

OIL & GAS DEVELOPMENT COMPANY LIMITED



TENDER ENQUIRY NO. PROC-SERVICES/CB/EXPL-4865-A/2021

HIRING OF SERVICES FOR WATER QUALITY/NORM, XRD/XRF, PYROLYSIS, CANISTER GAS DESORPTION, PRESSURIZED CORING & DESORPTION of CORES/SAMPLES/CUTTING AT WELLSITE/BASE LAB

Note:

Amount of Bid bond shall be

USD 3,600/- (US Dollar Three Thousand Six Hundred Only)	for Group-A.
USD 14,000/- (US Dollar Fourteen Thousand Only)	for Group-B.
USD 2,400/- (US Dollar Two Thousand Four Hundred Only)	for Group-C.
USD 10,000/- (US Dollar Ten Thousand Only)	for Group-D.

Bid bond must be submitted with the technical bid. Please see tender documents for further detail.

The master set of tender documents (services) uploaded on OGDCL website (www.ogdcl.com) is the integral part of this TOR.

HIRING OF SERVICES FOR WATER QUALITY/NORM, XRD/XRF, PYROLYSIS, CANISTER GAS DESORPTION, PRESSURIZED CORING & DESORPTION of CORES/SAMPLES/CUTTING AT WELLSITE/BASE LAB.

Oil & Gas Development Company Limited-Pakistan (OGDCL Pakistan), hereinafter called the "COMPANY" intends to acquire the Services at well-site/Base Lab for Shale/Tight Gas reservoir evaluation and characterization on cuttings and/or cores of wells. Different Analyses Services have been divided into A, B, C & D Groups. Analyses at base lab of the contractor of flow back/produced water are termed as Group "A" Services. At well site, Description, Photography etc., Handling, Preservation, Mineralogical Characterization of cuttings and cores are termed as Group "B" Services. To estimate, Storage Capacity/Total Gas Content through desorption of Core at well site is attributed to Group "C" Service, and Pressurized Coring for Gas Desorption Service at well-site will be called Group "D" Service in this document. All the analyses should be accompanied by graphs, charts, logs, description and implication comprising field reports. In all Groups two (02) specialists are required and each covering the daily drilling activity (round the clock, 24hrs/day/12 hours shift duty each at well site), throughout Pakistan as needed be. The scope and details of these analyses services are given in the following:

1. SCOPE OF WORK

- a) This scope of work relates to the provision of water quality Analyses (Group A), mineralogical analyses of core/ drill cuttings, (Group B). Core desorption analysis (Group C) and Pressurized Coring for Gas Desorption (Group D) for OGDCL Shale/Tight Gas wells activities and supplement the operational decision (See Tables 1 & 3).
- b) OGDCL Shale Gas/Tight Gas project has planned to drill three to four wells/deviate existing 2-3 wells during 2021-2022 & some optional wells. However, the optional wells will be planned upon encouraging results of initial drilled/deviated existing wells, or otherwise.
- c) COMPANY plans to hire the well-site Geosciences Services for Integrated cutting and/or Core analyses XRD (X-ray Diffraction – Mineralogy, Clay typing), XRF(X-ray Fluorescence – Elemental Analysis), Pyrolysis (S₁– Free Hydrocarbon, S₂-Residual Hydrocarbon, S₃- Amount of CO₂ to reflect the amount of Oxygen in oxidation, TOC- Total Organic Carbon by pyrolysis, GP- Genetic Potential, PI- Production Index, HI- Hydrogen Index, OI-Oxygen Index, NOR- Normalized Oil Ratio), T_{max} (Thermal Maturity – Oil Window to Dry Gas Window), calculated R₀- Vitrinite Reflectance, transported and original kerogen, Gas desorption (Adsorbed, absorbed, free gas, lost gas and total gas content) analysis by using state of the art Lab Units, Gadgets/Tools/equipment, Pressurized coring & desorption analyses manned with fully experienced & fully qualified crew on Rate Running Contract purely on "As & When Required Basis" for Shale Gas Project Wells (see Tables 1 & 3). Drilling of 2 - 4 wells and sample evaluation up to (but not limited), are planned in 2020-2021.
- d) COMPANY intends to get analyze samples at Base Lab for Group A Services by using state of the art Lab, Gadgets/Tools/equipment manned with fully experienced & fully qualified crew on Rate Running Contract purely on "As & When Required Basis".
- e) As described above the following tests/analyses would be required at rig site and after drilling at Base Lab.

