

Tender no:

## SCOPE OF WORK FOR THE SUPPLY OF

Cystal Habit Modifier for the Reaction Section at the Phosphoric Acid Plant




Tender no:

Revision<sup>1</sup>: **0.1 see** legend at bottom of page

Revised date: 25.11.2025

NAME	TITLE	Empl. no	SIGNATURE	DATE
<b>COMPILED - RECOMMENDATION</b>				
Siboniso Siyaya	Production Engineer	502150		04/03/2026
Ntsikelelo Lukope	Technical Services Manager	503496		06/03/2026

### APPROVAL TO PROCEED

Sagie Moodley	Phosphoric Acid Manager			06/03/2026
Musa Xulu	GM: Acid Division	12021		09/03/2026
Charles Mavuso	SHREQ Manager	504688		24/03/2026



---

**CONTENTS**

- 1.1 Confidentiality**
- 1.2 Conditions and Undertaking**
- 1.3 Background to the Scope of Work**
- 1.4 Scope of Work**
- 1.5 Quantity of CHM**
- 1.6 Dosing Equipment**
- 1.7 Pre-requisites & Inputs**
- 1.8 Document control and Quality Management**
- 1.9 Company Profile**
- 1.10 Health, Safety and Environment**
- 1.11 Tender Adjudication**
- 1.12 Tender Acceptance**
- 1.13 Site Visit**
- 1.14 Bill of quantities**



**1.1. Confidentiality**

The Bidder shall not disclose any such information or specification, whether explicit or implied, to any third party without the express written permission of a duly authorized representative of FOSKOR. Any bidder electing not to respond to this Request for Tender (RFT) shall ensure that the original correspondence and / or electronic media are returned to FOSKOR.

**1.2. Conditions and Undertaking**

The terms set out here are for recording the basis of the principles and topics upon which the parties will be required to reach agreement in concluding on the proposed agreement. It shall not be binding until they are incorporated into a comprehensive formal and final contract agreement signed by both parties.

Tenderers are required to submit full technical and support documentation of their proposed course of action where necessary. The tenderer accepts Foskor's minimum standard in terms of quality and specification. The costs incurred in preparing the tender are for the account of the Tenderer. Foskor (Pty) Ltd will not accept liability for the costs arising out of the delay in the Tender process.

The Tenderer must guarantee the validity of the response to this tender enquiry. Any arithmetical errors in pricing are the Tenderers responsibility. The preferred tenderer will sign a contract, after which they will be governed by the terms and conditions of the contract. If the Tenderer defaults, the Client, Foskor (Pty) Ltd, will have recourse in terms of the conditions as stipulated in the contract.



---

**1.3. Background to Scope of Work**

Foskor is a vertically integrated operation that consist of a Mining and Acid division. From phosphate-bearing ores, the operations in the Mining Division process phosphate rock concentrate, which is crucial for stimulating and raising crop yields. The Acid Division Plant manufactures sulphuric acid, phosphoric acid and phosphate-based granular fertilisers by using phosphate rock as a raw material.

The mine beneficiates igneous based phosphate rock ore which is used in the Phosphoric Acid as a raw material together with the Sulphuric Acid to produce Merchant Grade Phosphoric Acid (54 % as P<sub>2</sub>O<sub>5</sub>)

There are two types of rock used in phosphoric acid manufacturing. One is sedimentary and the other one igneous rock. Currently the plant is using only the igneous rock which is characterised by low reactivity. To assist the reaction the process requires Crystal Habit Modifiers (CHM) to be added in the reactor. The purpose of the CHM is to improve the crystal size and shape for better filtration and enhance the recovery of weak acid from the filters. It must be noted that Foskor does, occasionally, use sedimentary rock. This is, however, the exception.

In the reaction section the CHM is dosed utilizing the ratio control philosophy in relation to the sulphuric acid flow. The filterability of the P<sub>2</sub>O<sub>5</sub>/gypsum slurry is a function of temperature, SO<sub>3</sub> content, mother liquor density as well as the percentage solids. These are controlled at the reaction stage. In addition to this the filterability is also affected by the size, size distribution and morphology of the gypsum crystals as well as the rheology of the slurry. The optimum crystal is based on the length to width ratio close to 1:1 and if the ratio is different filtration efficiency is affected. Under/Overdosing, change in quality of CHM results in needle-like shaped crystals which tend to block the pores in the filter cloth. Control of the crystal shape is generally achieved by means of the addition of CHM which chemically interacts with the crystals driving them towards a more favourable shape. Therefore, it is imperative that the performance of the CHM is maintained to the highest standard. It is important that the correct and consistent quality of CHM is used to effectively filter the gypsum crystals and give the desired efficiency of phosphoric acid recovery.



