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Eskom

KOEBERG NUCLEAR POWER STATION

NUCLEAR PROJECT MANAGEMENT

KOEBERG TRANSIENT INTERIM STORAGE FACILITY

CIVIL CONSTRUCTION SAFETY CASE

PROJECT Nº 12010

Prepared by: (Tractebel)

Removed Contractor names in accordance with PAIA Chapter 4, Section 38 (b)

Reviewed by: (Tractebel)

Reviewed by: G Dongmo (Eskom)
Nuclear Physicist (Eskom)

Approved by: M. VARATHAM KORC Chairperson

Date: 2024-08-22

Additional Reviewers

Eskom: K Makhothe
Nuclear Corporate Specialist (Spent Fuel)

Eskom: A Lawrence
Senior Design Engineer (Mechanical)

Eskom: SJ Venter
Senior Design Engineer (Civil)

Eskom: S Pietersen
Senior Advisor (RP)

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1.0 INTRODUCTION

1.1 The Existing Design

The Transient Interim Storage Facility (TISF) at Koeberg Nuclear Power Station (KNPS) is presently used for the interim storage of the Original Steam Generators (OSGs) in the Original Steam Generators Interim Storage Facility (OSGISF) within the TISF area.

1.2 Problems with Existing Design and Installation

Redacted the expected date of the establishment of the CISF by NRWDI PAIA Chapter 4, Section 37 (b)

There is currently no national “off-site depository” and related disposal infrastructure available for the management of spent nuclear fuel in the Republic of South Africa (RSA), except for an “on-reactor site” storage infrastructure. The National Radioactive Waste Disposal Institute (NRWDI) focuses on the establishment of a national Centralised Interim Storage Facility (CISF) for the safe storage of Koeberg’s spent fuel and other high-level waste.

Currently Koeberg is evacuating the spent fuel pools (SFPs) by loading spent fuel into dry storage casks. The station license grants permission to store dry storage casks in the Cask Storage Building (CSB) which has a maximum capacity of 16 casks. To date, casks have been loaded and are stored in the CSB and therefore additional storage capacity is required. If no additional cask storage space is created before Outage 127 this would lead to extended Outages or the premature shutdown of the Koeberg reactors.

Deleted quantities of stored fuel inventory in accordance with PAIA Chapter 4, Section 38 (b)

1.3 The New Design

The proposed design of the first Cask Storage Area on the TISF consists of three modular reinforced concrete pads with seven Auxiliary Shielding Modules (ASMs), as described in the detailed design 12010TISF-0017 [1]. The general view of the TISF is shown in Figure 1.

Removed coordinates in accordance with PAIA Chapter 4, Section 38 (b)

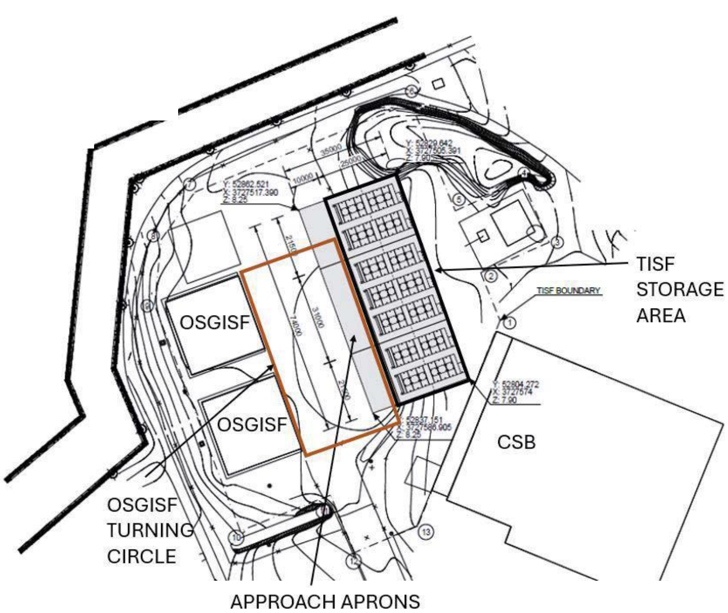

Figure 1: General View of the TISF

The ASM is designed for additional shielding so as to comply with the NNR controlled zone boundary dose rate requirements while also ensuring adequate cooling of the stored loaded spent fuel casks. The ASMs have a capacity to each house two loaded HI-STAR 100 casks and each module has a lockable access door to allow for Radiation Protection (RP), Inspection and Maintenance plant operations within the modules. The inside of each ASM will be fitted with lighting to provide visibility within the structures. The concrete pad will be constructed modularly in three sections.

