RFQ Number	**SAF-RFQ-0066**
Request for Quotation Date	**22 June 2023**
RFQ Closing Date	**12 July 2023**
RFQ Closing Time	**10:00**
Compulsory Site Briefing	**N/A**
Contact Person	**Koena Chokoe Tel: 012 305 5388 Email: Koena.Chokoe@necsa.co.za**
Quotation Validity	**30 Days from the closing date**
Submission Details	**RFQ Response must be sent to: Catherine.Matima@necsa.co.za**
RFQ Description	**SAFARI-1 Heat Exchangers Cleaning and In-service Inspection**

Dear Service Provider

Kindly provide a quotation for goods and or services as outlined in section 2 of this document.

1. Introduction

The South African Nuclear Energy Corporation Limited (Necsa) is a state-owned public company (SOC), registered in terms of the Companies Act, (Act No. 61 of 1973), registration number 2000/003735/06.

The Necsa Group engages in commercial business mainly through its wholly-owned commercial subsidiaries: NTP Radioisotopes SOC Ltd (NTP), which is responsible for a range of radiation-based products and services for healthcare, life sciences and industry, and Pelchem SOC Ltd (Pelchem), which supplies fluorine and fluorine-based products. Both subsidiaries, together with their subsidiaries, supply local and global markets, earning valuable foreign exchange for South Africa and are among the best in their field in their respective world markets.

Necsa's safety, health, environment and quality policies provides for top management commitment to compliance with regulatory requirements of ISO 14001, OHSAS 18001 and RD 0034 (Quality and Safety Management Requirements for Nuclear Installations), ISO 9001 and ISO 17025.

Necsa promotes the science, technology and engineering expertise of South Africa and improves the public understanding of these through regular communications at various forums and outreach programmes to the community. We are a proudly South African company continuously striving, and succeeding in many respects, to be at the edge of science, technology and engineering related to the safe use of nuclear knowledge to improve our world.

For more information on Necsa, please visit: www.necsa.co.za

2. Scope of Work

Item Description	Quantity
Pool Heat Exchanger Cleaning (See RR-SPE-0053 attached)	1
Primary Heat Exchangers Cleaning (See RR-SPE-0053 attached)	4
Pool Heat Exchanger ISI (See RR-SPE-0053 attached)	1
Primary Heat Exchangers ISI (See RR-SPE-0053 attached)	4
SHEQ Safety File	1
Site Work- Site Establishment	1

3. Evaluation Criteria

Item	Requirement	Weight	Points	Criteria
1	**Technical proposal** Specification for SAFARI-1 Reactor Pool, and Primary Heat Exchangers Cleaning and In-service Inspection (See RR-SPE-0053 attached)	50	50	Proposal is satisfactory to address the required spec objectives.
			0	No proposal submitted.
2	**Delivery Time** Please indicate on the quotation.	20	20	Supplier can deliver within specified period as per RR-SPE-0053
			0	Supplier has not specified ETD.
3	**Track Record / Company Experience**	20	20	Provide proof of (3) or more relevant reference with contact details of the clients (name of client, telephone number and/or email address)
			5	Provide proof of (1) relevant reference with contact details of the clients (name of client, telephone number and/or email address)

Item	Requirement	Weight	Points	Criteria
			0	No relevant references submitted
4	**Warranty support**	10	10	Supplier can provide warranty support after Cleaning and In-service Inspection of Heat Exchangers
			0	Supplier cannot provide warranty support after Cleaning and In-service Inspection of Heat Exchangers
Total		**100**		

4. Pricing

- All price quoted to include all applicable taxes.
- Price must be fixed and firm
- Price should include additional cost elements such as freight, insurance until acceptance, duty where applicable, disbursements etc.
- Quotation must be completed in full, incomplete quote could result in a quote being disqualified.
- Payment will be according to Necsa's General Conditions of Purchase.

5. Evaluation

5.1. Phase 1- Functionality Evaluation / Technical Evaluation

Where functional or technical evaluation criterion is applicable, assessment will be performed in terms of the criterion listed below and the criterion may include Technical, Performance, Quality and Risk.
If the Bidder's response to the Technical templates does not indicate that the Bidder can support an acceptable technical solution, the Bidder's response will be rejected and not evaluated further.

