Eskom	USER REQUIREMENT SPECIFICATION	Nuclear Engineering

Title: **Disposal of the original Unit 1 RPVCH and Unit 2 RPVCH and CRDMs**

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Letitia Geldenhuys	**John Venter**	**R Goldstein**
Technologist	**Chief Technologist**	**Design Engineering Manager**
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Content

1. INTRODUCTION

During Koeberg Nuclear Power Station (KNPS) Outages 116 and 225 the Unit 1 and 2 Reactor Pressure Vessel Closure Heads (RPVCH) and Unit 2 Control Rod Drive Mechanisms (CRDM) were replaced, respectively. The original RPVCHs are currently under interim storage at the KNPS low level waste building (LLWB) together with the Unit 2 CRDMs.

The RPVCHs and CRDMs, which are considered contaminated and radioactive, are to be removed from Koeberg Nuclear Power Station (KNPS) for disposal at an authorised facility for radioactive waste or be subject to reprocessing.

2. SCOPE WORK

This User Requirements Specification (URS) is applicable to the following activities related to the disposal or reprocessing of solid radioactive waste, described as KNPS Unit 1 RPVCH and Unit 2 RPVCH with CRDMs, hereafter referred to as “radioactive waste”:

- Preparation of waste management optioneering studies for the removal from Koeberg, transportation and either disposal or reprocessing;
- Development of a Solid Radioactive Waste Disposal Plan (SRWDP) and supporting documentation for submission and approval to, namely Eskom, NNR, NRWDI, NCRWM and DMRE;
- Development of a packaging specification and manufacture and supply packaging and shielding for waste transport and either disposal or reprocessing;
- Decontamination of components for transportation and acceptance by an authorised facility;
- Rigging and transport plans on the KNPS site;
- Transport from KNPS site to an authorised facility with appropriate security measures;
- All statutory approvals related to transport and disposal or repossessing of radioactive waste;
- Development of a licensing framework, referencing all applicable studies, safety cases, procedures for Eskom and NNR approval;
- Waste disposal acceptance at the authorised facility; and
- Rigging and offloading plans at an authorised facility.

2.1 Purpose

This URS specifies the Eskom (Koeberg) requirements in accordance with the NEC3 Term Service Contract to be signed between Eskom and the Contractor for the transport and either disposal or repossessing of the radioactive waste, per identified phases.

2.2 Applicability

This URS is applicable to the transportation and either disposal or reprocessing of solid radioactive waste from KNPS, as applicable to the KNPS Unit 1 RPVCH and Unit 2 RPVCH with CRDMs.

3. NORMATIVE/INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following sections unless a specific revision of the document is quoted below or stipulated by the Nuclear Installation License NIL-01 variation 19.

3.1 Normative

[1] Radioactive Waste Management Policy and Strategy for the Republic of South Africa 2005.

[2] IAEA SSR-6: Regulations for the Safe Transport of Radioactive Material (2018).

[3] KAA-811: The Integrated Koeberg Nuclear Emergency Plan.

[4] National Road Traffic Act 93 of 1996 – Regulations and Notices – Government Notice R225.

[5] Nuclear Energy Act, 1999 (Act No.46 of 1999), Section 34(r)(s)(t).

[6] KWH-S-033: Processing and Administration of Solid Rad waste.

[7] VLP-WAC-01: Waste Acceptance Criteria for Vaalputs.

[8] 239-QGA-001(T): Waste Management Guideline for the Reactor Pressure Vessel Closure Head (RPVCH) with Control Rod Drive Mechanisms (CRDM) removal from Koeberg Nuclear Power Station site.

[9] SANS 10229-1:2010: Transport of dangerous goods — Packaging and large packaging for road and rail transport Part 1: Packaging.

[10] SANS 10229-2:2010: Transport of dangerous goods — Packaging and large packaging for road and rail transport Part 2: Large packaging.

[11] KSA-132 - Lifting and Rigging Program Standard.

3.2 Informative

[12] IAEA SSG-26: Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (2012).

[13] 1407CPT-0882: Transportation Study for the Delivery of the RSGs and the Delivery of the OSGs for KNPS, 17 November 2014.

[14] 238-102: Nuclear Division Supplier Level 2 Quality Management Requirements.