The Front Shielding Door (Part #4 in Figure 2), the Roof Shielding Type 1 and Type 2 (Part #5 and Part #6 in Figure 2), the Top Cover Type 1 and Type 2 (Part #7 and Part #8 in Figure 2) and the Inspection Opening Shielding Roof (Part #10 in Figure 2) are designed as precast reinforced concrete components that could be manufactured off-site. All QA, QC and specification requirements applied to the contract applies equally to work performed off-site.

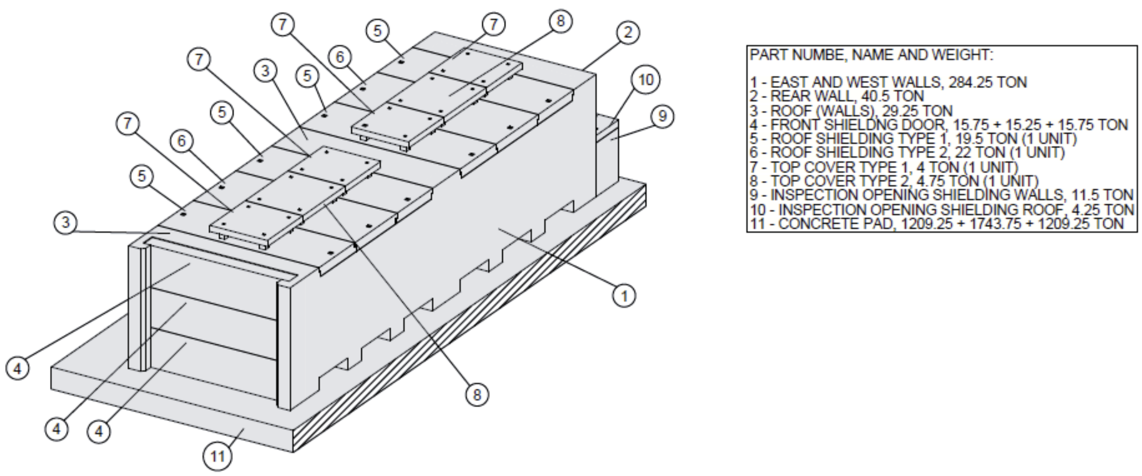

Figure 2: ASM Parts

The Approach Aprons are reinforced concrete slabs in front of the Storage Area and within the OSGISF Turning Circle that allows to perform the operations at the TISF with the transport and handling equipment, and serve as preparation/laydown area, if necessary.

The TISF Storage Area will accommodate a maximum of 14 HI-STAR 100 casks. Construction of the TISF storage area shall commence following approval of the Construction Safety Case by the NNR.

The storage area shall be constructed modularly in three sections. Starting with the entire concrete and approach apron pads. Thereafter the in-situ sections of the ASMs will be constructed on the Concrete Pad. In parallel, the precast sections of the ASMs will be constructed off-site.

The construction will be paused for the duration of the HI-STAR 100 cask loading campaign in Unit 2 before Outage 227.

The construction activities include:

- Bulk Earthworks of the entire Cask Storage Area
- Construction of Concrete and Approach Apron Pads .
- Execution of off-site precast components of the ASMs.
- Construction of the ASMs within the Concrete Pads.

Loading of a minimum of four (4) HI-STAR 100 casks from Unit 2 before Outage 227:

Construction activities will be paused during the HI-STAR 100 cask loading campaign and the necessary measures will be established to ensure safe movement of the casks.