Together the Technical, Performance & Quality and Risk criteria make up the functionality criterion and a Bidder's Proposal will be evaluated for functionality out of a possible 100 points. Only RFQ responses achieving an evaluation score of greater than the set threshold points out of the possible 100 points and which score a number of points for functionality that is greater than or equal to the set threshold points of the number of points achieved by the highest scoring Bid for functionality will be selected to progress to the second stage.

5.2. **Phase 2 - Evaluation In Terms Of Preferential Procurement Policy Framework Act, 2022**

This bid will be evaluated and adjudicated according to the 80/20 point system, in terms of which a maximum of 80 points will be awarded for price and 20 points will be allocated based on the specific goals (B-BBE status level).

	POINTS
PRICE	**80**
SPECIFIC GOALS (B-BBEE status level)	**20**
Total points for Price and SPECIFIC GOALS	**100**

Preference goal
B-BBEE status level contributor

B-BBEE Status Level of Contributor	Number of points (80/20 system)
1	20
2	18
3	14
4	12
5	8
6	6
7	4
8	2
Non-compliant contributor	0

6. Required Documentation
   - Tax Clearance Certificate (Tax pin issued by SARS)
   - Declaration of interest (SBD 4)
   - BEE Certificate / Applicable Affidavit if classified as EME
   - Letter of Good Standing (COID) only if Applicable due to the nature of work required

- Any other document or certification that might have been requested on this RFQ

7. Important

7.1. The supplier must quote for the whole scope of work as specified on RR-SPE-0053 attached. It is the responsibility of the supplier to sub-contract any works/tasks as he/she may see it fit. It is the responsibility of the appointed supplier to supervise the implementation of all the works/tasks.

7.2. Quotation must be submitted on or before the RFQ closing date and time stated above.

7.3. Orders above R 30 000 will be evaluated according to the PPPFA 80/20-point system and a functionality scorecard where applicable and the ones above R 1 Million will be subjected to the tender process.

7.4. This RFQ is subjected to the Necsa's General Conditions of Purchase, Preferential Procurement Policy Framework Act 2000 and the Preferential Procurement Regulations, 2022, the General Conditions of Contract (GCC) and, if applicable, any other legislation or special conditions of contract

7.5. Failure on the part of a bidder to submit proof of B-BBEE Status level of contributor together with the bid, will be interpreted to mean that preference points for specific goals are not claimed.

7.6. The purchaser reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to specific goals, in any manner required by the purchaser.

7.7. For a Bidder to obtain clarity on any matter arising from or referred to in this document, please refer queries, in writing, to the contact details provided above. Under no circumstances may any other employee within Necsa be approached for any information. Any such action might result in a disqualification of a response submitted in competition to this RFQ.

7.8. No goods and/or services should be delivered to Necsa without an official Necsa Purchase order.

7.9. Necsa reserves the right to; cancel or reject any quote and not to award the RFQ to the lowest Bidder or award parts of the RFQ to different Bidders, or not to award the RFQ at all.

7.10. The supplier shall under no circumstances offer, promise or make any gift, payment, loan, reward, inducement, benefit or other advantage, which may be construed as being made to solicit any favour, to any Necsa employee or its representatives. Such an act shall constitute a material breach of the Agreement and the Necsa shall be entitled to terminate the Agreement forthwith, without prejudice to any of its rights

7.11. By responding to this request, it shall be construed that: the bidder, hereby acknowledge to be fully conversant with the details and conditions set out in the Necsa's General Conditions of Purchase, Preferential Procurement Policy Framework Act 2000 and the Preferential Procurement Regulations, 2022, the General Conditions of Contract (GCC), Technical Information and Specifications

attached, and hereby agree to supply, render services or perform works in accordance therewith

Document number	RR-SPE-0053(TCE No: 211547)
Revision number	00
Date	JUNE 2023
Title	Specification for SAFARI-1 Reactor Pool, and Primary Heat Exchangers Cleaning and In-service Inspection - 2023

AUTHORISATION

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REVISIONS

This document has been revised in accordance with the following schedule:

Rev. No.	Date approved	Nature of Revision	Prepared
0	See title page	First Issue	N.A. Lukoto

1. PURPOSE

This document is intended to outline the requirements for high-pressure cleaning and In-Service Inspection (ISI) of the secondary side of the heat exchangers in the SAFARI-1 reactor pool and primary heat exchangers. These requirements are specified as per the directives in the SAFARI-1 management systems.

