the requirements. These assessments also covered Framatome capability to meet the Regulatory requirements. Compliance audits have subsequently been carried out and the Licensee maintains oversight throughout the contract duration on the compliance status of Framatome and its sub suppliers in respect of the specified quality and safety requirements. Regular auditing, quality control checks and assessments are integrated into the programmes. Where necessary, specialist assessment services are carried out by a competent quality control company.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>Please explain how the overall QA process of safety classified SG manufacturing has been followed by the licensee having the ultimate responsibility for safety?</p>	
25335	Sweden	77	Article 19	19.3.6 Regulatory review and control activities	<p>Pages 153, 155. It is stated that in line with section 4 of the SSRP, the operational safety-related programmes are based on the prior and operational safety assessments.</p> <p>QUESTION: The next sentence of the paragraph is about the validity of the safety case being implemented on an on-going basis through the operational safety-</p>	<p>Compliance to the safety case is ensured through the compliance to the identified safety related programmes. The Nuclear Licence have requirements that clearly states that the licensee must comply with the provisions in the KLBM for the applicable area that the requirement is applicable to.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>related programmes.          Could you please explain this a bit more? Furthermore could you expand a bit more on the first sentence under 19.3.6 on how the nuclear licence dictates compliance to KBLM etc..?</p>	
25336	Sweden	78	Article 19	19.4.4	<p>The text refers to the functional organisation known as the Operation Support Centre on the top of page 159. QUESTION: It is stated that the implementation of this organisation should be finished in 2016. Could you now give more information about this?</p>	<p>The operations support centre (OSC) is an onsite area separate from the control room and the technical support centre (TSC) where specific emergency response support personnel will assemble in an emergency. The OSC serve the following purpose:</p> <ul style="list-style-type: none"> <li>- Provide a location from where in-plant operations support can be coordinated during an emergency.</li> <li>- Reduce congestion to control rooms by having a response location for support personnel not specifically requested by the shift supervisor.</li> <li>- Central location for the coordination of on-site response team activities, as staffing pool for performance of these activities, an assembly area for select station personnel and a storage area for specific emergency supplies.</li> </ul> <p>The OSC organisation have been operationalized and is activated when the emergency plan is activated.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25337	Sweden	79	Article 14	14.1.4.3 Annex D.2 Solution concept: Portable Equipment.	Annex D.2 page 177. The new equipment for hardened water supply and supply ouch electricity are all portable and building ouch protection buildings. QUESTION: Have there been any evaluation of the alternative of some robust and bunkered stationary pumps and diesel generators?	<p>The use of portable equipment is in line with the international approach in response to the events at Fukushima. This approach allows maximum flexibility and allows Koeberg Nuclear Power Station the ability to utilise equipment from off site to mitigate the hazard in the event that the portable equipment is rendered unavailable. This is the approach prioritised for implementation at Koeberg Nuclear Power Station.</p> <p>Robust and bunkered stationary pumps and diesel generators remain under investigation by Koeberg Nuclear Power Station's engineering team.</p>
25338	Sweden	80	Article 14	14.1.4.3. Annex D.2 Post-Fukushima Actions Procedure enhancement	Annex D.2 page 178. The Koeberg SAMG were reviewed against the newly released PWROG generic SAMG and updated to the Koeberg-specific SAMG, and related background documents are in progress. QUESTION: Have the plant specific SAMGs been validated?	Koeberg is aligned to Revision 2 of the generic PWROG SAMG package that was released in 2013. Minimal changes were required to the Koeberg-specific SAMGs as they already contained guidance for spent fuel pool and shutdown accidents (since 2006). No re-validation was performed.
25339	Sweden	81	Article 7	7.2.3 System of regulatory inspection and assessment		The NNR takes note of this recommendation.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25889	Austria	82	Article 6	p.14	<p>It is stated that "(...) the periodic safety reviews must be performed against current standards and reasonably practicable safety improvements are to be implemented within the review period". What is your definition of reasonably practicable safety improvements?</p>	<p>This question is similar to one posed by Argentina for which the NNR gives the same response:</p> <p>The question relates to the following text from the South Africa CNS report:  "RG-0028 further requires that areas where either the licensing basis or current standards and practices are not achieved should be identified. A list of proposed safety improvements should be prepared for each negative finding, or, if no safety improvement can be identified that is reasonable and practicable, a justification for this should be provided. It is therefore expected that the periodic safety review should be performed against current standards, and that reasonably practicable improvement measures are identified and implemented in line with Principle 2 of the VDNS."</p> <p>The NNR approach to this is consistent with the following statements from IAEA Tecdoc 1894:  "Most regulatory frameworks do not prescribe a systematic approach for assessing what is reasonably practicable or reasonably achievable. Therefore, the process is normally considered on a case by case basis, in part by using engineering judgement. Since the responsibility for safety lies only on the licensee, it is the licensee's responsibility to justify and convince the regulator that additional measures are either justified or not and that the available options are optimized.  Safety research and advances in science and technology, as well as revisions to international safety standards, support decisions on a specific solution as evaluated by the licensee. Insights from PSAs and PSRs, for example, may also bring new insights for safety improvement needs when looking at the overall picture of the plant safety."</p> <p>"Significant limitations leading to a conclusion that a particular solution is</p>
-------	---------	----	-----------	------	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