## 1.4. Scope of Work

Supply of Crystal Habit Modifiers (CHM) (47.5-48.5%) for use in the Phosphoric acid plants, with the following specifications, to the Foskor, Richards Bay site:

Trade/Commercial Name:	Crystal Habit Modifiers (47.5- 48.5%)
Chemical Name:	Phenyl Sulphonate Solution
Form:	Viscous Liquid
pH@25:	8-10
Density @20 C g/ml	1.05-110
Appearance:	brown, soapy liquid

The goal of this tender is as follows:

- Obtain a reputable CHM supplier with experience in the Dihydrate Phosphoric Acid industry, specifically, that which processes igneous based phosphate rock ore. It should be noted that Foskor does occasionally, blend sedimentary rock into the feed. Whilst this is the exception it is expected that the CHM will perform to an acceptable standard in this situation. The tests will only be performed on igneous Foskor Palfos B.
- The supplier must have a proven track record of using CHM in a Phosphoric Acid plant or demonstrate that their product can achieve the performance required by supplying relevant literature of their product and verified trials of performance tests with Foskor's rock.
- The ultimate purpose of the tender is to acquire a tenderer to supply enough CHM to modify between 450 000 and 550 000 tons of  $P_2O_5$  per annum for a period of three years. The exact amount of CHM to be supplied is left to the tendered to specify. It is however expected that the tender be able to justify the amount of CHM to be used/quoted upon based on trials which they will conduct on site. Due to the risk involved in signing a contract with a new supplier that may be using a new product a full-scale trial will have to be run prior to the contract being awarded. Note that due to the risks and cost involved with running a full-scale the tender will have to prove that the CHM that is compatible with Foskor's product. This will be done by



providing references from companies that use Foskor rock in the production of phosphoric acid and by means of Foskor performing pilot plant tests using Palphos B and their proposed product. This pilot-plant trial may be witnessed by a vender representative.

- Once Foskor is satisfied with the results the tender process may proceed to the full-scale trial.
- The full-scale trial will be to confirm the efficacy of the CHM and is expected to last a week. Note that penalties will be applied should the average losses incurred during the full-scale trial be more than 10 percent greater than normal.

## Off-loading Equipment

- Foskor Richards Bay takes on the responsibility of providing the supplier with storage tank and safety shower. It is Tender's responsibility to provide pipe and pump to transfer the product to Foskor storage tank. Deliveries are only to be made during normal working hours (7:30am to 16:30pm) unless there is an emergency.
- The driver must have Hazardous chemical transport certificate
- The driver must wear Foskor approved PPE
- The tanker truck must have a reflector chevron
- The truck must have board that shows the UN number for the chemical load.
- The truck must have a capacity to carry minimum 15 tons of CHM.

The exact details of the penalty will be laid out in the final contract. In summary the tender will be adjudicated in three stages. These are:

- **Stage 1**
  - o The Tenderer shall supply Foskor with documentation to prove their bone-fides with regards to the supply of crystal habit modifier on this scale. This will include:
    - References and history of business regarding the supply of crystal habit modifier.
    - Proof of plant capacity to supply enough quantities.

- History of supply of crystal habit modifier to either Foskor or one of the other phosphoric acid manufacturers that use igneous phosphoric rock, preferably one of Foskor's clients.
- **Stage 2**
  - The remaining tenderer shall supply 10 liters of CHM for Foskor to trial on its pilot plant. The pilot plant will take a week for each tenderer. Once the pilot plant trial is completed and the CHM is proven to be successful in modifying the gypsum crystals the tender will move to stage 3. The 10 liters of crystal habit modifier for trial purposes will be free of charge.
- **Stage 3**
  - The venders whose product proved successful in the pilot plant trials and meet all other requirements shall supply enough CHM for one of the plants to run for one week. This is approximately 6 tons of CHM.
  -
- Once this is done the remaining tenderers will be evaluated based on the results, references, price, and dosage.

## 1.5 Quantity of CHM

The quantities required from the successful tenderer are as follows:

The tenderer is to supply enough CHM to produce between 450 000 and 550 000 tons of  $P_2O_5$  per annum for a period of three years. The exact amount of CHM is around 4000 tons.

Supply 25 tons of crystal habit modifier within 48 hrs after the order has been placed.