The cleaning and in-service inspection (ISI) of the SAFARI-1 research reactor pool, and primary heat exchangers should ensure optimal performance and comply with IAEA research reactor safety standards. This specification details the requirements, methods, and standards for these tasks.

2. SCOPE

This document specifies the scope of tasks, including high-pressure cleaning and In-Service Inspections, for tubes and associated parts on the secondary side of the heat exchanger. The conduct of these tasks must align with the guidelines set forth in RR-MPR-0003 and RR-ISP-2300. The outlined tasks encompass cleaning, inspection, maintenance, and report preparation for the following:

Reactor pool & primary heat exchangers

Further, it details the regulations governing inspection authorities.

3. REFERENCES

This report is based on the requirements and guidelines supplied in the following references:

Specific revisions are preferably listed in the last column. Where all role players agreed to take full responsibility, the specific revision was replaced with 'Latest approved' revision.

3.1 REFERENCED DOCUMENTS

Ref. No.	Doc. No.	CMS ID	Document Title	Revision
[1]	RR-SPE-0030		Specification for the Reactor Pool & Primary Heat Exchangers Cleaning and ISI	00
[2]	RR-ISP-2300		In-Service Inspection Plan (ISP): SAFARI-1	08
[3]	RR-MPR-0003		Mechanical Maintenance Schedules	

4. ABBREVIATIONS

The following abbreviations are referenced in this report:

EC	Eddy current inspection
DP	Die penetrant inspection
ISI	In Service Inspection
NDE	Non-Destructive Evaluation
TVC	Control Valve
TVC054	Control Valve number 054 that regulates the flow of the secondary coolant through the heat exchanger tubes
Vis	Visual inspection

5. DEFINITIONS

The following definitions are referenced in this report:

Sulphamic acid	Also known as amidosulfonic acid Sulphamic acid (H_3NSO_3)is used as an acidic cleaning agent, sometimes in household products, for removing rust and limescale deposits

6. HEAT EXCHANGER DESCRIPTION

6.1 SAFARI-1 POOL HEAT EXCHANGER

The temperature of the pool water is reduced to around 30°C using a shell and tube heat exchanger, which is designed similarly to the primary heat exchangers. However, this heat exchanger has a smaller capacity of only 820 kW. To regulate the temperature of the primary coolant in the pool, the flow of the secondary coolant through the heat exchanger tubes, control valve (TCV054) is controlled. This ensures that there are no fluctuations in flow or pressure within the Pool Primary Coolant System.

6.2 SAFARI-1 POOL HEAT EXCHANGER SPECIFICATIONS

- Tube Material: Stainless Steel 304
- Tube Diameter: ¾" OD and 16.4mm ID
- Tube Length: 6m
- Tube Configuration: Straight/Horizontal
- Total number of tubes: 342

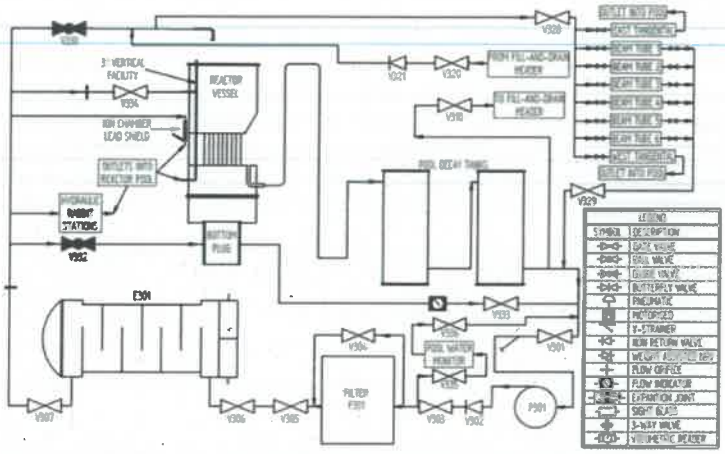

Figure 1 Safari-1 Research Reactor Pool Cooling System [1]

6.3 SAFARI -1 PRIMARY HEAT EXCHANGERS

The primary coolant piping, originating from the reactor primary pumps, extends towards the east and then divides into four separate 7.5 MW heat exchangers: E101, E102, E103, and E104. The outlets of these heat exchangers are subsequently reconnected using a 508 mm pipe. These heat exchangers are of the shell and tube type, constructed with stainless steel shells, tube plates, and tubes, along with carbon steel end covers [1].

