INVITATION TO SUBMIT TECHNICAL AND COMMERCIAL OFFERS

Drilling Fluids and Solid Control Services

We hereby invite qualified and experienced companies to submit their technical and commercial proposals for the provision of Drilling Fluids and Solid Control Services in accordance with the scope of work outlined in the attached document.

Scope of Work Includes:

- Provision of drilling fluids and solid control equipment for one re-entry well and two exploration wells in the Ghadames Basin, Block 95/96.

- Supply of mud and mud-related products necessary for drilling and/or completion operations.

- On-site manufacturing, maintenance, and recycling of drilling fluids.

- Equipped laboratory cabin for conducting all physico-chemical tests related to drilling fluids.

- Deployment of qualified mud technicians and solid control equipment operators on a 24/7 rotation.

- Delivery of daily mud reports, end-of-phase sheets, and final well documentation.

- Compliance with Libyan safety and operational standards, including insurance and personnel protection obligations.

Submission Guidelines:

- Offers must be submitted in sealed envelopes waxed in red.

- Both technical and commercial proposals must be included.

-- Pricing details must be confined to the commercial offer only.

- Deadline for submission: within FIVE (5) days from the date of this announcement.

We look forward to receiving your proposals.

SPECIFICATIONS OF EQUIPMENT AND SERVICES PROVIDED BY THE CONTRACTOR

4.2.6 DRILLING FLUIDS AND SOLID CONTROL SERVICES

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4.2.6.1. Description of Works

In order to meet the Client's requirements, the Contractor must provide the following:

- Drilling fluids services, provision of drilling fluids and solid control equipment for a well in accordance with the specifications issued by the Client,
- Supplying drilling sites with mud and mud-related products necessary for drilling and/or completion,
- Manufacturing and on-site maintenance of drilling and completion fluids,
- Recycling of drilling fluids.

This service must include, but not limited to:

- Provision and supply of drilling fluids (drilling fluids and mud products) necessary for the completion of the oil-gas well.
- All services, mud technicians, solid control technicians, technical support, materials, supplies (products), equipment, transportation, and any other items necessary for the completion of this service.
- Equipped Laboratory Cabin to conduct all physico-chemical tests related to drilling fluids and mud testing equipment (including testing equipment and consumables).
- Provision of input, advice, technical procedures related to drilling fluids following the drilling program. Preparation of a detailed drilling and completion fluid program and submission for the Client's approval before commencement of operations, as well as tests of formulations and additives using the contractor's equipment and laboratories on-site or on base as agreed by both parties. Provision of a daily report and an end-of-well report including the products and mud used during drilling and completion of the well as well as related technical details and lessons learned.
- Provision of a Job Report detailing all relevant operational aspects of the installation and use of the Contractor's equipment.
- Hydraulic simulations.
- Supply of products, solutions, formulations, advice, and procedures for loss or stuck treatments as well as decision trees for losses.

4.2.6.2. Personnel

a. Engineering:

The Contractor must:

- Provide a detailed mud program for each drilling phase including:
    - Formulations and characteristics, including preventive and curative treatments of the mud to maintain required characteristics.
    - Initial manufacturing volume and daily maintenance.
    - Mud manufacturing (mixing) sequences.
    - Specifications of all products and equipment.
    - Stock of products to be maintained on site.
    - Detailed procedures for using solid control equipment.
    - Discussion by section on expected problems and preventive measures to be taken and necessary recommendations for problems.
    - Hydraulic and Hole Cleaning simulations.
    - Highlights and recommendations.

b. Technical Personnel:

- At the Client's request, the Contractor assigns a team consisting of:
    - Two (02) mud technicians, one for day shift and one for night shift.
    - Two (02) operators for solid control equipment, one for day shift and one for night shift.
- The day shift mud technician is solely responsible for the Contractor on the drilling site.
- The Contractor must ensure the presence of personnel on the Site: two (02) mud technicians and two (02) solid control equipment operators will be full-time on-site.
- The relief system will be operated according to the Contractor's own regime.
- The relief of the two (02) mud technicians, as well as the two (02) solid control equipment operators, must be staggered by one week from each other.
- Mud technicians must be qualified and technically competent. They must be able to read, write, and speak in English and/or French. They must be familiar and experienced with the mud systems used in the field. Proficiency in computer literacy is required as well as certification in well control and prevention "IWCF" at the supervisor level.
- Solid control equipment operators must have experience with all equipment to be used. They must be able to read, write, and speak in English and/or French.