[15] 240-113228853: Solid Radioactive Waste Management Plan for Koeberg Nuclear Power Station.

[16] D02-ARV-01-173-244: Radiological activity inventory.

[17] 32-227: Radiation Protection and the Safety of Radiation Sources Policy.

[18] 32-226: Requirements and rules for radiation protection and the safety of radiation sources Standard.

[19] 238-51: Radioactive Waste Management Standard.

[20] RD-0034, revision 0, Quality and Safety management Requirements for Nuclear Installations

[21] ISO 9001: Quality Management Systems - Requirements

[22] ASME NQA-1: Quality Assurance Requirements for Nuclear Facilities Applications

4. DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

4.1.1 **Security Classifications**:

4.1.1.1 **Public domain**: published in any public forum without constraints (either enforced by law, or discretionary)

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

4.1.1.3 **Confidential**: the classification given to information that may be used by malicious/opposing/hostile elements to harm the objectives and functions of Eskom Holdings Limited

4.1.1.4 **Secret**: the classification given to information that may be used by malicious/opposing/hostile elements to disrupt the objectives and functions of Eskom Holdings Limited

4.1.1.5 **Top Secret**: the classification given to information that may be used by malicious/opposing/hostile elements to neutralize the objectives and functions of Eskom Holdings Limited

4.1.2 **Authorised facility:** a facility holding written permission issued by the Minister of DMRE in terms of Section 55 read with Section 46 of the Nuclear Energy Act, No. 46 of 1999

4.1.3 **Contamination**: radioactive substances on surfaces or within solids, liquids or gases (including the human body), where their presence is unintended or undesirable, or the process giving rise to their presence in such places

4.1.4 **Decontamination**: the complete or partial removal of contamination by a deliberate physical, chemical or biological process

4.1.5 **Disposal:** emplacement of waste in an appropriate facility without the intention of retrieval

4.1.6 **Radioactive waste**: waste that contains, or is contaminated with, radionuclides at concentrations or activities greater than clearance levels as established by the regulatory body

4.1.7 **Safety case**: a collection of arguments and evidence in support of the safety of a facility or activity

4.1.8 **Special arrangement**: those provisions, approved by the competent authority, under which consignments which do not satisfy all the applicable requirements of the [IAEA] transport regulations, may be transported

4.1.9 **Waste characterisation**: determination of the physical, chemical and radiological properties of the waste to establish the need for further adjustment, treatment or conditioning, or its suitability for further handling, processing, storage or disposal

4.1.10 **Low and Intermediate Level Waste (Short Lived) (LILW-SL)**: Radioactive waste with low or intermediate short-lived radionuclide and / or low long-lived radionuclide concentrations

4.1.11 **Licensing Framework**: a documented schedule of deliverable documents to support an applicable license, authorisation and permit issued by the regulatory authority

4.2 Abbreviations

Abbreviation	Description
ASME	American Society of Mechanical Engineers
BATNEEC	Best Available Technology Not Entailing Excessive Cost
Bq	Becquerel
CAS	Central Alarm Station
cm	Centimetre
CRDM	Control Rod Drive Mechanism
DMRE	Department of Mineral Resources and Energy
ECC	Emergency Control Centre
EIA	Environmental Impact Assessment
g	Gram
GPS	Global Positioning System
IAEA	International Atomic Energy Agency
KNPS	Koeberg Nuclear Power Station
LILW-SL	Low and intermediate level waste – Short Lived
LLWB	Low Level Waste Building
NCRWM	National Committee on Radioactive Waste Management
NNR	National Nuclear Regulator
NRWDI	National Radioactive Waste Disposal Institute
OE	Operating Experience
RP	Radiation Protection
RPVCH	Reactor Pressure Vessel Closure Head
RWMP	Radioactive Waste Management Plan
SRWDP	Solid Radioactive Waste Disposal Plan
TD&RM	Technical Documentation and Records Management
URS	User Requirement Specification
µSv	micro-Sievert
WAC	Waste Acceptance Criteria

5. REQUIREMENTS

The Contractor is responsible for the project planning, coordination, documenting, obtaining approvals, and managing all activities to achieve the contract objectives and the ultimate objective to safely and within the RSA Regulatory framework remove the described radioactive waste from the KNPS site, transport and deliver all items to an authorised facility for disposal or reprocessing.