To maintain the purity of the primary coolant water the reactor primary coolant circulates through the shell side of the heat exchangers. This ensures that the secondary side, which is more challenging to clean can be kept clean. Furthermore, the shell side, being a sealed unit, minimizes the risk of leakage to the outside.

The tubes of the heat exchangers accommodate the secondary cooling water, with the tubes being expanded and seal welded to the tube plates. Typically, all four heat exchangers operate simultaneously, with E103 and E104 sharing a common inlet valve on the primary side.

For structural integrity reasons, it is important to maintain a maximum operational differential pressure of 70 kPa across the primary side of the heat exchangers.

6.4 PRIMARY HEAT EXCHANGER TUBE SPECIFICATIONS

- Tube Material: Stainless Steel 304
- Tube Diameter: 25.4mm
- Tube Wall Thickness: 1.65mm
- Tube Length: 6m
- Tube Configuration: Straight/Horizontal
- Total number of tubes: 484/unit

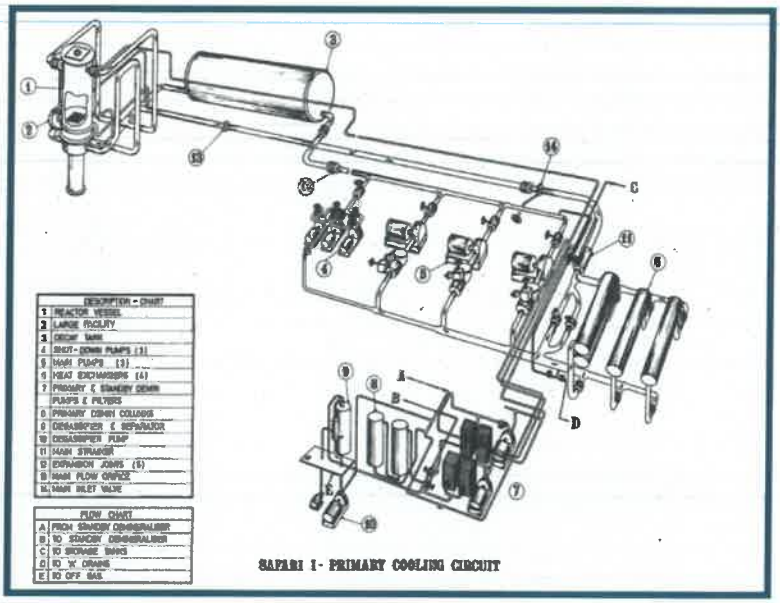

Figure 2 Safari-1 Research Reactor Primary Cooling System [1]

7. STATEMENT OF REQUIREMENTS

The SAFARI-1 In-Service Inspection Program (ISIP) establishes a critical set of obligations to ensure safe and efficient operation of the facility. Among the central components of this program is the required inspection of the reactor pool and the primary heat exchangers. This is an imperative process to detect any potential issues or areas of concern that could impact operational integrity or safety.

The In-Service Inspection Plan RR-ISP-2300, provides a breakdown of components/Items that are designated for inspection. Each component is listed in this plan, indicating its relevance and the nature of its inspection. This plan serves as a blueprint, guiding the operational team through the required procedures to guarantee the continued safety and functionality of the facility [2]. These items are specifically listed in Table 1.

This specification comprehensively outlines the inspection requirements and components to be inspected, all of which are crucial for maintaining the operational standards and safety of the SAFARI-1 facility.

Table 1 ISI Plan of listed equipment to be inspected

Item	Sample freq *	Technique / Reference	Frequency (Yearly)
7.1.1 Pool Heat Exchanger			
1. Vessel welds	100%	Vis	4
2. Tube surface conditions (Internal Secondary side)	All	Vis	4
3. Tube thickness	100%	EC / Go, No-go Gauge	4
7.1.2 Primary Heat Exchangers:	**E101, E102, E103 & E104**		
1. Vessel welds	100%	Vis	4
2. Tube surface conditions (Internal Secondary side)	All	Vis	4
3. Tube thickness	100%	EC / Go, No-go Gauge	4

The table lays out the sample inspection frequency, inspection method, and the interval between inspections. The listed frequency or inspection coverage represents the bare minimum requirement.

7.2 PRELIMINARY REQUIREMENTS

7.2.1 Inspection Approach

The ISI provider must detail the methodology that will be used in preparing for, implementing, and documenting the ISI program.