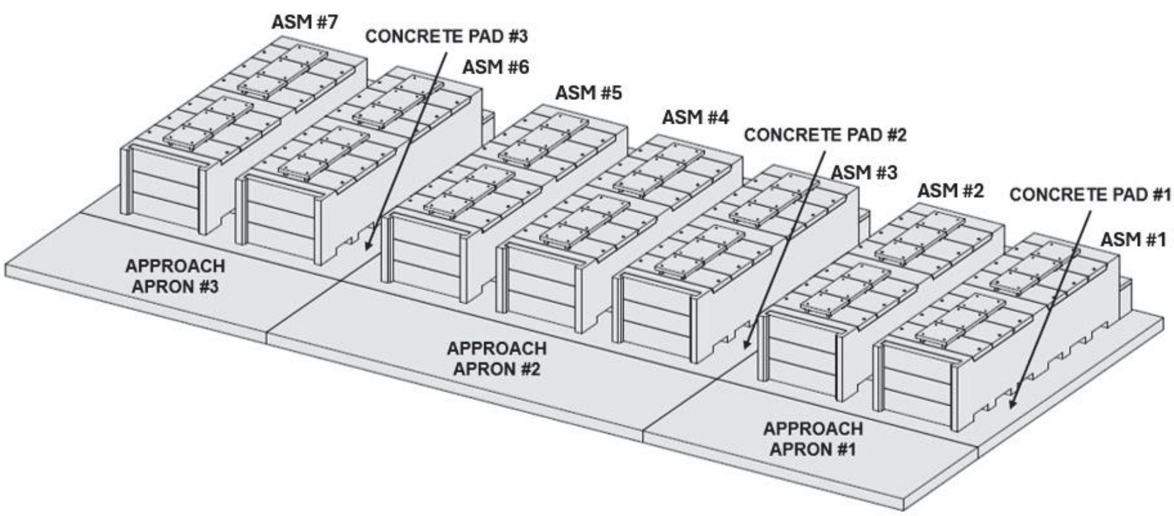

Figure 3: Identification of Concrete Pads, ASMs and Approach Aprons

1.4 Purpose of the Safety Case

The purpose of this safety case is to demonstrate that:

- The nuclear safety risks related to the design of the first TISF Cask Storage Area have been evaluated in accordance with KAA-709 [2].
- The nuclear safety risks related to the construction of the TISF Cask Storage Area have been evaluated in accordance with KAA-709 [2].
- The conventional safety risks during of the TISF construction activities have been mitigated in accordance with KGA-018 [3].

The cask loading safety case SC2022/0004 [4] as approved by the NNR will be revised and submitted to the NNR for approval before the loading transfer and placement of HI-STAR 100 casks on the TISF.

Deleted NNR letter number. in accordance with PAIA Chapter 4, Section 38 (b)

2.0 SAFETY SCREENING AND EVALUATION

Safety Evaluation E2023-0001 for the detailed design 12010TISF-0017 [1] was prepared by and reviewed by:

- G Dongmo from Probabilistic Safety Analysis (PSA) Group
- K Makhothe from Nuclear Engineering (NE)
- A Lawrence from Design Engineering (DE)
- S Pietersen from Radiation Protection (RP)
- T Moila from Systems Engineering (SE)
- K Smit from SME NE-MRG
- P Ireland from Operating Group (OPG).

Removed Contractor names in accordance with PAIA Chapter 4, Section 38 (b)

E2023-0001 was independently reviewed by Tractebel and approved by M Valaitham as the Koeberg Operating Review Committee (KORC) chairperson.

The safety evaluation concluded that there were no Unreviewed Safety Question (USQ), and consequently a safety justification was not compiled.

Safety Screening S14007 [5] for the construction of the first TISF Storage Area was prepared by A Lawrence from DE, reviewed by K Makhothe from NE and approved by A Lawrence from DE.

3.0 ELEMENTS OF THE SAFETY CASE

3.1 Design

- 3.1.1. The design was compiled, reviewed and approved by KCC as a Level 2 supplier in accordance with Eskom supplier quality requirements in 238-102 and as included in the Eskom Approved Suppliers List.

- The proposed TISF design for Koeberg purposes, is detailed in 12010TISF-0017 Rev.1 Detailed Design of the Koeberg TISF - First Spent Fuel Cask Storage Pad [1], was reviewed and accepted by Eskom by the following:

- A Lawrence from DE;
- K Makhothe from NE;
- S Pietersen from RP; and
- SJ Venter from DE.

- The design was authorised by R Goldstein (DE Manager).

- 3.1.2. The design includes a description of the first TISF Cask Storage Area which includes the Concrete Storage Pads, the Approach Aprons and the ASMs.