The Contractor shall develop a Solid Radioactive Waste Disposal Plan (SRWDP) and supporting documents within a licensing framework including, safety cases, procedures, specifications and reports e.g. radiological characterisations, decontamination, dose exposure reports, and risk assessments, as applicable to support all authorisations and license approvals.

A phased approach is proposed for the project. The phases are given below:

- Phase 1a: Waste Management Optioneering Studies

  Development of waste management **optioneering studies** for the removal of radioactive waste from the Affected Property, considering the following scenarios:

  a) on-site storage,

  b) disposal at an authorised facility, and

  c) reprocessing in accordance with international norms and best practices;

  for the acceptance by the Service Manager.

  Note: A road transport route study to an authorised facility, (namely Vaalputs), was performed under the Steam Generator Replacement Project: Transportation Study for the Delivery of the RSGs and the Delivery of the OSGs for KNPS [13].

- Phase 1b: Solid Radioactive Waste Disposal Plan

  Development of a **Solid Radioactive Waste Disposal Plan** (SRWDP) and supporting documentation in accordance with the Radioactive Waste Management Policy and Strategy for the Republic of South Africa 2005 {based on scenario b} for submission for review, acceptance and authorisation, as applicable, to namely the Service Manager, National Nuclear Regulator (NNR), National Radioactive Waste Disposal Institute (NRWDI), National Committee on Radioactive Waste Management (NCRWM) and the Minster of the Department of Mineral Resources and Energy (DMRE).

- Phase 2: Development of the Licensing Framework

  Development of the **licensing framework** and **safety case** documentation for approval; and

- Phase 3: Implementation of the Waste Management Programme

  Implementation of the **approved SRWDP**, based on scenario b of the optioneering study, including the transport from the Affected Property to an authorised facility with appropriate security measures;
  - Transportation Packaging Design and Manufacturing
  - Obtain all acceptances for the waste disposal delivery to the authorised facility.
  - Transportation and Off-Loading

The above phases must consider the process framework and guidance set out in the Waste Management Guideline for the RPVCH with CRDM removal from Koeberg Nuclear Power Station site [8]. The guideline document also elaborates on the authorities that are to provide approval, issue authorisations and licenses to support this scope of work. For example –

- Ministerial approval from the Department of Mineral Resources and Energy for the SRWDP in accordance with [5].
- National Committee on Radioactive Waste Management (NCRWM) recommendation in accordance with the Radioactive Waste Management Policy [1] of the SRWDP.
- National Radioactive Waste Disposal Institute (NRWDI) for acceptance of radioactive waste at an authorised facility within RSA.
- National Nuclear Regulator (NNR) for the removal and transportation of radioactive material from a licensed site, namely KNPS.
- Eskom approval as the Nuclear License holder for KNPS.
- Other authorities, namely provincial, local and Koeberg management structures for documents and permits.

5.1 PHASE 1: OPTIONEERING STUDIES, WASTE MANAGEMENT PLAN AND RADIOLOGICAL CHARACTERISATION

5.1.1 Phase 1a: Waste Management Optioneering Studies

The Contractor shall develop and document optioneering studies for the radioactive waste management considering the following scenarios:

a) on-site storage,

b) disposal at an authorised facility, and

c) reprocessing in accordance with international norms and best practices at an authorised facility.

The optioneering studies shall consider the various topics described under phase 2, however not limited to the topics below:

- Current legal and licensing framework.
- Characterisation of the solid waste including packaging and shielding.
- Remedial practices based on Best Available Technology Not Entailing Excessive Cost (BATNEEC).
- Nuclear Safety and Decontamination Methods.
- Solution risks.
- Cost implications.
- Proposed best solution.

Subject to Eskom approval of the preferred radioactive waste management option, all phases and applicable requirements under this User Requirement Specification shall be adapted accordingly.

5.1.2 Phase 1b: Waste Management Plan

The Contractor shall develop the **Solid Radioactive Waste Disposal Plan** (SRWDP) for either the disposal or reprocessing of the KNPS Unit 1 RPVCH and Unit 2 RPVH with CRDMs. The plan shall comply with the requirements of the Radioactive Waste Management Policy and Strategy [1].