- f) TOR including technical evaluation criteria and provisional bid format are attached herewith (Tables 4 and 8).
- g) At the time of bidding conditional pricing or price other than rates Format / financial evaluation criteria will not be accepted.

2. Group “A” Service At Base Lab/Well-Site

Frac Fluid/Flow Back/Produced Water Analyses (At Base Lab)

Water quality data of frac fluid /flow back /produced water like chemical oxygen demand (COD) mg/L, bio chemical oxygen demand (BOD) PH, Alkalinity mg/L, Turbidity NTU, TSS, mg/L, VSS mg/L, TDS mg/L, major & trace elements (See table 3)

2.1 Analyses of frac fluids, drilling fluids coming back from fracked formations

2.2 Analyses of fractured flow back/produced water by taking reading at random days (D₁, D₃, D₇, D₁₀, D₂₀, D₃₀, D₄₀, D₅₀, and D₆₀).Contractor may suggest better randomness of taking samples without increasing the number of samples

2.3Analyses should be carried out as per world recognized and recommended practices.

2.4Samples of flow back /produced water should be collected/transported by contractor and no extra cost will be charged by contractor. However, accommodation and messing facility may be available for the staff of collecting samples.

2.5Comparison with produced and injected frac fluids in shale gas, implication of produced water in the light of analyses

2.6Recommendations for treatment of produced water or its reuse.

Frac Fluid//Flow Back/Produced Water Analyses Required

2.7 Elemental Composition

2.8 Origin & Nature of Salinity

2.9 Naturally occurring radioactive material (NORM) of flow back/produced water & Total dissolved solids (TDS), Total suspended solids (TSS), Volatile suspended solids (VSS) PH, Chlorides, Specific Gravity, Temperature, Alkalinity, and Turbidity.

2.10 The contractor is responsible to collect & take care of frac fluid/flow back water samples handling solely at his own expense as per industry standards at well site. The contractor is solely responsible to provide above parameters and major ions and trace elements like Cl⁻, Br⁻, SO⁻², HCO₃⁻, Mn, Fe, Ti, Mg, Si, Al, Ca, Na, K, Ba, Sr, Li, Ag, Au (but not limited to) and naturally occurring radioactive minerals (NORM) through accurate analyses.

Table 1 Type of Analyses/services required at well-site/Base Lab.

Sr. #	Description of Tests/ Analysis	Min of Samples/ Day	Sampling Interval	Total Interval	Remarks
1.	XRD	20 or more Samples	Each meter or as dictates	Varies from well to well & Formation to	All sampling intervals and on site analysis may change as
2.	XRF	20 or more Samples			
3.	Pyrolysis	20 or more Samples			

4.	Desorption by canister Gas Method.	20 or more sample	cuttings/Each core	Formation	per well situation or sweet spots encountered.
5.	Desorption through pressurized core barrel	2-4 or more core			
6.	Water Quality Analyses	1-2/ As per OGDCL requirement	As per serial # 2.3	Till flow back water produced	As per required procedure
7.	Major & Trace elements/NORM Analyses	1-2/ As per OGDCL requirement	As per serial 2.10/ OGDCL Instructions	Till flow back water produced	As per required procedure

The following shale formations may encountered during drilling vary from well to well, however, approximate thicknesses are as under in table 2.