- The design has been developed in compliance with 10 CFR 72 [6]. Site-specific conditions have been considered in the design and verified according to the Koeberg SAR as follows:
- Specification for Modifications and Equipment Required for External Flooding Applications [7]
- Specification for Modifications and Equipment Required for Seismic Event Applications [8]
- Specification for Modifications and Equipment Required for High-Speed Wind and Tornado Applications [9]
- Specification for Modifications and Equipment Required for Severe Ambient Temperature Applications [10]

Shielding calculations have been performed to verify compliance with the following standards:

- 10 CFR 72.104 Criteria for Radioactive Materials in Effluents and Direct Radiation from an ISFSI [6]
- 10 CFR 72.106 Controlled Area of an ISFSI [6]
- KAA-637 Access control to radiological controlled zones [11]
- 238-36 Operational Radiation Protection Requirements [12]
- RD-0022 Radiation Dose Limitation at Koeberg Nuclear Power Station [13]

The seismic response analysis has been conducted according to the following regulations:

- ASCE 4-16 Seismic Analysis of Safety-Related Nuclear Structures [14]
- NUREG/CR-6865 Parametric Evaluation of Seismic Behavior of Freestanding Spent Fuel Dry Cask Storage Systems [15]
- NUREG-0800 Section 3.7.1 Seismic Design Parameters [16]
- Regulatory Guide 1.92 Combining Modal Responses and Spatial Components in Seismic Response Analysis [17]
- Regulatory Guide 1.61 Damping Values for Seismic Design of Nuclear Power Plants [18]

Liquefaction analysis has been conducted according to Regulatory Guide 1.198 [19] and NUREG/CR-5741 [20].

The load cases and load combinations for the structural analysis have been defined according to NUREG-2215 Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities [21].

The structural design of the concrete is conducted according to the following South African codes:

- SANS 10100-1 The structural use of concrete Part 1: Design [22]
- SANS 10100-2 The structural use of concrete Part 2: Materials and execution of work [23]
- SANS 10114 Detailing of steel reinforcement for concrete [24]

Additionally, concrete design is verified according to ACI 349-13 [25].

- The design life of the TISF is at least until the end of 2055.

- 3.1.3. The detailed design excludes the following aspects which will be documented in separate design reports:

- Security requirements for the facility
- Remote monitoring of the ASM internal ambient temperatures
- Electrical requirements for the facility
- Fire detection of the facility

The above-mentioned designs along with the requisite implementation safety case, will be submitted separately to the NNR for approval and will be installed before loading, transfer and placement of casks on the storage area.

3.2 Installation / Implementation

The modification will be installed using Eskom reviewed and accepted the Method Statements and Quality Control Plans as listed in this section in accordance KAA-502 [26].

The Method Statements for the construction activities are listed as follows:

- NQMS-QAS-MS-001 Concrete Cube Making, Curing and Testing [27]
- NQMS-QAS-MS-002 Bulk Earthworks [28]
- NQMS-QAS-MS-006 Precast Elements [29]
- NQMS-QAS-MS-007 In situ Concrete Works [30]
- NQMS-QAS-MS-008 Excavation of existing underground services [31]

The Quality Control Plans (QCPs or ITPs) for the construction activities are listed as follows:

- ITP 001 – General Requirements [32]
- ITP 002 – Earthworks [33]
- ITP 003 – Drainage [34]
- ITP 004 – Reinforced Concrete Structures [35]
- ITP 005 – Structural Steel Erection [36]
- ITP 006 – Precast Elements [37]
- ITP 007 – (Insitu) Concrete Works [38]
- ITP 008 – Survey [39]

A rigging study and lifting plan has been reviewed and accepted by Eskom and is included in the work plan in accordance with KSA-132 before off-loading or installing any of the precast panels onto the ASMs.

Construction of the surface drainage channels will be performed in accordance with - NQMS-QAS-MS-007 [29] and ITP 003 [33] and 004 [34] as documented in the detailed design [1] to address surface flooding concerns.

The location of the TISF is separate from that of the plant, but in the vicinity of the CSB and the OSGISF (Figure 1), with the following interfaces to the existing plant:

- Interfaces with the CSB: The construction activities to be developed in the vicinity of the CSB are those established for typical reinforced concrete civil works (earthworks, formwork activities, steel fixing, using of power tools, scaffolding erection & dismantling, placing concrete, crane lifting activities).