The plan shall be reviewed and accepted by the NRWDI and broadly describe the rigging and offloading requirements in consultation with the disposal facility operator. The SRWDP prepared by the Contractor, shall be a final product, ready for Eskom acceptance and submission to the Minister of Mineral Resources and Energy. The NCRWM shall be requested by the Minister of Mineral Resources and Energy to evaluate the SRWDP and recommend whether to approve it or not.

The methodology for the development of the SRWDP is specified in document Solid Radioactive Waste Management Plan for Koeberg Nuclear Power Station [15].

5.1.3 Phase 1b: Radiological Characterisation

The Contractor shall develop and document a procedure for radiological and chemical characterisation of the radioactive waste, see previously performed Radiological activity inventory [16] in order to classify the waste for transport and either disposal or reprocessing. The radiological characterisation process shall include the use of actual measurements and calculations. The use of a shielding software code shall be considered for the determination of the activity of the respective radionuclides. The internationally accepted characterisation methods shall be considered and classification shall be done in accordance with the IAEA transport regulations [2], Solid Radioactive Waste Management Plan for Koeberg Nuclear Power Station [15] and the Waste Acceptance Criteria for Vaalputs [7]. The method used must be scientifically sound and acceptable to Eskom and the NNR. The required information to be supplied by the Contractor includes:

- Activity distribution.
- Total activity concentration.
- The dose rates on the external surfaces of the Radioactive waste.
- The radionuclides and radioactivity levels on the accessible and inaccessible parts of the Radioactive waste.
- The total activity and activity concentration of long-lived alpha emitting radionuclides.
- The total activity and activity concentration of long-lived beta/gamma emitting radionuclides.
- The radioactivity of pure beta emitting radionuclides.
- Fixed and loose external contamination levels.

The main studies to be performed are:

- Review characterisation options – radiological and chemical.
- Perform literature review on characterisation methodology, decontamination techniques on the radioactive waste and define key considerations for inclusion in the review i.e. external measurements, internal measurements and modelling.
- Develop a characterisation model and procedures (i.e., methodologies).
- The Contractor shall take into account International best practices.

The list of radionuclides must be exhaustive enough to include all the radionuclides that are expected to be on the inaccessible parts of the Radioactive waste. The dose rates and radioactivity must be reported in units of μSv/h, Bq, $Bq.g^{-1}$ and $Bq.cm^{-2}$. The Contractor shall determine any other radiological data that will be required for the radioactive waste classification of Unit 1 RPVCH and Unit 2 RPVCH with CRDMs in terms of the Radioactive Waste Management Policy [1], Waste Management Guideline for the RPVCH with CRDM removal from Koeberg Nuclear Power Station site [8], Waste Acceptance Criteria for Vaalputs [7] and the IAEA transport regulations [2].

5.1.4 Phase 1b: Decontamination Methods

The outcome of the Waste Characterisation must determine whether Decontamination methods are required. The study will include, as a minimum, decontamination means to achieve the transport and either disposal or reprocessing requirements.

5.1.5 Phase 1b: Packaging and Shielding

The Contractor shall investigate suitable packaging and shielding methods to meet the IAEA Transport requirements [2], to facilitate the transportation from KNPS to an authorised facility. The Contractor shall evaluate ***International Operating Experience*** (OE) for the disposal of the radioactive waste. The Contractor shall determine the suitable packaging or shielding material to be used to package the radioactive waste. The Contractor shall manufacture and supply packaging and shielding in accordance with the approved waste management option as per Phase 1.

The Contractor shall recommend to Eskom the preferred transportation packaging method for implementation that considers regulatory, technical dimensions, International Operating Experience (OE), public acceptance, safety, and economic considerations.