7.2.2 Inspection Timeframe

The ISI provider must ensure they are prepared to perform the inspection within the agreed time period, with the actual inspection not exceeding 2 days. This timeframe does not include potential on-site preparations and equipment setup which can be completed prior to shutdown.

Similarly, the high-pressure cleaning provider must confirm their preparedness to carry out the cleaning within the agreed timeframe, with the actual task not lasting more than 3 days. This does not include potential on-site preparations and equipment setup which can be accomplished prior to shutdown.

8. CLEANING REQUIREMENTS

8.1 HEAT EXCHANGERS CLEANING

The primary heat exchangers shall be cleaned to ensure optimal thermal efficiency, ensuring the removal of any deposits and obstructions.

Objective: The task's aim is to thoroughly clean all heat exchanger tubes in compliance with RR-MPR-0003. The pool heat exchanger is to be cleaned annually, while primary heat exchangers require cleaning every two years.

The cleaning procedure comprises: • Unsealing, cleaning, and conducting a visual inspection. • Treating with a 5% - 10% solution of inhibited Sulphamic acid, followed by high-pressure water tube cleaning. • Cleaning and inspecting lids & end shields for any signs of rust.

The supplier is tasked with safely discarding all Sulphamic effluent from the site, an obligation encompassed in their pricing structure.

9. IN-SERVICE INSPECTION (ISI)

ISI for heat exchangers should assess the performance of tubes, seals, and joints, and overall structural integrity.

9.1 ISI ITEM DESCRIPTION AND REQUIREMENTS

The goal of the inspection process is to visually inspect and measure the thickness of the secondary side heat exchanger tubes.

9.1.1 Tube Visual Inspection

Objective:

The inspection aims to visually scrutinize the heat exchanger tubes to detect any irregularities like cracks, visible corrosion, or deformations implying corrosion, especially at welds on the tubes.

9.1.2 Eddy Current Inspection of Tube Thickness

Objective:

The inspection's purpose is to assess the tube integrity through an Eddy Current (EC) inspection of all (100%) internal heat exchanger tubes.

The following shall be verified by Necsa and copies obtained as applicable:

- Personnel Qualification Records (qualified NDE person)
- Calibration of test equipment.
- All inspection and test reports.
- Inspection and test instructions (detailed the codes and standards used for the NDE).

10. CLEANING AND ISI METHODS

Methods used should be based on international best practices, with an emphasis on non-intrusive, remote techniques to minimize exposure to personnel.

11. COMPLIANCE

All activities should comply with relevant regulations and safety procedures, including radiation protection measures, environmental protection guidelines, and waste disposal practices.

12. REPORTING

Detailed documentation of all cleaning and ISI activities should be provided. This includes a description of the process, findings, any issues, and corrective actions taken.

Cleaning and In-Service Inspection (ISI) of the heat exchangers are crucial for maintaining operational efficiency and safety standards. Detailed documentation of these procedures is essential for quality control and future reference.

The documentation of the cleaning process should cover the techniques and methods used, along with the outcomes, noting any anomalies observed during the process. Similarly, the ISI reports should detail the inspection methodology, findings, and any concerns identified during the procedure.

Both these reports should comprehensively discuss any issues encountered. These could include equipment malfunctions, unforeseen conditions, or any other incidents that may have hindered the process or potentially affect the performance of the heat exchangers.

Lastly, the documentation must also include the corrective actions undertaken to resolve any detected issues. These may include immediate repairs, changes in maintenance protocols, or upgrades in equipment based on the findings.

13. QUALITY ASSURANCE

The supplier shall implement a quality assurance program, ensuring that all activities are carried out in line with the industry's best practices and regulatory requirements.

14. SAFETY REQUIREMENTS

The supplier is obligated to rigidly comply with all nuclear and occupational safety norms and guidelines, including provisions for emergency situations, worker protection, and reduction of radiation exposure.

Given that the facility operates at its maximum power level and only accommodates brief monthly and annual shutdowns, these short intervals will be capitalized upon for carrying out this task as dictated by RR-MPR-0003.

During any shutdown phase, it is mandatory to completely drain the water level in the secondary system before embarking on this task.

Steps will be taken to regulate exposure to workers near the heat exchangers as well as to the supplier's equipment. It is anticipated that the supplier will align with all safety mandates set forth by SAFARI-1. To ensure this, a safety induction conducted by Necsa will be arranged prior to the commencement of work. This induction is not expected to exceed a 4-hour duration.