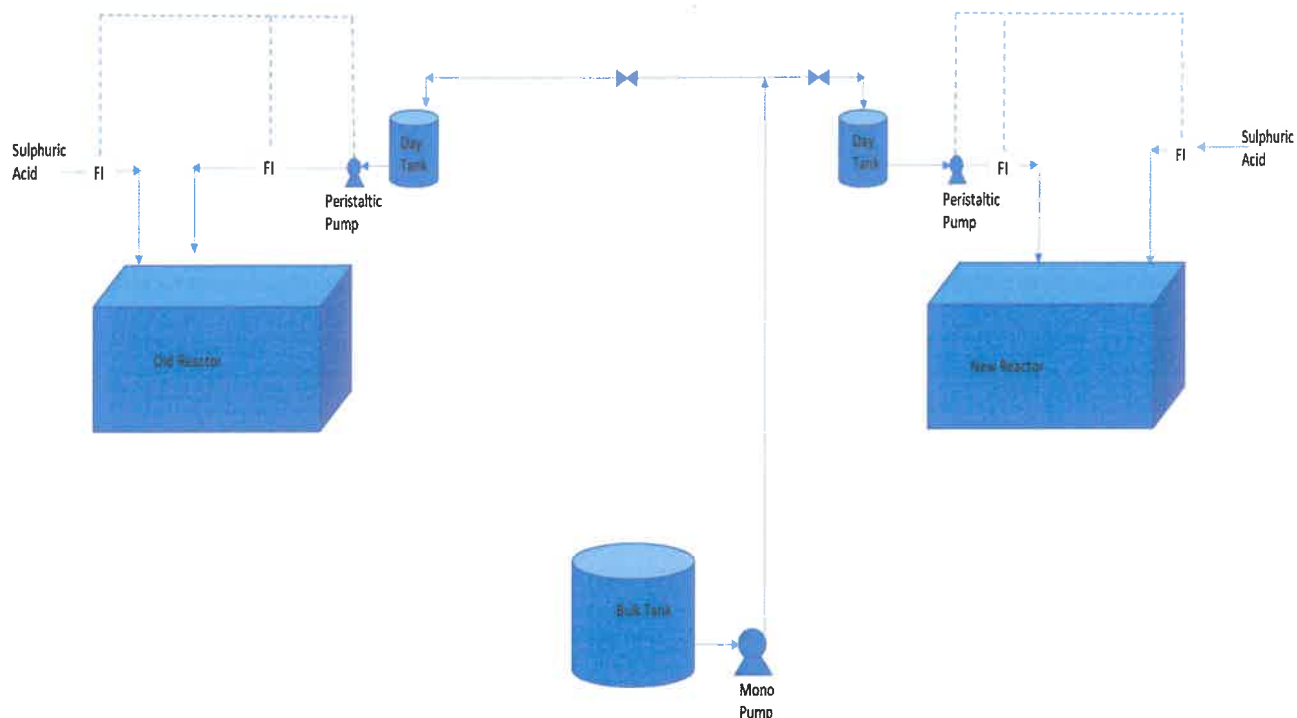
In case of an emergency the supplier must be able to supply 20 tons within 12 hrs.

The storage capacity on site is 25 tons.

## 1.6 Dosing Equipment

Dosing equipment consists of 1 bulk tank with a mono pump, 2-day tanks (one for each plant) each with a peristaltic pump. Each plant also has a flowmeter to control the amount of CHM entering the reactor. A diagram of the set-up is shown below.





Ratio setting is provided by process as a factor and to be used as a set-point in the DCS with the option of changing this manually. A Ratio Controller exists between H2SO4 ( $\text{m}^3/\text{hr}$ ) flow into the Attack and the CHM flow into the Attack ( $\text{mL}/\text{min}$ ).

The additive pumps will also be interlocked with the H2SO4 flow meters to the mixing Tee's for the respective old or new plants. This means that when the H2SO4 flow to the mixing Tee's for the old plant is off, the CHM additive pump for the old plant is not able to be started unless manually overridden. The same applies to the new plant. This prevents the addition of CHM into the Attack without H2SO4 also being added.