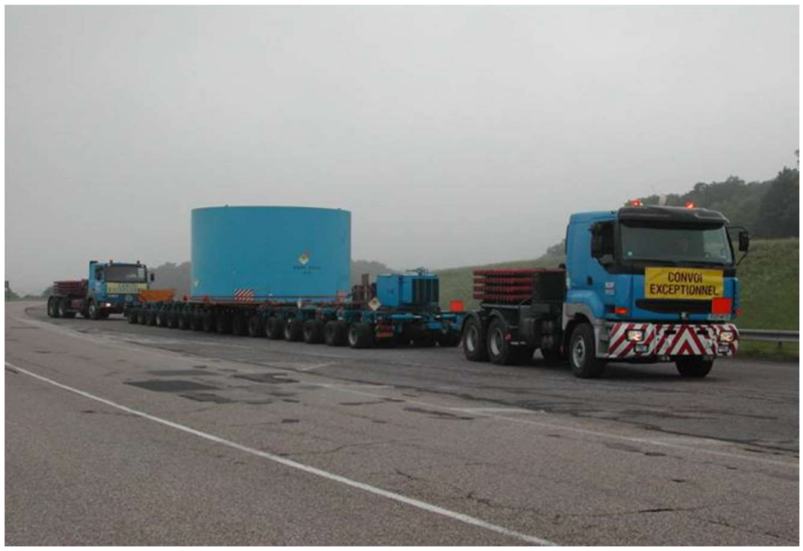

Figure 1: Example for transporting the RPVCH

5.2 PHASE 2: DEVELOPMENT OF THE LICENSING FRAMEWORK

Subject to the radioactive waste management option approved by Eskom under Phase 1, all subsequent requirements shall be aligned.

The Contractor shall prepare and document a licensing framework and safety cases with supporting documents to obtain permission for the removal, transportation, security and either disposal or reprocessing of the radioactive waste.

The Contractor shall prepare the authorisation and license application/s for the removal, transportation, security and either disposal or reprocessing of the radioactive waste for submission to the applicable authorities, e.g. Eskom, NNR, NRWDI, and others. Refer to the Waste Management Guideline [8] for the process framework.

5.2.1 Preparation of Licensing Framework

The purpose of the licensing framework is to initiate communication with the NNR and other applicable authorities and to obtain agreement in principle to be followed by the licensing of all aspects associated with the radioactive waste.

A typical licensing framework for the transportation and either disposal or reprocessing of radioactive waste should address the following:

- Purpose;
- Scope;
- Applicable documents;
- Project Summary;
- Project hazard overview and fundamental safety functions;
- Project phases and submittal plan (i.e. timing); and
- Project safety case, procedural and supporting document submissions.

The Contractor shall prepare all applications for submission for the licensing approvals related to radioactive waste including continued temporary storage at KNPS, removal, transportation, security and either disposal or reprocessing.

The licensing submissions shall be made by the Employer, but not limited to the following entities; the NNR, Department of Mineral Resources and Energy, Department of Transport and Public Works (Provincial), local authorities, National Radioactive Waste Disposal Institute (NRWDI), etc.

5.2.2 Licensing Framework Supporting Topics

The licensing framework shall consider inter alia:

5.2.2.1 Waste Characterisation

The Contractor shall perform a radiological characterisation of the radioactive waste. The radiological characterisation process shall include the use of actual measurements and calculations. The method used must be scientifically sound and acceptable to Eskom and to the NNR. See the input information under section 5.1.2.

5.2.2.2 Remedial Practices

The Contractor must determine remedial practices in accordance with the proposed optioneering studies that shall be applied to maintain or reduce radiation and dose exposure levels emanating from the radioactive waste, for the removal from KNPS, transportation and disposal interventions.

The remedial practices to consider, at least:

- Waste Acceptance Criteria for Vaalputs [7];
- IAEA transport regulations [2] and [4]; and
- Dose exposure to workers and members of the public.

5.2.2.3 Waste Handling Plans

The Contractor shall perform and document such waste handling studies for approval, to determine the most suitable method for loading and off-loading the radioactive waste at KNPS and the authorised facility. The following shall be considered in the study:

- Regulatory requirements;
- KNPS applicable process documents and procedures for rigging and handling reference KSA-132 [11];
- Technical, operational and safety requirements and options;
- Availability and flexibility of load handling means; and
- Economic trade-offs.

5.2.2.4 Risk Assessments

The Contractor shall perform risk assessment studies considering the options considered (as documented under section 5.1.1 above) for the radioactive waste management project. The risk assessment shall identify all events or conditions that may affect the project objectives including schedule, cost and mitigations. Refer also to the Waste Management Guideline [8].

