



CAIRN ENERGY INDIA PTY LIMITED

(Incorporated in New South Wales, Australia – ACN 002 066 784)

GLOBAL EXPRESSION OF INTEREST (EOI) FOR PROCUREMENT OF ENHANCE OIL RECOVERY (EOR) PILOT PLANT CHEMICALS

Cairn Energy India pty Ltd (“CEIL”) is the operator of block RJ-ON-90/1 (the “Block”) in India, and operates the Block on behalf of itself and its Joint Venture (JV) partners Cairn Energy Hydrocarbons Limited and Oil and Natural Gas Corporation (ONGC). The Block contains number of major oil discoveries, including the Mangala, Bhagyam and Aishwariya Fields.

Mangala field development envisages development of its multi-layered reservoir through secondary recovery using hot water injection. On a prudent note, Cairn is looking at implementing enhanced oil recovery measures very early in the field life. Early application of EOR would be designed to extend the crude oil production plateau periods, reduce water production, mitigate future decline rates and potentially accelerate crude oil production. To this end, extensive screening studies, laboratory studies and numerical evaluations have been carried out, which have established that chemical methods of EOR are suitable for Mangala and other fields.

Chemical EOR methods using polymer and alkali-surfactant-polymer have a significant potential for increasing recovery. Ahead of the full scale implementation of chemical EOR, Cairn intends to set up a pilot facility for field application of the EOR (Polymer /ASP) technique, as part of the Mangala field development. EOR Pilot Project is aimed at studying the phased and early application of these aqueous-based chemical flooding EOR techniques at Mangala. Successful EOR Pilot implementation will be followed by full-field implementation of EOR.

CEIL intends to award a contract for the supply of surfactants through an International Competitive Bidding Process. To this effect CEIL seeks Expressions of Interest (EOI) for supply of chemicals as stated below-

I. Supply of Chemicals :

- 1.) Products : Combination of following surfactants
 - a. Surfactant 1: Branched alcohol EO/POsulphate
 - b. Surfactant 2: High Carbon Number (C₁₆₋₁₈ to C₂₀₋₂₄) Internal Olefin Sulphonates
 - c. Surfactant 3: High carbon number (C₁₄₊ ABS) Alkyl Benzene Sulphonate
 - d. Surfactant 4: For improving aqueous solubility, if required

The expected required ratio of above products (a:b) or (a:c) is 1:1 or 2:1

- 2.) **Proven product in EOR** : The vendor has to demonstrate that the product being proposed has been either successfully used in similar oil field chemical EOR projects or has been successfully used in detailed laboratory analysis including corefloods.
- 3.) **Supply timelines**: The vendor has to demonstrate that the surfactants could be manufactured commercially. It has to demonstrate that the product could be supplied in time (5-6 months) at Barmer, Rajasthan, India from the date of award. Details on feedstock access, sulphonation/sulphation/alkoxylation technology/capacity to be provided.

4.) Technical Specifications

- a. Surfactants
 - Activity >20% on minimum (Desired > 40%)
 - Flash Point > 96oC
 - Viscosity < 10,000 cp at 40oC
 - pH of 5% active solution 11±0.5

- 5.) **Performance Specifications**: Following performance specifications would be desirable for the chemical blend.

- Aqueous stability# :Solution should be clear with no precipitation
- Optimal Salinity* : 1.5 to 2.5 % of soda ash
- Solubilization Ratio* : Greater than 10
- Thermal stability : Surfactant should be thermally stable at 65oC

All these tests would be done at University of Texas at Austin or any other laboratory as chosen by the operator according to their standard phase behavior procedures

#Aqueous stability of alkali (3% soda-ash), surfactant 1& 2 (0.3%), surfactant 3 (as proposed) & polymer (SNF's Flopaam 3630S 0.25%) in 0.6% NaCl brine.

* Standard UT (University of Texas) Phase behavior test at following conditions

- With Mangala crude in 0.6% NaCl brine
- Temperature = 62 o C
- WOR = (50 and 90% water-cut)
- Equilibration time = 2 weeks

Note: Detailed coreflood tests of formulation successful in phase behavior tests may be performed for confirming the chemical efficiency in dynamic conditions if required

As the quality and precise supply of these EOR chemicals is very critical to the success of this project; CEIL seeks Expression of Interest (EOI) from reputed Contractors with proven quality and delivery capability are requested to respond to this EOI to meet business objectives of the EOR Pilot Project.

The Companies are requested, as a minimum, to submit the following documents and details which will serve as techno-commercial pre-bid qualification criteria:

1. Letter of interest with detailed company information as follows:
 - a. State the name of the parent Company
 - b. State the name/address/phone/e-mail of the company that would execute the Contract
 - c. If a Joint Venture to be proposed, state the name/address/phone/e-mail of all Joint Venture partners
 - d. Organization structure
 - e. Size of Departments
 - f. Procurement system & procedure
 - g. Material Control System
 - h. Supply Chain Management System & procedures
2. Company's financial performance documents (including JV partner's financials, if proposed) i.e, Audited Balance Sheets, Profit and Loss Account & Cash Flow Statement for the last 3 years & following details separately;
 - a. Company Turnover based on last 3 audited/Financial statement
 - b. Company's Net Worth based on last 3 audited/Financial statement
 - c. Working Capital based on last 3 audited/Financial statement
 - d. State the banker's name, address and Solvency certificate from the bank indicating the credibility limit in financial terms
3. Experience
 - a. Lists of similar projects successfully executed with detail facility in the last five years in India or abroad with completion certificate and those of currency under execution.
 - b. No of years in similar business
 - c. Detail of orders (minimum 3) executed for more than USD 2 Million recently

- d. Details of current commitments
- 4. HSE Systems:
 - a. For all projects executed in last 5 years
 - b. HSE Manual/Policy
 - c. Project specific HSE Plan for similar project
- 5. Quality Systems:
 - a. Copy of current ISO Certificate provided
 - b. Certification of the companies QA system by an accredited certification body
 - c. QMS of the Company

The envelope should be subscribed with

“Reference No. CEIL/C&P/EOI/SURFACTANTS - 6000001572”

All information and documentation shall be provided at address below within 14 days of publication of this EOI by e-mail as attached PDF file and via courier to:

Senior Manager – P&SCM

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