- Interfaces with the OSGISF: The Approach Aprons are included within the OSGISF Turning Circle, so it will be necessary to excavate, backfill and concrete this structure within this area. Once constructed the Approach Aprons will allow manoeuvring of the Kamag 25 system for the Original Steam Generators transport, as indicated in Section 7.2.2.3 of Appendix A2.17 of the detailed design [1]. The TISF construction activities shall be co-ordinated by Eskom to allow implementation of OSGISF activities where required.

- Existing services: After clearing and grubbing the area, a below surface survey scan will be executed, as described in NQMS-QAS-MS-008 [31]. These activities are included in ITP 002 [33] and ITP 008 [39]. If any services are detected, KCC will inform the Project Team and work will not commence around the detected equipment until the Project Team provides KCC with Excavation permit. Excavation of existing underground services will be executed in accordance with NQMS-QAS-MS-008 [31].

- The TISF construction activities will be paused if any other Eskom activities are conducted within the TISF location. KCC will inform the Eskom Project Team and work will not continue until the resolution of the other activities has been communicated to KCC by the Eskom Project Manager.

3.3 Testing

The concrete mix design will be verified by testing the following properties, in accordance with NQMS-QAS-MS-001 [27]. Compliance of concrete mix design will be verified as a Hold Point of the ITP 007 [38].

The Concrete Pads cast-in-place concrete shall be tested at 28 days to ensure that they have a minimum and maximum cube compressive strength of 30 MPa and 51.7 MPa, respectively. This test shall be performed in accordance with SANS 5863 [40].

The ASMs and Approach Aprons cast-in-place concrete shall be tested at 28 days to ensure that they have a minimum cube compressive strength of 30 MPa. This test shall be performed in accordance with SANS 5863 [40].

The ASM concrete density shall be tested to ensure that it has a minimum and maximum density of 2.2994 t/m^3 and 2.5 t/m^3, respectively. This test shall be performed in accordance with SANS 6251 [41]. The concrete density test will be performed in accordance with the method statement NQMS-QAS-MS-006 [29] and NQMS-QAS-MS-007 [30]. Compliance of the concrete density will be verified as a Hold Point of the associated ITPs 006 and 007, respectively [37] [38].

A Pad level survey will be conducted on completion of construction of each Concrete Pad. The level surveys will be performed in accordance with the method statement NQMS-QAS-MS-007 [30]. Compliance of the level surveys will be verified as a Hold Point of the ITP 007 [38].

Concrete durability shall be ensured by complying with the following requirements:

- Minimum cover: 60 mm.
- Maximum w/c ratio: 0.5.
- Minimum content of cement (kg/m3): 300.
- Maximum water penetration depth (UNE-EN 12390-8 [42]): 50 mm.
- Average water penetration depth (UNE-EN 12390-8 [42]): 30 mm.
- Type of cement: CEM III/A, CEM III/B, CEM IV, CEM II/B-V, CEM II/A-D or concrete with more than 6 % added micro-silica or more than 20 % added fly ash.

The Concrete Pad shall rest over an engineering fill of 1 m with granular base material (gravel/sand) and compacted to a minimum of 95 percent of the Maximum Dry Density, as detailed in THM Sand Replacement Test Method Rev.0 [43].

- Maximum Dry Density as indicated in ASTM D1557 [44].
- Dry Density by Sand Replacement Method as per ASTM D4914/D4914M [45].

3.4 Documentation

All affected documents are listed in the Documentation Change Identification Form (DCIF), Attachment D1 of the detailed design [1]. The following design drawings, also listed in the DCIF will be finalised and available as soon after construction acceptance as possible:

Drawings Issued for Construction: Appendix A2.16 of [1] – TISF KOEBERG DETAILED DESIGN DRAWINGS (00857PL004 to 00857PL010)

- 00857PL004 – NOTES
- 00857PL005 – TISF LAYOUT
- 00857PL006 – SHAPE DRAWINGS GENERAL VIEW
- 00857PL007 – SHAPE DRAWINGS AUXILIARY SHIELDING MODULE
- 00857PL008 – REBAR DETAIL 1

In accordance with PAIA Chapter 37, drawings PL008 to 010 and some drawings in PL007 have been redacted in the TISF Civil Construction Detailed Design as they are Contractor intellectual property.