Table 2 Thicknesses of the formations

Sr. #	Name of Formation	Approximate Thickness in Meters
1	Lower Goru Shale Unit *	400-700
2	Upper Shale	250-300
3	Shales of Middle Sand	70-80
4	Lower Shale	150-200
5	Shales of Basal Sand	50-60
6	Talhar	50-70
7	Shales of Massive Sand	80-100
8	Sembar Formation	500-700

* Lower Goru Shale Unit=400-700m, where zonation not *Possible*, known as Lower Goru Shale Unit

3. GROUP "B" SERVICES At Well Site

(a) XRD (X-Ray Diffraction):

Mineralogical Composition (Clay typing Qualitative/Quantitative),
Mineralogical Brittleness Index, (See Table 3)

- 3.1. Identification of all minerals present in the rock sample (core/core chips/cuttings)
- 3.2. Ternary diagram
- 3.3. Mineralogy based brittleness index and its comparison with mineral families
- 3.4. Qualitative clay identification
- 3.5. Cross plots for lithological characteristics
- 3.6. Diffractograms of samples analyzed and Reports
- 3.7. Grain Density and porosity

XRD – X RAY Diffraction for Mineralogy

CONTRACTOR shall supply XRD instrument, X-Ray Diffraction Analysis capable to obtain mineralogy analysis directly from cuttings/cores at Well-site. Sample preparation kit shall be included in the service. The mineralogical identification & quantified by well-site XRD includes (See Table 3).

- 3.8. Quartz, Opal and Chalcedony
- 3.9. Feldspars-Plagioclase, K-feldspar
- 3.10. Total Clay + Types of Clay (Kaolinite, Illite, Vermiculite, Smectite, Chlorite, Montmorillonite, etc)
- 3.11. Carbonates – Calcite, Dolomite, Siderite, Ankerite
- 3.12. Pyrite
- 3.13. Sulfates – Anhydrite, Gypsum, Barite
- 3.14. Apatite
- 3.15. Halite
- 3.16. Mica (its types) muscovite and biotite
- 3.17. Glauconite
- 3.18. The contractor is bound to provide logic, method, calculation to identify minerals by Studying diffractogram of each sample after the completion of XRD analysis.

(b) XRF (X-ray Fluorescence):

Rock Chemical (elemental) composition

- 3.19. All elements should be determined present in cuttings/Core
- 3.20. Elemental characterization of Samples.
- 3.21. Chemo-stratigraphic charts/reports of the above elemental data.
- 3.22. Elements, their oxides like Cl⁻, Br⁻, Ag, Au, Li, U, SiO₂, TiO₂, Al₂O₃, MgO, Fe₂O₃, MnO, CaO, Na₂O, K₂O, P₂O₅, SO₃²⁻, and other compounds.
- 3.23. Major and trace elements like Cl⁻, Br⁻, SO₃²⁻, HCO₃⁻, Mn, Fe, Mg, Si, Al, Ti, , Ca, Na, K, Ba, Sr, Ni and naturally occurring radioactive minerals (NORM) in rock samples.
- 3.24. Trace Elements like – V, Cr, Ag, Au, Li, Co, , Cu, Zn, Ga, As, Rb, Sr, , Zr, Nb, Mo, Ba, Be, Hf, Pb, Th, U (but not limited to)
- 3.25. Chemo-stratigraphic charts/reports of the above element

CONTRACTOR shall supply XRF instrument to make elemental analysis at Well-site and should be capable of identifying the above mentioned elements/compounds with accuracy and precision. Sample preparation kit shall be included in the service. All Elements present in the rock sample should be identified and should be quantified:-

(c) Source Rock Pyrolysis at Well Site (if Required):

- 3.26. S₁ (Free Hydrocarbon)
- 3.27. S₂ (Residual Hydrocarbon)
- 3.28. S₃ (Amount of CO₂ to reflect the amount of Oxygen in oxidation)
- 3.29. GP (Genetic Potential)
- 3.30. PI (Production Index)
- 3.31. HI (Hydrogen Index)
- 3.32. OI (Oxygen Index)
- 3.33. NOR (Normalized Oil Ratio)
- 3.34. T_{max} (Thermal Maturity)
- 3.35. Present day / Original TOC (charts, plots)
- 3.36. TOC from Pyrolysis

CONTRACTOR shall supply TOC Field Analyzer instrument at Well-site to quickly obtain information on Total Organic Carbon by means of pyrolysis. The system should be able to perform analysis in a short time, using a low amount of samples and after a dedicated sample preparation. If needed be, Sample preparation kit shall be included in the service.