5.2.2.5 Public Awareness Programme

The Contractor shall facilitate liaison with the NNR at the early stages of the project to determine the degree of mandatory public awareness and information sessions for the radioactive waste transportation and either disposal or reprocessing. The licensing framework will have a corresponding interaction in this matter. The Contractor shall prepare and implement the public awareness programme as required by the NNR.

5.2.2.6 Preparation of Safety Cases

The Contractor shall prepare the safety cases, see Appendix A for a proposed structure, for the KNPS temporary storage, transport, and either disposal or reprocessing of the radioactive waste.

Inter alia the Contractor shall determine the metallurgical corrosion rates and leaching rates of the radioactive waste for use in the safety case and the rate of migration of radioactivity into ground water. The dose to the public will be assessed for the different periods, including the post-closure period. The annual dose estimate will be compared to the limit under the authorised facilities license conditions.

The Contractor shall also consider the results of a safety assessment of credible accidents associated with the handling and transportation of radioactive waste. The dose that will be incurred by the workers and members of the public shall be determined for all credible postulated accidents.

The Contractor shall develop the Emergency Plan for the radioactive waste transportation to an authorised facility, see Appendix A for the proposed headings.

5.2.2.7 Waste Disposal Acceptance Criteria

Subject to the approved option under section 5.1.1, the disposal facility's waste acceptance criteria shall be established.

The current authorised facility (Vaalputs) for the disposal of radioactive waste is licensed to dispose of Low and Intermediate Level Waste – Short Lived (LILW-SL) in near surface trenches. The Waste Acceptance Criteria (WAC) for Vaalputs [7] prescribes criteria that shall be met before radioactive waste will be accepted for disposal at the authorised facility.

The Contractor shall prepare such documentation for approval to demonstrate that the radioactive waste complies with the requirements of Waste Acceptance Criteria (WAC) for Vaalputs [7], stipulated below:

- Compliance with standards and acceptance criteria;
- Waste transport;
- Waste form;
- Data pack and documentation; and
- Any other applicable WAC requirement to the project.

5.2.2.8 Packaging and Shielding for Disposal

See the input information under section 5.1.4.

5.2.2.9 Transportation

Eskom commissioned a study that evaluated the different transport routes from KNPS to the authorised facility, namely Vaalputs, for the Steam Generator Replacement (SGR) Project. The study concluded that road transport was the preferred option [12], if Vaalputs is determined as the preferred option.

The Contractor shall review this study for applicability to the radioactive waste and document a Transportation Plan making recommendations as to -

a) suitable route with identification of all the necessary permits and approvals from the roads authorities, as applicable;

b) transportation requirements, including emergency measures, considering those described in the Waste Acceptance Criteria for Vaalputs [7]; and

c) packaging, notices, labelling, documentation, etc. required to comply with the IAEA transport regulations [2] and SANS 10229 parts 1 [9] and 2 [10].

5.3 PHASE 3: IMPLEMENTATION OF THE WASTE MANAGEMENT PROGRAMME

Subject to the approved option under section 5.1.1, the Solid Radioactive Waste Disposal Plan (SRWDP) shall be implemented.

The Contractor shall be ultimately responsible for the implementation and execution of the licensed Solid Radioactive Waste Disposal Plan (SRWDP). The implementation shall focus on the following:

- Securing supporting approved Contractors to execute applicable aspects of the programme
- Securing the applicable equipment, tools, and resources to execute the programme activities
- Directly managing the execution of the programme implementation
- Closing out the executed activities and submission of close-out certification

5.3.1 Transportation Packaging Design and Manufacturing

The Contractor shall use the information from the optioneering studies and as described under [Section 5.1.4] to design and manufacture the packaging and or shielding.

5.3.2 Disposal Acceptance at an Authorised Facility

The Contractor shall ensure acceptance of the radiological waste by the authorised facility.

5.3.3 Transportation and Off-Loading

The Contractor shall be responsible for the loading at KNPS and the off-loading of the radioactive waste, in terms of the scope of this URS, at the authorised facility.