- 00857PL009 – REBAR DETAIL 2
- 00857PL010 – OPERATIONS

In accordance with GA 43883 in the detailed design [1], the Koeberg emergency procedure KEP-088 will be updated to include inspection and actions to be conducted in the event with an incident / accident involving the ASMs.

The Koeberg SAR will be updated under the SAR update request number UR-2503.

These updates will ensure that all documents accurately reflect the as-built status of the plant design basis.

3.5 Operating / Maintenance

In accordance with GA 43878 in the detailed design [1], the civil inspection programme (240-166149425 [46]) will be updated to incorporate the required inspections and monitoring of the TISF in accordance with Section 3.10 of the detailed design.

3.6 Training

All personnel involved in the construction of the first TISF Cask Storage Area are appointed and qualified in accordance with the Eskom accepted organogram and appointment letters included in the Project Safety File. The team will also be trained in accordance with Koeberg plant entry, rigging as well as radiation worker requirements.

Pre-job briefings for all activities on-site shall be carried out in order to ensure that the details of the work plan are understood and that the appropriate safety measures and level of personal protective equipment are deployed. Records of all competency training are kept on the SHE file as per the Health and Safety Plan for the TISF.

3.7 Probabilistic Safety Assessment (PSA)

The PSA review of E2023-0001 in the TISF detailed design [1] determined that the proposed project does not involve an unreviewed safety question (USQ). The review concluded that there is not a more than minimal increase in Koeberg baseline risk because of the first TISF Spent Fuel Cask Storage Pad activities.

3.8 In-Service Inspection

The TISF construction introduces new inspections into the in-service-inspection programme. These new inspections will be included in the civil inspection programme (240-166149425 [46]) and Management of Non-License Binding Civil Monitoring Programme Surveillances at KNPS (240-166150507 [47]), in accordance with GA 43878 in the detailed design [1].

3.9 Radiation Protection / ALARA

- The construction activities will be conducted under a Radiation Protection Certificate (RPC), after placement of loaded HI-STAR 100 casks on the TISF in accordance with KAA-637 as included in KCC's safety file.
- The As Low As Reasonably Achievable (ALARA) principle will be followed through the planning of the construction activities in the ALARA plan as contained in KCC's safety file.
- Occupational radiation doses will not exceed the limits specified in NNR RP licensing requirements.
- Only the necessary personnel will be involved in the respective construction activities in a bid to preclude unnecessary exposure.
- Pre-job briefings will be performed with the necessary working personnel involved to minimise dose exposure.

3.10 SHE Risk

All industrial safety measures in accordance with Safety Health and Environmental (SHE) principles are incorporated into the overall project planning to meet the requirements of the Occupational Health and Safety Act (OH&SA) and related regulations.

The Health & Safety Plan for the Spent Fuel Transient Interim Storage Facility Project is a coherent site-specific plan based on the following Eskom's HS specifications:

- A Baseline Risk assessment for the intended construction work project.
- HS Specific Guidelines (KGA-073 [48])
- HS Specification (12010TISF-002 [49])

The SHE File has been compiled and accepted by Eskom containing the information about the safety and health management system during construction and all information relating to the post-construction phase after handover to the client, so that the client can maintain the works in a healthy and safe way. The SHE File contains the following documentation:

- A copy of the notification letter sent to the DoL and their approval.
- SHE Policy is included in the SH Plan.
- A copy of the letter of good standing (LoG).
- Organisational Organogram.
- Records of all training and qualifications of all contractor employees.
- Certificate of fitness for all contractor employees.

- Inspection checklists for scaffolding.