Outcomes of Group Service B

Integrated Daily Reports of Core/Cutting Analysis. Integrated Cutting Analysis Composite Log, Graphs, tables and cross plots for TOC, S₁, S₂, S₃, T_{max}, R_O, and Chemical and Elemental data. Composite logs for measured, calculated and interpreted results (XRD, XRF, TOC, Pyrolysis and calculated R_O). Reports of evaluated and interpreted results including recommendations. Software/utility/excel that used for all above charts/graphs/model may be shared with OGDCL

The contractor is solely responsible and to take cores chips/drill cuttings (Samples) at well site analyses and to take backup samples as per industry SOP's for future analyses. The contractor is solely responsible for core quality photography according to scale with proper description, Demarcation of orientation & visual properties of core as per SOP's.

4. GROUP "C" SERVICES at Well site (As per Requirement)

Gas Desorption Analysis: See Table 3

- 4.1. Vertical orientation of core at well-site

- 4.2. The sample will be wiped clean, weighed and photographed according to scale.
- 4.3. Samples that are selected for desorption must be put in canister and exposure to the Atmosphere should be minimum time as per SOP's.
- 4.4. The top depth and bottom depth, ambient temperature and atmospheric pressure, description of the sample will also be recorded before the sample placed into a desorption canister by contractor/service provider.
- 4.5. On-Site Pre-Coring Operations (Effective core handling and preservation program).
- 4.6. Core Handling, Sampling & Preservation (Define depth allocation, maintain core integrity, Preserve core properties, effective core stabilization & preservation methods etc) Core Description (Texture, core recovery, core logs, core image, digitized data, Oil Fluorescence/cut, etc)
- 4.7. Core & other data Transportation/Shipping (provide protection against damage Environmental change, mechanical vibration, mishandling, etc) Gas Content (Canister Gas) Sample Collection will be responsibility of the contractor.
- 4.8. Measured gas (released into the canister and measured)
- 4.9. Canister gas analysis at well site for desorption volume measurements and analysis
- 4.10. Residual gas (estimated to be remaining in the sample when measurements are terminated)
- 4.11. Crushed gas
- 4.12. Gas Samples collection in iso-tubes/gas cylinders for preservation and further composition & isotopic analyses if required.
- 4.13. Average total gas content of each zone/formation should be given as early as possible.

Following necessary parameters may be evaluated at Base Lab of the Contractor):

- 4.14. Adsorption/Desorption isotherm
- 4.15. Gas In Place (GIP)
- 4.16. Gas Composition
- 4.17. Isotopic Analysis of Gas/Hydrocarbons Elements
- 4.18. Gas Saturation
- 4.19. In-situ Permeability / Porosity
- 4.20. Wettability
- 4.21. Water Saturation

Daily Outcomes

Gas Sorption Analysis Reports, Daily Desorbed gas/fluid content Integrated Core Analysis Daily Reports, Integrated Core Analysis Composite Logs/Core Logs, Graphs, tables, cross plots and composite logs for measured, calculated and interpreted results. Reports of evaluated and interpreted results including recommendations. See table 3

5. GROUP "D" SERVICES

Pressurized Coring & Desorption Analyses (See Table 3)

(Minimum up to 2-4 cores/per well but not limited, Contingent upon results)

- 5.1. On-Site Pre-Coring Operations (Effective core handling and Preserved core Under in-situ conditions).
- 5.2. Pressurized core system should be capable to cut core at 8000K subsurface reservoir pressure and temperature range is up to 200 ° C.
- 5.3. For pressurized cores equipment is capable to cut cores in 8 ½", 6", 4.5", 4" hole sizes.
- 5.4. An equipment should be adjustable for core length according to requirement.