The Contractor shall ensure that all the requirements identified in section 5.2 above are implemented. The Contractor shall ensure that the transport vehicles meet all the legislative, regulatory and IAEA requirements prior to transport from KNPS. The Contractor shall ensure that the transport plan is implemented and that all the requirements as set out in the approved safety case are complied with.

The Contractor shall be responsible for the off-loading and rigging infrastructure at the authorised facility.

6. DOCUMENTATION

The Contractor shall be responsible for the development of all supporting documentation for the storage, transportation, and either disposal or repossessing of the radioactive waste. The documentation includes, but not limited to, the Solid Radioactive Waste Disposal Plan (SRWDP), safety case/s, the transportation of the radioactive waste from KNPS to the authorised facility and documentation/permits from applicable Road's authorities.

All the documents generated by the Contractor and accepted by Eskom shall be retained as a permanent record for the operational life of KNPS by the Technical Documentation and Records Management (TD&RM).

Each document deliverable is to be provided in hardcopy and includes all required signatures obtained.

Each document deliverable is also to be provided as a searchable electronic PDF format and includes all required signatures obtained. Electronic signatures are generally acceptable in accordance with the Contractor's Quality Management System.

Each document deliverable is provided as an editable Microsoft file which corresponds to all final documentation issued to Eskom.

All documentation, including drawings and operating and maintenance instruction manuals, are uniquely identified and cross-referenced with all related documents.

All documents provided by the Contractor as part of this project will become the sole property of Eskom. No information or documentation can be shared or disclosed to a third party without prior consent from Eskom.

6.1 Documentation to be provided by Eskom

Eskom, on request from the Contractor, provides copies of all applicable Eskom Standards, Procedures, Guides, Work instructions and Forms as well as available technical details of the radioactive waste, as applicable.

The Project Manager only authorises the relevant personnel once the Contractor has signed a confidentiality agreement.

6.2 Project Management Plan

The Contractor shall prepare the project management plan for acceptance by Eskom. The Contractor shall develop a project schedule that is acceptable to Eskom, setting out interventions (major and minor activities), critical path, start and end dates, with Gantt chart presentations.

6.3 Communication Plan

The Contractor shall prepare a communication plan for acceptance by Eskom. The communication with internal and external stakeholders shall be addressed in the plan.

6.4 Risk Assessment

See Section 5.2.2.4.

6.5 Environmental Authorisations

The Contractor shall be responsible for any environmental authorisation or environmental permits that may be required for the disposal of the radioactive waste.

7. QUALITY REQUIREMENTS

7.1 Classification Technical Control

Technical control shall be in accordance with the classifications given below:

Scope of Service	Classification No	Quality Level	RD-0034 Level
The disposal of solid radioactive waste from KNPS, as applicable to the KNPS Unit 1 RPVCH and Unit 2 RPVCH with CRDMs	0007/04Q	Q1	Level 2

7.2 Quality Assurance Programme

The Contractor shall meet the Nuclear Division Supplier Level 2 Quality Management Requirements as specified in 238-102 [14].

The Contractor and his Supplier/s are therefore required to implement a quality management system (QMS) which is consistent with and meets the requirements of Reference [14], [20], [21] & [22]. The Contractor and his Suppliers shall provide certification to prove compliance to these stated requirements.

The Employer or his appointed quality assurance representative reserves the right of access to the Contractor's or Supplier's facilities and records for the purpose of inspection or audits.

8. DEVELOPMENT TEAM

Name	Designation
L Geldenhuys	Technologist Engineering - Design Engineering
L Kloppenborg	RPVCH Project: Quality Engineer
R Adams	RPVCH Project: Project Leader

9. ACCEPTANCE

This document has been seen and accepted by:

Name	Designation
X Motlhale	Project Manager – Nuclear Project Management (NPM)
J Kotze	Execution Manager (Strategic) Nuclear Project Management (NPM)
A Kotze	Chief Engineer Nuclear Engineering (NE)
T Karsten	Chief Advisor - Radiation Protection
C Le Roux	Snr Supervisor Radiation Waste

10. REVISIONS

Date	Rev.	Compiler	Remarks
December 2015	1	L Geldenhuys	Original issue.
October 2022	2	L Geldenhuys	Updated phases and information detail
February 2023	3	L Geldenhuys	Alignment of phases 1a and 1b and sequence with the procurement strategy.