The following Method Statements have been compiled and submitted as part of the HS Plan for the TISF project:

- MS-HS 001 Site Establishment [50]
- MS-HS 002 Formwork Activities [51]
- MS-HS 003 Steel Fixing [52]
- MS-HS 004 Hot Work Activities [53]
- MS-HS 005 Use of Power Tools [54]
- MS-HS 006 Scaffolding Erection & Dismantling [55]
- MS-HS 007 Placement of Concrete [56]
- MS-HS 008 Lifting Activities [57]
- MS-HS 009 Troxler Activities [58]
- MS-HS 010 Laboratory Activities [59]
- MS-HS 011 Excavations [60]
- MS-HS 012 Clear and Grub [61]
- MS-HS 013 Backfill and Layerworks [62]
- MS-HS-014 Maintenance of Onsite Toilet Services [63]

The risk assessment discusses risks including hazards associated with each construction activity, consequences of the risk, control measures to prevent the risk, and actions to mitigate the risk. The following Risk Assessments have been compiled and submitted as part of the HS Plan for the TISF project:

- RA-HS 002 Formwork Activities [64]
- RA HS 003 Steel Fixing [65]
- RA HS 004 Hot Work Activities [66]
- RA HS 005 Using of Power Tools [67]
- RA HS 006 Scaffolding Erection & Dismantling [68]
- RA HS 007 Placing Concrete [69]
- RA HS 008 Crane Lifting Activities [70]

- RA HS 009 Troxler Operations [71]
- RA HS 010 Laboratory Activities [72]
- RA HS 011 Excavations [73]
- RA HS 012 Clear and Grub [74]
- RA HS 013 Processing of Backfill and Layerworks [75]
- RA HS 014 Excavations for Existing Underground Services [76]

3.11 Environmental Impact Assessment

The authorised Environmental Authorisation (EA) provided by the Department of Environmental Affairs [77] forms the basis of the environmental consideration for this project. The requirements as defined in the EA shall be complied with during the design and construction of the facility. The environmental management requirements directly related to the TISF during the design phase have been addressed in the detailed design 12010TISF-0017 [1].

The environmental management requirements directly related to the TISF during construction phase are included in the Waste Management and Environmental Management Plan of KCC [78], [79].

3.12 Quality Assurance

The KCC Quality Management System used is based on the ISO 9001:2015 and ISO 3834 systems. Further requirements as set out in the ASME-NQA-1 (‘NQA-1’) Standard are also applied to this project according to KCC Contract Quality Management Plan [80], as submitted to the NNR in the Eskom letter NAPP11A113. All work performed will be according to Eskom’s specifications, drawings and the contract quality requirements.

The construction Quality Plan [81] is established specifically for the TISF Construction. The classifications in terms of quality level and safety level are as follows:

- Quality Level: Q2
- Safety Level: L3

3.13 Decommissioning

In accordance with the Koeberg decommissioning strategy [82]:

- The TISF design introduces additional concrete and reinforced steel for decommissioning. In line with the Koeberg decommissioning strategy [82], following the removal of spent fuel and casks from the Koeberg site, the TISF as, with the CSB, will be demolished accordingly. It can be expected that the buildings will not be contaminated and therefore will be demolished under Phase 6a for non-contaminated structures.

- A TISF Decommissioning Waste Management Plan is included in Table 20 of the detailed design [1].

3.14 Aging Management

- In accordance with ACI 349.3R [83] recommendations, the TISF Concrete Pad, ASM and Approach Apron are structures exposed to natural environment and it is recommended that an inspection is executed once each 5 years.
- As with the CSB, the Koeberg surveillance procedure for civil structures, 240-166149425, Revision 1 [46], will be updated accordingly, to include civil inspection requirements for the TISF Storage Area.

3.15 Reviews

This document has been seen and accepted by:

- T Moila — Systems Engineering (Civil)
- A Ludidi — Maintenance
- C Pretorius — OTS/SAR
- N Mahlangu — OPG
- P Ellis — RP
- G Dongmo — SAMG / PSA
- K Jonnalagadda — Spent Fuel Storage Project Manager

4.0 CONCLUSIONS

All nuclear and conventional safety risks as a result of the construction of the first TISF Cask Storage Area civil structure have been identified and satisfactorily addressed in this safety case. Eskom therefore requests approval of the safety case and the attached License Change Request (LCR-2077) [84] thereby granting permission for Eskom to commence with the construction activities of the first TISF Cask Storage Area civil structure.

5.0 REFERENCES

[1] Eskom, «12010TISF-0017 Rev.2 Detailed Design of the Koeberg TISF - First Spent Fuel Cask Storage Pad,» 2024.