						<p>not "reasonably practicable" include the following:</p> <ul style="list-style-type: none"><li>– Technical infeasibility of implementing a solution (e.g. major plant layout changes);</li><li>– Permanent worsening of operability of the plant (significantly longer outages, increase of collective and individual effective doses, decrease of robustness of existing barriers in defence in depth);</li><li>– For safety improvements that are not mandatory, efforts and implementation time to implement a safety improvement (e.g. feasibility to recover costs in the remaining plant lifetime) are not justified by the magnitude of the safety improvement that would result."</li></ul>
--	--	--	--	--	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25890	Austria	83	Article 7	p.20	Please provide some information on the regulations and guidance documents which are to be promulgated.	The NNR has made use of the IAEA fundamentals and requirements in updating and proposing new draft regulations to the Minister of Mineral Resources and Energy for review and promulgation. The framework of regulations comprises General Nuclear Safety Regulations integrating all thematic areas in a coherent and harmonised set, complemented by a series of Specific Nuclear Safety and Security Regulations. The Regulatory Guides follow the provisions of the IAEA safety guides and international regulators, as well as local operational experience and practices.
25891	Austria	84	Article 8	p.39	Please elaborate the impact on the NNR's service delivery. How will independent funding of the NNR be secured in the future?	In Section 17 of the National Nuclear Regulatory Act, of 1999, the NNR is able to receive licence fees for its operations. The grant affects the fullness of NNR's service delivery. The core business is managed well.
25892	Austria	85	Article 8	p.43	What are the main TSOs working for the regulatory body? Which TSOs does the operator work with?	The TSO providing support to the NNR is Mzesi a local based company. In terms of our policy guidance we may not enter into a contract for longer than 3 years. This is to ensure fairness and promote competition in the industry. Mzesi has been the platform for contract with other local and international consultant companies.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