- The Client reserves the right to choose, from a list provided by the Contractor, all technicians and equipment operators selected to work on-site based on their detailed CVs.

- The coordinator and/or operations supervisor designated by the Contractor must be able to read, write, and speak in English and/or French. Proficiency in computer literacy is required as well as certification in well control and prevention "IWCF" at the supervisor level with presentation of a detailed CV.

c. Contractor Personnel "Needs & Qualifications":

Designation	Observations
Mud Superintendent	Minimum ten (10) years of experience. Confirmed mud technician.
Field Technician	Minimum six (06) years of experience. Confirmed mud technician
Day Shift Mud Technician	Minimum five (05) years of experience.
Night Shift Mud Technician	Minimum three (03) years of experience
Day Shift SCE Operator	Minimum three (03) years of experience.
Night Shift SCE Operator	Minimum two (02) years of experience.

The number of years of experience should only consider:

- The period during which the personnel worked as a full-time employee; the training period should not be considered as experience. The number of years of experience may be adjusted upwards.

4.2.6.3. Equipment

a. Laboratory Cabin:

- The Contractor shall provide a laboratory cabin equipped with all the equipment and products listed in the standard procedures for drilling fluid testing "API RP 13B".

- Minimum dimensions of the cabin: Length = 2.5m, Height = 2.5m, and Width = 5.5m.

- The Contractor, at their expense, must provide spare parts and ensure the maintenance and replacement of equipment to guarantee continuous service.

- The laboratory cabin must be compartmentalized and equipped with an emergency shower with eye wash located outside the cabin.

- The electrical power cable with its outlet plug shall be provided by the Contractor.

- The air-conditioned sleeping compartment must be comfortable, equipped with a shower, toilet, and cleaning products.

- The air-conditioned laboratory compartment must be equipped with at least:

- Two (02) API Density Meters,
- One (01) Pressurized Density Meter on demand,
- One (01) Viscometer Kit (Allowing reliable measurement of Marsh viscosity), One (01) Viscometer with a minimum of 6-speed rotor,
- One (01) API Filter Press Kit,
- One (01) HP/HT Filter Press Kit,
- Two (02) Distillator kits (20 cc and 50 cc),
- Two (02) Sand Content Sets (elutriometer),
- One (01) H2S kit with user manual,
- One (01) High-speed Mixer for pilot tests,
- Electronic balance with a precision of 0.1 gram (maximum weight ≥ 1 kg),
- Equipment and products for chemical analysis according to the type of drilling fluid used,
- One (01) PH Meter (PH Paper) with calibration solutions (standards),
- Glass thermometers (standards),
- Two (02) Thermocups,
- Two (02) Timers,
- High-speed stirrer (standards) with hotplate,
- One (01) desktop computer or laptop with printer and consumables,
- Electronic media for transmitting reports to the Client in electronic format (Memory Disc type),
- A refrigerator,
- Fire extinguisher,
- Wash Eyes,

- And all necessary equipment for different types of analyses.

b. Solids Control Equipment:

These will be included in the drilling rig equipment.

4.2.6.4. Mud Products

The Contractor shall:

- Provide information regarding mud products:
  - Description and chemical composition of each product with its generic and commercial name,
  - Product classification,
  - Procedures and standards for quality control of all proposed products,

- Type of packaging,
- Weight or volume of the unit,
- Standard or recommended concentrations,
- Product handling instructions,
- Toxicological data sheet;
- Manufacturing and expiration dates;
- Origin and source.

- Any hazardous product must bear a standardized visible sign.
- The Contractor must:
  - Always ensure a minimum stock of auxiliary products on the site according to the type of mud.
- The Contractor must:
  - Provide a safety stock of mud products in case of potential well problems.
- Bear all costs for any damage or loss of products during transfers.
- The Contractor must:
  - Ensure the maintenance of products in good condition on-site.
- The Contractor must:
  - Maintain a stock of products in its warehouses to meet the Client's requirements and ensure continuous activity.
- In the case of drilling with oil-based mud, diesel is provided by the Contractor at the Client's request. The Contractor guarantees its monitoring and management on-site.