[2] Eskom, «KAA-709: Process for Performing Safety Screenings, Safety Evaluations, Safety Justifications and Safety Cases».

[3] Eskom, «KGA-018: Safety Case Preparation».

[4] Eskom, «SC2022/0004 Storage of Twelve (12) HI-STAR 100 Casks at Koeberg».
[5] Eskom, «S14007, Revision 1 - Implementation of Koeberg TISF - First Spent Fuel Cask Storage Pad».
[6] NRC, «10 CFR Part 72 - Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste.».
[7] Eskom, «240-120994091 - Specification for Modifications and Equipment Required for External Flooding».
[8] Eskom, «240-121010217 - Specification for Modifications and Equipment Required for Seismic Event Applications».
[9] Eskom, «240-121005755 - Specification for Modifications and Equipment Required for High Speed Wind and Tornado Applications».
[10] Eskom, «240-121013197 - Specification for Modifications and Equipment Required for Severe Ambient Temperature Applications».
[11] Eskom, «KAA-637 Access control to radiological controlled zones».
[12] Eskom, «238-36 Operational Radiation Protection Requirements».
[13] NNR, «RD-0022: Radiation Dose Limitation at Koeberg Nuclear Power Station».
[14] ASCE, «ASCE 4-16 Seismic Analysis of Safety-Related Nuclear Structures».
[15] NRC, «NUREG/CR-6865 Parametric Evaluation of Seismic Behavior of Freestanding Spent Fuel Dry Cask Storage Systems».
[16] NRC, «NUREG-0800 Section 3.7.1 Seismic Design Parameters».
[17] NRC, «Regulatory Guide 1.92 Combining Modal Responses and Spatial Components in Seismic Response Analysis».
[18] NRC, «Regulatory Guide 1.61 Damping Values for Seismic Design of Nuclear Power Plants».
[19] NRC, «NRC Regulatory Guide 1.198 Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites».
[20] NRC, «NUREG/CR-5741 - Technical Bases for Regulatory Guide for Soil Liquefaction».
[21] NRC, «NUREG-2215 Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities».
[22] SANS, «SANS 10100-1 The structural use of concrete Part 1: Design».
[23] SANS, «SANS 10100-2 The structural use of concrete Part 2: Materials and execution of work».
[24] SANS, «SANS 10114 Detailing of steel reinforcement for concrete».
[25] ACI, «ACI 349-13 Code Requirements for Nuclear Safety-Related Concrete Structures».
[26] Eskom, «KAA-502 New Facilities and Changes To Facilities at Koeberg Nuclear Power Station».
[27] WBHO, «NQMS-QAS-MS-001 Concrete Cube Making, Curing and Testing».
[28] WBHO, «NQMS-QAS-MS-002 Bulk Earthworks».
[29] WBHO, «NQMS-QAS-MS-006 Precast Elements».
[30] WBHO, «NQMS-QAS-MS-007 In situ Concrete Works».
[31] WBHO, «NQMS-QAS-MS-008 Excavation of Existing Underground Services».
[32] WBHO, «ITP 001 - General Requirements».
[33] WBHO, «ITP 002 - Earthworks».
[34] WBHO, «ITP 003 - Drainage».

[35] WBHO, «ITP 004 – Reinforced Concrete Structures».
[36] WBHO, «ITP 005 - Structural Steel Erection».
[37] WBHO, «ITP 006 – Precast Elements».
[38] WBHO, «ITP 007 – (In situ) Concrete Works».
[39] WBHO, «ITP 008 - Survey».
[40] SANS, «SANS 5863 Concrete Tests – Compressive Strength of Hardened Concrete».
[41] SANS, «SANS 6251 Concrete Tests - Density of Hardened Concrete».
[42] AENOR, «UNE EN 12390-8 Testing hardened concrete - Part 8: Depth of penetration of water under pressure».
[43] WBHO, «TMH Sand replacement test method».
[44] ASTM, «ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort».
[45] ASTM, «ASTM D4914/D4914M Standard Test Methods for Density of Soil and Rock in Place by the Sand Replacement Method in a Test Pit».
[46] Eskom, «240-166149425, Revision 1, Basis and Scope for Non-License Binding Civil Surveillances at Koeberg Nuclear Power Station.».
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