25893	Austria	86	Article 11	p.68	<p>It is mentioned that personnel at KNPS undertaking safety-related work are required to have a minimum level of qualification and experience. Further it is noted, that a minimum number of personnel per position is determined. Could you elaborate those criteria?</p>	<p>KNPS has a classification system which includes classifications for “SR” items. This category is very broad and encompasses all items that form part of the licensing basis, may expose individuals to radioactive dose, or could have any impact on the nuclear safety of the plant. Personnel performing activities related to items classified as SR are specifically authorised to perform those activities. For example, in the Design Engineering space, Design Engineers carry specific “SR” authorisations. In order to compile or review Safety Related Designs, an engineer must be so authorised. To gain an SR authorisation a design engineer must have experience in design of non-SR systems, and must prove familiarity with the nuclear systems of the Plant. This includes knowledge of nuclear design codes and regulations, familiarity with the safety and safeguard systems, as well as accident and transient analysis. This knowledge is typically gained through a “Nuclear Engineers Programme” – which is a full time study programme of approximately 12 months. The Design Engineering department maintain a “Competency Index” which measures the capabilities and authorisations of existing personnel against an “ideal/desired” number of personnel in order to achieve KNPS’s aims. This competency index is constantly monitored to ensure the department retains at the very least an “intelligent customer” capability. Other departments have different requirements for authorisation depending on the significance of the possible consequences of their particular tasks.</p>
25894	Austria	87	Article 18	ch 18	<p>Do you have plans for the implementation of an alternative ultimate heat sink at Koeberg NPP? Which</p>	<p>The option for installation of an alternate measure (Cooling towers or air cooled condenser fan) in case of loss of ultimate heat sink was considered but dispositioned in 2019.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					possibilities / measures in case of a loss of the ultimate heat sink are considered?	
26280	France	88	Article 8	§ 8.1.8 p.40	Could South Africa indicate in what proportion the National Nuclear Regulator NNR plans to increase its staffing levels over the next five years and what is the amount of additional resources it will need to cope with upcoming projects?	The NNR proposes to increase its staffing levels by 22 percent over 5 years. This is based on the needed resources. Large projects are resourced with a dedicated resource plan commensurate with the scale and scope of the project. At the moment this proposal is aspirational and is subject to availability of finances.
26281	France	89	Article 8	§ 8.1.10 p.41	Could South Africa clarify how it measures stakeholder confidence in the nuclear safety regime?	The measure of stakeholder confidence requires a lot more treatment than is allowed in this setting. We have approached professional consultants that design surveys dealing with the perceptions of the NNRs effectiveness. The method involves a questionnaire, interviews, and reviews from external parties. All these elements are scored when the party responds to the information requested by the NNR. The scores are aggregated across the methods and an overall score is arrived at. From past stakeholder assessments the NNR fared well in areas such as interaction with the Unions. We have also carried out similar surveys regarding the view of our licensee. These have been quantified, and we use these scores expressed as percentage to refocus our service levels to our stakeholders

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

26282	France	90	Article 8	§ 8.1.10 p.42	Could South Africa indicate if the National Nuclear Regulator NNR website is interactive with the audience and how many visitors per year are connecting to this website?	The website is interactive and allows for registering of complaints and availability of regulatory documents. There were 61 827 visits in 2019.
26283	France	91	Article 10	§ 10.4.1 p.60 and 61	Does South Africa use the outcomes of the self-assessment conducted by the National Nuclear Regulator NNR in safety culture for developing a common understanding of a safety culture with the licensee, and establishing a permanent and mutual dialogue between both, in accordance with principles stated in IAEA TECDOC-1707?	<p>The regulations on Safety Standards and Regulatory Practices (No. R. 388) caters to ensure that a safety culture is fostered and maintained to encourage a questioning and learning attitude to radiation protection and nuclear safety and to discourage complacency. Results of the Self-Assessment identified the need to improve NNR provisions for the promotion and support for safety culture. NNR encourage facilities and activities, subject to NNR regulatory authority and oversight, to conduct their own safety and security culture self-assessments as part of the NNR's process based licensing approach. The NNR regulatory documents requires that licensees must develop and introduce a Safety Culture Enhancement Programme, which must provide the framework for the implementation of the aspects of safety culture within the licensee organisation.</p> <p>The NNR requires the licensee to submit on an annual basis a written report addressing the licensee's self-assessment, oversight and monitoring of nuclear safety culture.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