- 5.5. Core Description, Core Handling, Sampling & Preservation (Define depth allocation, maintain core integrity, Preserve core properties, effective core stabilization & preservation methods etc.).
- 5.6. 6 Compositional Gas analysis samples at different pressure stages throughout depressurization process required.
- 5.7. 4 high pressure PVT Samples of core fluids required.
- 5.8. 14 liquid samples from different pressure stages required.
- 5.9. 8 gas samples from different pressure stages required.
- 5.10. Measurement required of complete volume of gases produced by core.
- 5.11. Measurement required of complete volume of core liquid expelled from core.
- 5.12. Measurement of Pressure & Temperature logs required.

Core service Specification

- | | |
|-----------------------------|---|
| 5.13. Core Length: | 3 to 9 m or as per requirement |
| 5.14. hole sizes | 4.5", 6" ,8 1/2" |
| 5.15. Outer Barrel OD | As per requirement/Standard |
| 5.16. Core diameter | 2 5/8" to 4 1/2" or As per requirement |
| 5.17. Pressure Range | 5000- 8000, 8000-10000 psi |
| 5.18. Operating Temperature | 100-160, 160-200°C |
| 5.19. Core Barrel/volt | Should be H ₂ S & Corrosion free |

Following results/reports are required

- 5.20. Accurate surface & reservoir temperature, Pressure readings
- 5.21. Measured Fluid/gases saturation,
- 5.22. Fluids/gases composition, Isotopic Analysis of Gas/Hydrocarbons Elements, viscosities
- 5.23. Measured Mass/Volume of Fluids (GIP.OIP, GOR etc)
- 5.24. Bubble Point
- 5.25. Fluid Sampling (in gas cylinder/ industry standard tubes)
- 5.26. Measured interval specific GOR
- 5.27. Material Balance.
- 5.28. P&T log of entire coring & analytical process
- 5.29. Precise determination of the volume of all gases
- 5.30. Sampling and determination of all remaining fluids after depressurization
- 5.31. Marking, cutting & packing of core in shock resistant core boxes (if required)
- 5.32. Gas chromatography (detailed determination of gas composition)
- 5.33. Ports for sampling of all fluids by controlled reduction of pressure
- 5.34. Share whole operation strategy

The contractor is solely responsible to provide above parameters of desorption process. The contractor is solely responsible to cut core & take care core handling to preserve core at reservoir pressure and temperature without any error as per HSE and industry standards at well site. After total desorption sample should be reverted to OGDCL. Desorption Analyses as one core sample may be carried out for maximum period of seven days (7) or when the gas emission/desorption rate is 5 ml/day or as per instruction of OGDCL. If long time of desorption is required contractor may shift sample by own to his base Lab without any extra cost for further desorption. After complete desorption of core/core sample length, Contractor is solely responsible to hand over the core to OGDCL. Considering the innovative aspects of these analyses, the Contractor will have to provide a complete documentation about the technical characteristics of the tools proposed and detailed procedure for sample preparation and analysis and detailed procedure for data of each Service (A, B, C & D) processing and data analysis and a comprehensive report may be prepared for the Company.

