| Eskom | User Requirements Specification | NUCLEAR ENGINEERING |
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Title: **User Requirements Specification – Nuclear Fuel Handlers**

Document Identifier: **RFE-URS-2025-43**

Alternative Reference Number: None

Area of Applicability: **Eskom Holdings SOC Ltd**

Functional Area: **Nuclear Engineering**

Revision: **1**

Total Pages: **8**

Next Review Date: **Not Applicable**

Disclosure Classification: **Controlled Disclosure**

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| Date: 2025-08-13 | Date: 2025-08-13 | Date: 2025-08-13 | Date: 2025-08-13 |

## Nuclear Additional Classification Information

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|---|---|
| Business Level: | **3** |
| Working Document: | **3** |
| Importance Classification: | **N/A** |
| NNR Approval: | **No** |
| Safety Committee Approval: | **No** |
| ALARA Review: | **No** |
| Functional Control Area: | **Nuclear Engineering** |

## Content

# 1. Introduction

Reactor Fuel Engineering (RFE) is mandated to establish and maintain the basis for safe nuclear fuel operation in line with the operating specifications. Thus, fuel handling operations form part of the RFE mandate.

Fuel handling services are regarded as critical as it involves direct manipulation of nuclear fuel. These services are required during both maintenance and refuelling outages. In an outage activities entails unloading of the reactor core to allow drain down for statutory maintenance interventions to be executed. Following this maintenance period, the core needs to be replenished with a fuel batch that consists of one third fresh assemblies. This newly loaded core will supply the necessary energy for the reactor to operate for a full cycle, according to the 10 Year Production plan requirements.

Outside outage periods, fuel handling services involve the receipt of fresh nuclear fuel in specialised nuclear fuel containers. The new nuclear fuel has to be shunted, unpacked, inspected and stored in dry storage racks. Furthermore, other services include handling, inspection and loading of spent nuclear fuel into dry storage casks.

Fuel handlers perform all of the above activities and play a crucial role to ensure that these activities, which involves the direct handling of the first protection (fission) barrier, are executed with the necessary due diligence and with nuclear safety as the overriding consideration.

RFE requires the Nuclear Fuel Handling Services contract as this forms part of the nuclear strategic support services for Koeberg Nuclear Power Station (KNPS).

# 2. Supporting Clauses

## 2.1 Scope

The scope of this User Requirement Specification (URS) covers Eskom requirements for the services required by the RFE to support the RFE mandate.

### 2.1.1 **Purpose**

The purpose of this URS is to define Eskom requirements for the services required by the RFE to support the RFE mandate.

### 2.1.2 **Applicability**

This document applies to the services required by the RFE group and the Contractor for RFE to achieve RFE mandate.

### 2.1.3 **Effective date**

The URS shall be effective from the authorisation date.

## 2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

#### 2.2.1 Normative

[1] NNR Act: National Nuclear Regulatory Act, 1999 (Act No.47 of 1999)

[2] ISO 9001: Quality Management Systems

[3] RD-0034: Quality and Safety Management Requirements for Nuclear Installations

#### 2.2.2 Informative

[4] N/A

### 2.3 Definitions

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

2.3.2 **Contractor:** for the purposes of this URS, the Contractor is the organisation responsible for the works.

### 2.4 Abbreviations

| Abbreviation | Explanation |
|---|---|
| ACP | Access control Point |
| FFD | Fitness for Duty |
| IAEA | International Atomic Energy Agency |
| KNPS | Koeberg Nuclear Power Station |
| NNR | National Nuclear Regulator |
| NAS | Nuclear Analysis and Siting |
| RFE | Reactor Fuel Engineering |
| URS | User Requirement Specification |
| PMC | Fuel Handling and Storage |
| PPE | Personnel Protective Equipment |
| RCCA | Rod Control Cluster Assembly |

### 2.5 Related/Supporting Documents

N/A

## 3. Requirements

### 3.1 RFE Scope of Work

The Nuclear Fuel Handling Services will be used for all fuel handling activities for both outages period, and online.

### 3.2 Service Description

The Nuclear Fuel Handling Services will be required to drive the Fuel Handling equipment (PMC) crane both in reactor and fuel buildings during unloading and reloading of the core. In between unload and reload, Nuclear Fuel Handlers are required in the fuel building for fuel permutations which involves manipulation of fuel handling tools. Outside outages fresh fuel assemblies are delivered at Koeberg, this work includes shunting of fresh fuel containers from O m to 20 m fuel building, unpacking, and storing of fresh fuel assemblies.

The Nuclear Fuel Handlers' activities are as follows:

- Drive the PMC crane in the spent fuel pool in the fuel and reactor buildings.
- Move fuel from the spent fuel pool to the transfer channel.
- Control the transfer compartment.
- Move fuel from transfer channel into the reactor.
- Operate the fuel handling tools in the spent fuel pool.
- Load the fuel handling sequence on the PMC both in the reactor and fuel buildings.
- Understand and resolve fuel handling rules on the PMC crane.
- Shunt fuel containers in and out of fuel building.
- Operate fuel unpacking equipment.
- Open new fuel containers.
- Unpack new fuel into dry storage.
- Operate the new fuel elevator to transfer new fuel into the spent fuel pool.
- Load spent nuclear fuel into the dry casks.
- Sipping of spent nuclear fuel assemblies to check for fuel defects.
- Unpack new Rod Control Cluster Assemblies (RCCAs).

### 3.3 Timelines of the Deliverables

Duration every outage and outside the outage period they will be needed for fresh fuel reception and dry cask loading.

- Start Date: 01 December 2025
- Completion Date: 20 December 2030

### 3.4 Access and Training Requirements

- The educational level is a Grade 12 certificate or relevant experience in fuel handling with proficiency in English reading and writing.

- KNPS will be providing technical training that is required to be authorised as a Nuclear Fuel Handler by the RFE Manager or delegate.
- Nuclear Fuel Handlers already authorised by the KNPS RFE Manager or delegate.

### 3.5 Working Times

The normal working hours (45 per week outside outages) at KNPS are as follows:

Monday -Thursday: 07h30 – 16h35

Friday: 07h30 – 13h30

Therefore, the contractor will follow the Eskom KNPS normal working hours.

During outages and for pre-outage activities:

- Shift work is applicable and will be according to an agreed shift roster.
- Shift work is envisaged to be 12-hour cycle to cover a 24-hour day, with 1 off day in 7 days during activities.

### 3.6 Handling, Storage, Conservation, Transportation and Packaging

All documentations and records produced will be stored in line with Eskom documents and record management system.

### 3.7 Quality Assurance Requirements

All work should be performed in compliance with the Nuclear Engineering Quality Management systems as contained in Eskom document 331-2 and other RFE processes.

### 3.8 Health and Safety

The contractor shall comply with the health and safety requirements as stipulated by Eskom KNPS including Eskom's lifesaving rules, SHEQ policy, SHE specifications, Fitness For Duty (FFD) and Personnel Protective Equipment's (PPE).

### 3.9 Operating Experience

The contractor should be able to use latest methodologies based on latest international standards codes and guides to perform the work. Eskom will supply any relevant Operating Experience that is available.

## 4. Acceptance

This document has been seen and accepted by:

| Name | Designation |
|---|---|
| Nolan Botha | Senior Physicist |

## 5. Revisions

| Date | Rev. | Compiler | Remarks |
|---|---|---|---|
| August 2025 | 0 | Nomfusi Gumede | Develop URS for Nuclear Fuel Handlers |

## 6. Development Team

The following people were involved in the development of this document:

- N/A

## 7. Acknowledgements

N/A