26284	France	92	Article 11	§ 11.2.5 p.67	<p>Could South Africa provide further details regarding the “talent management process” and its implementation, with a specific focus on the efficiency of the knowledge acquisition and transfer?</p>	<p>This process is managed the line function level to ensure coaching and mentoring between experienced staff to younger staff. It starts with identification, assessment of staff, the development of training and the implementation thereof, then review and monitoring. A talent management framework is used. Knowledge acquisition is aided by coaching and training</p>
26285	France	93	Article 13	13 p.76 to 79	<p>Could South Africa precise procedures and guidance to manage detection of non-conforming, counterfeit, suspect or fraudulent items received from suppliers before they are installed in the plant? Could South Africa precise the inspection program focusing on preventing and detecting the incorporation of non-conforming, counterfeit, suspicious and fraudulent items?</p>	<p>The NNR has an approved documented process setting the requirements to all related organisations providing products important to nuclear safety that a Quality management system is implemented during all stages of the life cycle. This process governs activities related to siting, design, manufacturing, construction, operations, modifications, and eventual decommissioning as defined in the NNR Safety Regulations. As per the requirements document, all products related to the installation must be classified with respect to the importance of the product to nuclear safety to allow for the identification of applicable requirements. In case the important to nuclear safety activities are outsourced by the licensee or suppliers to sub-suppliers, the delegating organisation must implement oversight measures for these activities.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

26286	France	94	Article 14	§ 14.2.3 p.96 to 98	Considering the fact that thermal ageing of cast duplex stainless steel is a major concern in several countries, does South Africa intend to replace the elbows connected to the Steam Generators during their replacements?	Eskom have included replacement of all 3 hot leg elbows on both units (6 in total) during replacement of the 3 Steam Generators of each unit due to low fracture toughness of 4 of the 6 elbows. The cast austenitic components are being replaced with forged austenitic components. The change from cast to forged components would require re-analysis of the primary circuit but this was required to be carried out anyway as the new Steam Generators are of larger capacity than the existing units to allow for future Thermal Power Upgrade. The remaining cold leg and cross-over leg elbows have been technically justified for 60 years of operation, except for one elbow on the inlet to a primary pump which is undergoing further detailed analysis for continued operation after Steam Generator Replacement
26287	France	95	Article 16	Summary p.11	Could South Africa specify if the Press briefings carried out during the last global exercise met the requirements and how these communication actions where involving the public for transparency?	South Africa has not conducted or been involved in a global exercise, however, "full scale" exercises are being conducted by the Regulator (NNR). "Full scale" in a sense that it tests the overall capability of the emergency responders to respond to an emergency and it tests most aspects of EPR arrangements. In the last exercise a press conference was simulated where press briefings were conducted; the public was not directly involved but was simulated to be part of that press conference. Press Briefings carried out during regulatory emergency exercises were in compliance with requirements of EPR. Feedback to public was provided at the Quarterly Public Safety Information Forums

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

26944	Poland	96	General	B, p. 9	What is the reason for replacing three main components: steam generators, reactor vessel head of unit 2 and the refuelling water storage tanks?	For the Koeberg Nuclear Power Station the main consideration was related to extending the life of the plant, since these were old SGs and were due for replacement in their function and reliability. For the Reactor Vessel head, there was an onset of corrosion and the operational experience showed that this component is due for replacement. The Refuelling Tanks were replaced due to ageing affects that impacted on the reliability and integrity of the tanks
26945	Poland	97	General	B, p. 9	Could you explain why the SSHAC results for Duynfontyn will be submitted to NNR later than other siting documentations?	The time and effort and costs of the SSHAC study provided by Eskom is onerous and would delay the review and submission of the other siting documents. This was undertaken by the request of Eskom
26946	Poland	98	Article 8	Page 31, 8.1.2	It is stated in the Report that the Directorate of Radiation Control in the Department of Health is responsible for regulatory control in scientific area. Does it mean that the Directorate overlooks the research reactor?	The Department Radiation Control is responsible for the regulation of Medical Devices and Radioactive Sources that are not part of the nuclear fuel cycle. The Research Reactors is part of the Nuclear Fuel Cycle, and is used as a source of neutrons. In this regard it is regulated by the NNR.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