11. APPENDICES

11.1 APPENDIX A: Transportation Safety Case structure

APPENDIX A: TRANSPORTATION SAFETY CASE STRUCTURE

The following provides the information structure for the transportation safety case, and serves as an example for other safety cases structures:

a) Transportation route justification.
b) Waste package qualification.
c) Transportation safety assessment.
   i. Purpose
   ii. Scope
   iii. Approach
   iv. Risk assessment model
   v. Inventory analysis
   vi. Risk calculation
d) Transport plan.
   i. Pre-transport planning
      - Identification and classification
      - Transport agreement with road authorities
      - Transport mode
      - Selection of the packaging
      - Emergency planning
      - Security planning
      - Route planning
      - Loading and off-loading facilities
      - Insurance
   ii. Pre-transport readiness verification
      - Operator fitness
      - Checks performed by the Contractor
      - Driver readiness
      - Vehicle fitness and requirements
      - Consignment verification (Radioactive material assessment)
   iii. Loading, transport and unloading
      - Provide signage for all vehicles/trailers
      - Provide emergency procedure orientation to drivers
      - Provide security procedure orientation to drivers
      - Provide drivers with the route and convoy instructions
      - Ensure necessary radiological surveys have been performed and conform to transport requirements
   iv. After loading
      - The transport vehicle is mechanically safe and with notices and signage
      - All packaging is secured and properly labelled
      - Check that the contact dose rate on the surface of the radioactive waste packages is less than 2 mSv/h.
   v. Transport schedule
   vi. Transport
      - Requirements for the manning of the Koeberg Emergency Control Centre (ECC)
      - Each trailer and hauler to be suitably licensed and equipped for hazardous goods
      - Specify escort requirements for the convoy (e.g., security, RP and emergency response team)

- Specify convoy split and separation distance
- Specify escort requirements for each section of the convoy and for the overall convoy
- Specify the speed limit for the convoy
- Specify the number of planned stops for fuel, driver comfort and meals. Specify criteria and procedure for unplanned stops
- Specify pre-arrangements with the authorities to prevent convoy stops such as at weigh bridges.
- Communication arrangements between elements of the convoy as well as between the convoy and the ECC
- Determine official in charge of the convoy and reporting hierarchy in the ECC
- Tracking and monitoring of the convoy by the ECC or Central Alarm Station (CAS)
- Requirements for portable Global Positioning System (GPS) devices in the convoy

vii. Statutory and regulatory requirements

- Authorisation to process and transport radioactive waste
- Authorisation from the authorised facility to receive radioactive waste
- License requirements for transport vehicle to carry dangerous goods
- Professional Driver Permit requirements for the drivers
- Testing and certification of all lifting equipment
- Training and certification requirements for personnel such as riggers and crane operators
- Training requirements for drivers, riggers, and crane operators for handling of radioactive material

e) Transport emergency plan.
   i. Reporting mechanism
   ii. Communication failure
   iii. Breakdowns
   iv. Vehicle accidents
   v. Spills of waste materials
   vi. Handling of injured persons who are contaminated
   vii. Clean-up operations
   viii. Hijacking
   ix. Fire
f) Transport risk management plan.
   i. Identification and classification of risk
   ii. Risk categories and ownership
      - Security
      - Safety
      - Operational
      - Quality
      - Financial
      - Social
      - Environmental
      - Health
   iii. Risk quantification
g) Transport security plan.
   i. Responsibilities for Transporter, Security and Drivers
   ii. Training of all role players
   iii. Security measures

- Transport vehicle
- Communication means
- Waste package securing on transport vehicles

iv. In-transit requirements

h) Emergency response plan

i. Equipment and emergency response kits (risk informed)
ii. Personnel
iii. Actions
iv. Responsibilities
    - KNPS
    - ECC
    - Emergency Controller
    - Health Physics Controller
    - RP Specialist accompanying the convoy
    - RP Monitor accompanying the convoy
    - Drivers of the vehicles transporting the waste packages
    - Fire fighters
    - Security
v. Radiation protection programme
vi. Emergency reaction plan
    - Mechanical breakdown
    - Accident
    - Hijacking
    - Fire