4.2.6.5. Transportation

- When the Work is performed on a Lump Sum basis:
  - Transportation of all mud products, personnel, mud, diesel, laboratory cabins, and equipment between its base and the work sites as well as their reintegration is the responsibility of the Contractor.
- All transportation costs, including losses and damages, will be borne by the Contractor.
- Handling equipment on the Rig will be provided by the Contractor.
- The transfer of equipment, laboratory cabins, and mud products between two platforms is the responsibility of the Contractor.
- The Contractor must oversee the transfer operation; the Client will not be responsible for any damage. Handling equipment will be provided by the Contractor.
- No product or equipment should be left on the platform at the end of the well.

- The Client guarantees the accessibility of the track.
- Any type of air freight for the Contractor's equipment or products, spare parts, or personnel will be borne by the Contractor.

4.2.6.6. Documentation

The Contractor must provide at least the following reports:

- Daily mud report according to the Model agreed upon by both Parties,
- End-of-phase sheet according to the model agreed upon by both parties,
- Daily report on the monitoring of solids control equipment according to the model agreed upon by both parties,
- End-of-well report (must include analyses carried out/forecasts and recommendations for future wells),
- Report on testing of new technologies,
- HSSE audit report,
- Incidents and/or accidents report,
- Site rehabilitation report for the area allocated to the mud company (Reintegration of waste and cleaning of the site reserved for it).

4.2.6.7. Invoicing Mode

Lump Sum Mode:

- All drilling/completion fluid services (products, personnel, and equipment) are included in the Lump Sum for each phase according to the volume (m3) of the drilling or completion fluid used.

Time and Material Mode:

- Laboratory Cabin:
    - Rate included in the Daily Rate of the Contractor's Equipment.
- Solids Control Equipment:
    - Rate included in the Daily Rate of the Contractor's Equipment.
- Mud Products:
    - Only mud products consumed (passed through the mixer) will be invoiced.
- Personnel:
    - Rate included in the Daily Rate of the Contractor's Equipment.

4.2.6.8. Specifications

a. Technical Specifications:

This section outlines the technical specifications of the equipment, types of drilling and completion fluids, and their physico-chemical characteristics according to the planned well architecture, as well as the personnel requirements.

Interval Properties	**26"**	**16"**	**12" ¼**	**8" ½**
Mud type	Bentonitic spud WBM	KCl Polymer WBM	KCl Polymer WBM	KCl Polymer WBM
Density ppg	8.6 - 8.8	8.6 - 9	8.9 - 9.1	8.7 - 9
PV	ALAP	ALAP	ALAP	ALAP
YP lb/100 ft^2	40 - 50	35 - 45	20 - 24	14 - 16
API filtrate cc / 30min	NC	< 8	< 7	< 6
MBT Kg/m^3	70 - 80	70 - 80	20 - 30	15 - 20
PH	9.5 - 10	9.5 - 10	9.5 - 10.5	9.5 - 10.5
LGS %	< 5	< 5	< 5	< 5
KCl % by weight	-	3	3.5	3.5
Funnel Viscosity sec/qt	80 - 90	50 -70	45 - 50	45 - 50

For reference, we provide the volumes of drilling fluids handled during the drilling of the two offset wells --------- and ----------.

Phase	**Depth** (ft)	**Casing/Liner** (In)	**"Handled Volume" Re-entry** (m^3)	**"Handled Volume" Well 1** (m^3)	**"Handled Volume" Well 2** (m^3)
26”	250	20”	/		
16 ”	3300	13 3/8”	/		
12 ¼”	6150	9 5/8”	/		
8 ½”	9422	Liner 7”			
6’’	/	/	/	/	/

4.2.6.9. Mud Testing Equipment

a. Laboratory Testing Equipment

Each testing package must include:

Item Description	Quantity	Comply? (Y/N)
Mud balance with range of the 2-scale are as follows : 6 - 24 pound per gallon 0.72 - 2.88 specific gravity		
Pressurized Fluid Density Balance complete with instrument for air or gas removal with-in the range stated in the mud balance above.		
March Funnel Viscometer and Graduated Cup		
Stop Watch in Protective Rubber case		
Standard hand crank viscometer		
115 Volt motor-Driven viscometer		
Viscometer Cup Heater		
Hamilton Beach Blender		
Standard Filter Press Kit c/w spares		
500 ml High Pressure - High Temperature Filter press kit - minimum working pressure 600 psi complete with heater complete with spare parts.		
Sand - Content Set		
Analytical PH - Meter, complete with standard solutions		
Oil and Water Retort Kit		
Methylene Blue test kit		
Beam balance for pilot testing		
Potassium Specific Electrode		
Filtrate analysis test kit for the following : • Chloride ion • Calver hardness • Versenate hardness • Pf, Mf and PM alkalinities • Potassium ion by centrifuge method • Sulphate ion • P1, P2 carbonate ion or Garret Gas Train		