27380	India	99	Article 10	Page 60	<p>It is mentioned that 'The NNR uses a system of annual performance plans, with quarterly and annual reports around the achievement of these plans, applying indicators that reflect achievement in the key performance areas covering the various aspects of regulatory control and internal processes. This enables the NNR to assess its performance on a quarterly basis and to refocus its activities accordingly.'</p> <p>South Africa is appreciated for systematic use of indicators by NNR to assess its own performance.</p> <p>Can South Africa share the details of indicators used by NNR to prioritise safety in its activities?</p>	<p>The NNR has adopted the Balanced Score Card approach in categorising its metrics. The perspectives of the Score card are: 1) Regulatory (includes stakeholders), 2) Financial, 3) Internal Business Processes and 4) People Management. All the KPIs under the Regulatory Perspective are meant to prioritise safety.</p>
-------	-------	----	------------	---------	---	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

27381	India	100	Article 13	Page 77	<p>It is mentioned 'Eskom's QA programme, including the Quality Policy Directive, is specified in the Safety and Quality Management Manual of its Nuclear Division. Oversight of the operations is provided by the QA programme of KNPS. This programme is based, as a minimum, on the IAEA Safety Code No. 50-C/SG-Q and the licensing requirements as per NNR documents LD-1023 [4.4] and RD-0034[4.5]. The Eskom Nuclear Division Safety and Quality Management Manual is also used as a basis for the QA programme.'</p> <p>The reference of 50-C/SG-Q is relatively quiet old, so how latest quality management aspects</p>	<p>The Nuclear Operating Unit's (NOU) management manual i.e. 238-8, rev 4 was revisited. It references the IAEA GSR Part 2 and with the PSR review underway, there is a plan to evaluate clause by clause compliance within the NOU QMS, SMS and supporting process. At the moment the recommendations of IAEA GSR Part 2 are realised across the NOU Manual 238-8 and supporting Business unit Manuals, e.g. 335-2 for KNPS, 331-2 for Engineering etc.</p>
-------	-------	-----	------------	---------	--	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>are reflected in QMM ? South Africa can elaborate on same.          Can South Africa elaborate how latest recommendations of IAEA (IAEA GSR Part-2) are considered in NPPs?</p>	
27382	India	101	Article 10	Page 60	<p>Article-10.3 elaborates the regulatory oversight processes of NNR.</p> <p>Can South Africa clarify whether NNR has programme for independent assessment of safety culture of utilities?</p>	<p>NNR encourages facilities and activities, subject to NNR regulatory authority and oversight, to conduct their own safety and security culture self-assessments and independent safety culture assessments part of the NNR's process based licensing approach. NNR regulations require that the licensee maintain an appropriate safety culture.</p> <p>Safety culture assessments are performed on an annual basis to assess the health of the safety culture across the station, and nuclear safety awareness seminars are conducted to promote improvements in the safety culture.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

27565	United States of America	102	Article 7	Section 7.2.1.1	<p>The report states that the NNR has revised and developed a suite of regulations and guidance documents considering IAEA Safety Standards as appropriate, and that this suite of regulations is still to be promulgated.</p> <p>(1) When will these revised regulations be put into place?</p> <p>(2) Are they significantly different than the current regulations?</p>	<p>(1) The regulatory framework has been augmented as provided for in Section 7.2.1.2 of the 2019 CNS report. The amendments to the primary legislation have been delayed by the need to undergo a thorough legislative approval process which includes a social cost benefit analysis.</p> <p>(2) Yes, they are significantly different from the current regulations in that they reflect the transition from a non-prescriptive licensing regime to a performance-based licensing regime. For example, as mentioned in the response to a previous Article 7 question from Sweden, as part of this transition, the NNR has drafted General Nuclear Safety Regulations and Specific Nuclear Safety Regulations: Nuclear Facilities, which contain many more explicit mandatory requirements for nuclear power plant design.</p>
27566	United States of America	103	Article 10	Section 10.2.2.2	<p>The report states that the NNR has moved to a more process-oriented licensing approach, which demands increased discipline and safety culture from the staff of the nuclear installation and increased vigilance from the NNR to detect incipient weaknesses or any deterioration of the</p>	<p>NNR encourage facilities and activities, subject to NNR regulatory authority and oversight, to conduct their own safety and security culture self-assessments as part of the NNR's process based licensing approach. The NNR regulatory documents requires that licensees must develop and introduce a Safety Culture Enhancement Programme, which must provide the framework for the implementation of the aspects of safety culture within the licensee organisation. The licensee is held responsible for various processes, in particular a safety screening and evaluation process that identifies which modifications or changes require regulatory approval.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>safety commitment. Can you explain how a process-oriented approach increases safety culture?</p>	
27567	United States of America	104	Article 11	Section 11.2.12	<p>The report states that the operator periodically experiences problems with high turnover of staff because they are leaving for lucrative international new build options and that the impact has been managed as required, with new staff expected to be fully qualified in mid-2021. (1) What actions is the operator taking to address this concern between now and 2021? (2) How does NNR provide oversight?</p>	<p>Question (1) Koeberg Power station developed a training plan to address the concern. This has resulted in a number of licensed operators being trained. The current number of RO's are 35 and SRO's are 28. As a result of the ongoing training, we expect an additional 18 RO's and 3 SRO's to qualify in July 2020. We report on this at the various NNR- Eskom interface meetings (for example, KCAF - Koeberg Compliance and Assurance Forum). Question (2) The NNR raised this matter as an Area of Concern, and emphasises the need to have staff that are qualified and experienced at the KNPS.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