## 1.7 Pre-requisites & Inputs

FOSKOR Richards Bay will supply the successful tenderer with the following:

- Availability of duly authorised personnel to represent FOSKOR for this project
- FOSKOR technical specifications
- Electricity





- 
- Water
  - Air

**Note** that the full-scale trial will only be performed on one reactor. For this reason a 1 cubic meter flow-bin will be required to hold the CHM and a pump and piping will be required to feed the day tank. This is the responsibility of the tenderer. The CHM will also be supplied by the tenderer. Should the trial be successful the cost of the CHM will be refunded to the supplier. If it is unsuccessful, it will be carried by the tenderer.

### **1.8 Document Control, Quality Management and Quality Assurance**

**Tenderers are to adhere to Foskor's quality management system and specifications incorporated in this Tender Document.**

It is a requirement of the contract that the Contractor maintains an effective documented system for the control of product quality. Proof of compliance with a recognized quality assurance standards ISO 9001 and 14001 should be submitted with the Contractor's tender.

The Contractor's Quality Assurance Dept. Manager shall be responsible to a senior executive only and not be under the control of persons responsible for production.

The Contractor's Quality Assurance Manager is regarded as the principal link between the Contractor and Foskor in all matters affecting quality.

The Contractor's Quality Manager shall have access to the Contractor's offer document and to all other associated specifications and documents necessary for the satisfactory execution of the project.

### **1.9 Company Profile**

Tenderers are to submit an extensive portfolio indicating their experience and expertise with reference to supplying CHM.



---

**1.10 Health, Safety and Environment**

- The Contractor shall comply with all Foskor Regulations and Safety Standards especially the contractor must be familiar with COP-06 and submission of a safety plan for approval by Foskor Safety Department prior to site access.
- The Contractor shall fully comply with the OHS Act (Act 85 of 1993). It is essential to sign Section 37(2) agreement with the Safety Department.
- The Contractor must submit to Foskor Safety Department a SHE Plan / Risk Assessment for the tasks to be done, intake form and employee's qualifications before commencing with any activity in the Plant.
- The Contractor on entering site, must always wear Foskor minimum required PPE namely safety glasses, acid resistant overalls, safety harnesses (on heights), safety boots or steel cap gumboots, ear protection.
- The contractor company names must be on the garment either on front or back.
- The contractor should have a respirator pack which consist of a gas masks single filter screw type with filter type ABEK1 cartridge, Uvex ultra vision goggles (W1663459B –DIN CE 0196) and a pouch.
- The Contractor shall provide appropriate safety procedures and written work instructions to the labour force to minimize the risk of injury.
- The Contractor shall ensure all his personnel have attended the Safety Induction, by Foskor before they enter site.
- Should a Contractor be found on site without the above-mentioned safety clothing he/she will be removed from site and will not be allowed to return.
- A task-based risk assessment for the delivery of the CHM to be supplied to Foskor by the prospective bidder.
- The truck driver must wear all required PPE on site and during the offloading of CH from the tanker to the Foskor storage tank.
- The Contractor shall be ISO 14001 and ISO 90001 Certified.

**1.11 Tender Adjudication**

Proposals will be adjudicated on a mix of the following criteria (in no particular order):

- Technical support



- 
- Track record and references letters
  - Contractor to provide Procedure and certificate for transportation of Hazardous chemicals
  - Lead time
  - ISO 9001 and 14001
  - Product Certificate of analysis
  - Efficacy of product (as determined in the plant trial).

**Note: The Tenderer is to note that if they decide on sub-contracting works, no contractual obligation is held between the third company and Foskor (Pty) Ltd. Foskor's contractual obligation is limited to the Tenderer and the Tenderer is answerable to Foskor in the event of default by the Sub-contractor.**

### **1.13 Site Visit**

Site visit will be determined by the success of the pilot plant trials and references. This visit shall be mandatory. A clarification meeting shall be held at this time.

Foskor Contacts:

#### **Technical Enquiries:**

Phosphoric Acid Production Engineer: Siboniso Siyaya (035) 902 3397 or [sibonisos@foskor.co.za](mailto:sibonisos@foskor.co.za)

#### **Commercial Enquiries:**

Procurement – Nana Ndlovu (035 902 3235) or [nanan@foskor.co.za](mailto:nanan@foskor.co.za)



The tender closing date is the \_\_\_\_\_. Tenders must be in a sealed envelope, with the tender number and closing date clearly marked on the outside. Tenders must be deposited in the tender box, situated at Foskor Richards Bay's Main reception, before 12h00 of the closing date.

## 1.14 Bill of quantities

Description	UoM	Qty	Rate/Ton	Total
Crystal Habit Modifiers (CHM) (47.5-48.5%)	Ton			
Transportation	Km			
Offloading Labor cost	Hour			