4.2.6.10. Mud Products Specification and Designation

MATERIALS	PRODUCT TRADE NAME	For Liquid, State % Activity	MANUFACTURER & LOCATION	POINT OF ORIGIN	Unit Packaging	REMARKS	
						Contractor Requirements	Contractor Comments
API Bentonite, (API Specs 13A)							
Hardness Reducer							
Sodium Hydroxide							
Size CaCO3							
PAC, Regular (pure Grade)							
PAC, Low Viscosity (pure grade)							
Barite (API Specs 13A)							
Viscosifier							
Fluid Loss							
Potassium Chloride							
Fluid Loss							
Fluid Loss							
Fluid Loss							
Fluid Loss							
LCM							
Mica, Coarse							
Mica, Medium							
Mica, Fine							
Nut Plug, Coarse							
Nut Plug, Medium							
Nut Plug, Fine							
Lost Circulation Agent							
Liquid Defoamer							
Detergent							
Thinner							
Lubricant							
Bridgeing agent							
Polycol							
Silicate inhibitor							

Graphite							
anti-salt inhibitor							
Zn（OH）CO3							
pipe free							
starch							
biocide							
Sulfonated Asphalt							
polymer encapsulator							
Fluid Loss							
inhibitor							
solid polycol							
Shale Inhibitor							
Fluid Loss							
LCM							
Silicate inhibitor							

Note: For HPWBM, the shale inhibitor must be of the polyether diamine type with the following molecular composition:

$$H_2N - CHCH_2\text{-}\,[OCHCH_2]a - [OCH_2CH_2]b - [OCH_2CH]c - NH_2$$
$$\qquad\quad | \qquad\qquad\qquad | \qquad\quad |$$
$$\qquad CH_3 \qquad\qquad\quad CH_3 \qquad\quad CH_3$$

with

b=8,5

a + c =2,5

Approximate molecular weight = 600

Minimum Stock of Supplementary and Safety Products:

The Contractor must:

- Ensure on-site a minimum stock of supplementary and safety products. The mud program approved by the Client defines the necessary quantities.

A safety volume of Kill Mud weighted with Barite to a required density must be manufactured before the start of drilling the reservoir phase.

Mud Technicians:

- Must possess a minimum of five (05) years of relevant experience in mud engineering and management.
- Proficient in conducting physico-chemical tests on drilling fluids.
- Familiarity with various drilling fluid systems and additives.
- Ability to troubleshoot and resolve mud-related issues efficiently.
- Strong communication skills in both English, Arabic and/or French.
- Certification in well control and prevention "IWCF" at the supervisor level.
- Proficiency in computer literacy for data analysis and reporting.
- Proactive attitude towards safety protocols and hazard identification.

- **Solid Control Equipment Operators:**
  - Previous experience operating solid control equipment in drilling operations.
  - Familiarity with the setup, operation, and maintenance of various solid control systems.
  - Ability to interpret and act upon data provided by solid control equipment.
  - Proficiency in conducting routine maintenance and troubleshooting of solid control equipment.
  - Effective communication skills to coordinate with mud technicians and drilling team.
  - Fluency in English and/or French.
  - Commitment to adhering to safety regulations and protocols.
  - Certification in well control and prevention "IWCF" at the appropriate level.
  - Adaptability to work in challenging environments and rotating shifts.

- **Coordinator/Operations Supervisor:**
  - Extensive experience in drilling operations management.
  - Strong leadership skills to oversee personnel and coordinate drilling activities.

- Proficiency in English and/or French for effective communication with the Client and Contractor team.

- Thorough understanding of drilling fluid systems, solid control processes, and hydraulic simulations.

- Ability to analyze data and make informed decisions to optimize drilling performance.

- Certification in well control and prevention "IWCF" at the appropriate level.

- Excellent organizational skills to manage logistics and resources efficiently.

- Proven track record of implementing and enforcing safety procedures.

- Problem-solving aptitude to address operational challenges effectively.

- Commitment to ensuring compliance with regulatory standards and contractual obligations.