27568	United States of America	105	Article 16	Section 16.1.5.2	<p>The report states that an emergency exercise was held in August 2018, and resulted in areas identified for improvement.</p> <p>(1) Please describe what are the areas that need improvement.</p> <p>(2) Please clarify if there is a timeline for addressing and closing these challenges.</p>	<p>1. Areas of improvement included communication among the emergency responders, maintenance of emergency equipment, access into one of the response locations, command and control issues and transport arrangements. 2. After issuing the exercise findings report, the authorisation holder prepares and submit a corrective action plan with implementation timelines, upon adequate implementation, NNR closes the finding.</p>
27577	United States of America	106	Article 19.3	19.3.6.1	<p>The report states that an IAEA Pre-SALTO mission took place in September 2019.</p> <p>(1) Please share the most significant findings of the mission.</p> <p>(2) In addition to the issuance of the RG, what actions or activities is NNR taking to ensure regulatory readiness in preparation for the submittal of the long term operation application?</p>	<p>The major findings from the Pre-Salto mission relates to the state of readiness for long term operation and specifically resources, status of the verification of the various ageing management aspects. The Regulator have issued recent guidance in regards AM and LTO, and because LTO would also be based on input from the PSR new guidance on PSR was issued. Internally the Regulator has already established a team that is dealing with the oversight of AM, PSR and LTO with the aim of preparing for the review of the safety case that would be submitted to the regulator.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

28204	Russian Federation	107	General	Section B. SUMMARY	<p>The summary provides only general short information on the reaction of South Africa to "Major Common Issues Arising from Country Groups Discussions" (paragraphs 25 to 34 of the Summary Report of the 7th Review Meeting of the Contracting Parties to The Convention on Nuclear Safety), but without links to concrete information in the National Report. What concrete actions did South Africa take in response to the "Major Common Issues Arising from Country Groups Discussions"?</p>	<p>South Africa notes the concern of the Russian Federation. The major common issues are annoyed in each introductory section of each Article and is clearly identified for easy reference. We have chosen this format as we deemed it in line with our report format.</p>
28358	Russian Federation	108	Article 16	Article 16	<p>Are there unannounced emergency drills and exercises in South Africa? If yes, then what are the lessons learned from such exercises compared to</p>	<p>Yes, lessons learned are: 1. Unannounced can only be limited to drills (minor portions of emergency response capabilities), due to business operations of the utility. 2. Financial constraints in terms of remuneration for overtime in case the exercise takes place outside normal working hours. 3. Logistical arrangements (e.g. transport if at night)</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					planned drills and exercises?	
--	--	--	--	--	-------------------------------	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

28417	Italy	109	Article 7	Page 29	<p>Could South Africa provide information about the applicable regulations regarding the suspension, modification or revocation of the nuclear installation license?</p>	<p>Currently, such enforcement aspects are addressed through provisions in the NNR regulatory philosophy and policy and authorisation process documents as follows:</p> <ol style="list-style-type: none"> <li>1) Enforcement action through the implementation of appropriate interventions could include suspension or revocation of the authorisation, curtailing of activities or operations, and prosecution in terms of the Act. Sanctions that will deter deliberate or careless deviation from regulatory requirements are imposed.</li> <li>2) Enforcement actions are:             <ol style="list-style-type: none"> <li>a) Performed in accordance with provisions of the Act;</li> <li>b) Carried out in accordance with due legal process and other applicable regulations and legislative provisions; and</li> <li>c) Consistent, impartial and transparent.</li> </ol> </li> <li>3) Enforcement actions consider:             <ol style="list-style-type: none"> <li>a) The nature of the non-compliance (repeat event, wilful, etc.);</li> <li>b) Operator's compliance history;</li> <li>c) Potential impact on safety, i.e. severity; and</li> <li>d) Significance of the deficiency of the corrective action.</li> </ol> </li> <li>4) Enforcement actions may result from non-compliance with the conditions of nuclear authorisations, regulations, directives, approved operational procedures as well as any condition imposed by the Regulator as required.</li> </ol> <p>The NNR is also currently drafting enforcement regulations, which are aligned with the enforcement provisions in the NNR regulatory philosophy and policy and authorisation process and which are consistent with the provisions in the NNR Act related to enforcement.</p>
-------	-------	-----	-----------	---------	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

28418	Italy	110	Article 15	Para 15.1.2	<p>Could South Africa clarify if for the different activities conducted in the NPP there is an obligation for the licensee to demonstrate that the optimization principle has been properly applied for worker's exposures? Is a "dose constraint" established? Please also specify why table 15.3.1 does not report the maximum annual effective dose for exposed workers; this could be useful just in the implementation of dose constraint.</p> <p>Could South Africa also clarify how in the safety assessment documents submitted to support the licensing process an analysis of possible accident scenarios involving unplanned or uncontrolled releases and the</p>	<p>1. Yes, optimisation is covered in the regulations and in the requirement document (RD-0022), which states that: all exposures must be kept as low as reasonably achievable, economic and social factors taken. It further indicates that in the implementation of the ALARA principle, a system of dose constraints must be established and implemented, and must not exceed values which can cause the exceedance of the dose limits. the application of the dose constraint must ensure as far as possible that doses are restricted by application of the ALARA principle on a source specific basis rather than by dose limits.</p> <p>2. The implemented dose constraint for members of the public is 0,25 mSv/a. Eskom has an applied administrative dose constraint of 15 mSv/a for workers. Eskom also have an ALARA target, which is the average annual dose target for workers, at 4 mSv/a.</p> <p>3. Koeberg reports Maximum Annual Effective Dose to the NNR in their annual report. Table 15.3.1 could include this in the future.</p> <p>4. For normal operating conditions, a system of Annual Authorised Quantities (AADQs), which should comply with the dose constraint of 0,25 mSv/a, applies. (Discussed in Section 15 of CNS report). For accidents, the license holder has to develop a technical basis for emergency planning, to comply with the requirements of the NNR document, PP-0015. Section 14 deals with assessment and verification of safety. Emergencies are dealt with in Section 16 and 16 of the CNS report.</p>
-------	-------	-----	------------	-------------	--	---

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					assessment of the relevant consequences in terms of radiological impact on critical groups of population concerned are developed.	
--	--	--	--	--	---	--

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

28419	Italy	111	Article 15	15.1.3	Could South Africa specify the dose limits for members of the public on which plant discharges have to comply with?	The dose limit for all activities for members of the public is 1 mSv/a. However, for a source, such as Koeberg, a dose constraint of 250 µSv/a (per source) is used to limit exposure to the members of the public.
28420	Italy	112	Article 14	Para 14.1.2.1	Could South Africa clarify the exact intended meaning of the objective of “no off-site effects” established in relation of new NPPs for the design basis accidents (DBA).	The Regulatory guide RG-0019 states that events (including combinations of events) equal to or greater than 10 <sup>-5</sup> per year of operation of the facility but less than 10 <sup>-2</sup> there should be no radiological impact outside the site boundary or exclusion area in excess of 50mSv at the lower end of the frequency scale.
28421	Italy	113	Article 14	Para 14.1.3.2	Could South Africa clarify if the Koeberg Accident Analysis Manual cover the areas of source term evaluation, radionuclide transport in the environment and dose assessment? If so, have the more up-to-date models and assumptions adopted by Eskom resulted in a change to the above Manual?	Yes, the accident analysis manual covers all levels of PSA. Continual updates to the manual is performed, the latest being the reference to use of the Alternate Source Term.

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

28422	Italy	114	Article 14	Para 14.1.3.2	Which are the KNPS dose criteria and dose objectives for the members of the public in accident conditions?	<p>The regulator specified fundamental nuclear safety criteria limits on the annual average or maximum risk to members of the public and facility personnel due to exposure to radioactive material as a result of accidents or normal operations. These limits for the public during an accident are as follows:</p> <p>Average Annual Population Risk - <math>10^{-8}</math> fatalities per year per site (one fatality per one hundred million per year per site)  Maximum Annual Individual Risk - <math>5 \times 10^{-6}</math> fatalities per year (one fatality per two hundred thousand per year)</p> <p>No action may be authorised which would give rise to any member of the public receiving a radiation dose from all authorised actions exceeding 1 mSv in a year.</p>
28423	Italy	115	Article 14	Para 14.1.3.2	Using the more up-to-date models and assumptions, which is the exposure time (early phase, medium term, long term) usually adopted for the dose assessment for the members of the population in accident (and severe accident) conditions?	<p>The analysis release durations for the accidents noted in Table 6 of U.S. NRC RG 1.183 remain applicable and are adopted in total when determining the total effective dose equivalent (TEDE) at the outer boundary of the low population zone (LPZ).</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

28424	Italy	116	Article 18	Para 18.1.3 Para 18.1.6	Could South Africa clarify if design extended condition (DEC) scenarios have been considered and if for them existing safety margins as well as design features and capabilities of safety systems have been assessed and consequential improvement measures, if any, have been adopted?	<p>The following plant modifications has been identified to be designed and operational after a DEC external event:</p> <ul style="list-style-type: none"> <li>• Hardened water supply;</li> <li>• Installation of hardened instrumentation;</li> <li>• Hardened electrical external connection points (ECPs);</li> <li>• Hardened storage building;</li> <li>• Hardened water external connection points;</li> <li>• Procedure enhancement (SD-EOPs and TSC support manual).</li> </ul>
28566	Bulgaria	117	Article 11	page 66, section 11.2.5	The Report states that “The training, qualification and ongoing training requirements for the production support groups (maintenance, chemistry, radiation protection, nuclear fuel management and plant engineering) are set by Eskom. Eskom follows a practice based on formal on-the-job training and examinations to formally authorise staff to perform tasks	<p>Yes, the production support group includes Inspection and Test, which is the responsible group for destructive and non-destructive testing (NDT) at KNPS. The I&amp;T scope mainly consist of NDT and functional testing of safety related and BOP equipment as per the relevant code requirements (e.g. ASME XI, OM code, PER, ASME B31.1 etc.). The initial training, qualification, and ongoing training requirements, for I&amp;T, are set by Eskom to the relevant code requirements. In addition, personnel are also trained and certified by external accredited bodies (e.g. ISO-9712 etc.). Once the relevant certification is obtained a formal authorisation is issued subject to a successful panel interview. No, The training that I&amp;T personnel at KNPS receive includes: Classroom and practical training, on the job assessment and a panel interview to assess competency before authorisation to work on site is granted.</p>

SOUTH AFRICA'S RESPONSE TO QUESTIONS ON THE 8<sup>TH</sup> CNS REPORT

					<p>on safety-related plant systems.”</p> <p>Does this “production support group” include the destructive and non-destructive testing (NDT) personnel?</p> <p>Is the “on-the-job-training” the only training and qualification the NDT personnel gets?</p>	
--	--	--	--	--	---	--