Table 3: Shale /Tight Gas Reservoir Evaluation Services/Analyses

TEST SERVICES /ANALYSES				
SR#	GROUP SERVICES	TYPE OF TESTS	SERVICES REQUIRED FOR	OUT COMES/TYPES OF RESULTS REQUIRED
1	Group A	Frac Fluid/ /Flow back/produced water Analyses	At Well-site/ Base Lab	Elemental Composition, Origin & Nature of Salinity, Naturally occurring radioactive material (NORM) of water used & produced water, Total dissolved solids (TDS), and Total suspended solids (TSS), Volatile suspended solids (VSS). PH, Chlorides, Specific gravity, Temperature (If required). (COD) mg/L, bio chemical oxygen demand (BOD) mg/L, PH, Alkalinity mg/L, Turbidity NTU, TSS mg/L, VSS mg/L, TDS mg/L, major & trace elements See serial # 2
2	Group B	XRD /XRF	At Well-site	Quartz, Opal, Chalcedony, K-Feldspar, Plagioclase, Calcite, Dolomite, Siderite, Pyrite, Anhydrite, Apatite, Halite, Total Clay, Clay Typing, and other possible mineralogy etc. SiO ₂ , TiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , MnO, MgO, CaO, Na ₂ O, K ₂ O, P ₂ O ₅ , SO ₃ ⁻ , and Cl ⁻ ; Major and trace elements are required like (but not limited to) : Li, V, Cr, Co, Ni, Cu, Zn, Ga, As, Br, Rb, Sr, Y, Zr, Nb, Mo, Ba, Hf, Pb, Th, and U etc. See serial # 3
		Pyrolysis (cutting /core plug/Core)		S ₁ (Free Hydrocarbon), S ₂ (Residual Hydrocarbon), S ₃ (Amount of CO ₂ to reflect the amount of Oxygen, GP (Genetic Potential), PI (Production Index), HI (Hydrogen Index), OI (Oxygen Index), NOR (Normalized Oil Ratio), T _{max} (Thermal Maturity), Present day / original TOC, TOC from Pyrolysis. Hand over complete reports/charts to OGDCL in due time See serial # 3
3	Group C	Gas Desorption (core samples)	At Well-site	Free gas volume, desorbed gas volume, adsorbed gas volume. Gas storage Capacity, gas Content, lost gas, crushed gas, total gas content, In-situ permeability / porosity, gas composition, wettability, water Saturation, gas saturation, GIIP etc. For crushed gas, contractor solely responsible to shift core sample/s from well-site to Base Lab till complete desorption analyses, complete reports/charts for OGDCL. serial # 4
4	Group D	Pressurized coring and Desorption Analyses	At Well-site	Surface & reservoir temperature, pressure, measurement of fluid/gases saturation, measured fluid/gases composition, measurement of fluid viscosities, measurement mass/volume of fluids (GIP.OIP, GOR etc.), bubble point, fluid Sampling (in gas cylinder/ industry standard tubes), measurement of interval specific GOR, material balance, P&T log of entire coring & analytical process. complete reports/charts to OGDCL in due time. See serial # 5

*Taken Sample/ core/core plug/sample/ transportation sample preparation from G&R lab of OGDCL for analyses Contractor's responsibility.

6. TECHNICAL EVALUATION CRITERIA:

Table 4 is given to evaluate the technical Bid and will be given 70% weightage. The financial proposal of bidders obtaining less than 70% points in total and less than 50% points in each category in the technical evaluation will not be opened. See table 4.

Table 4 Evaluation of the Technical Bid Criteria (Group A, B, C & D)

Serial No.	Description	Points
1	Advanced equipment and its back-up (Maximum marks will be given new equipment)	10
2	Projects at Well-site Shale/Tight Gas projects/services $\geq 10 = 20$ points, $\leq (6 - 9)$ projects = 12-18 points, $\leq (3 - 5)$ projects = 6 -10 points, $\leq (2 - 3)$ projects = 4 - 6 points, \leq less than (2) projects = 2 points,	20
3	Experience of the Firm / Bidder Experience >10 Years = 20 points, (8-9) Years = 16 - 18 points, (6-7) Years = 12 - 14 point, (5 -6) Years = 10 - 12 points, (3-4) Years = 6- 8 points, (2-3) Years = 4- 6 points <2 years = 2 points. < 1 year =0	20
4	Work plan of each analyses including manning schedule	10
5	Training/ Skill transfer plan to OGDCL Professionals Training for 3 - 5 working days in Pakistan/Abroad. OGDCL professionals participating in Lab analyses to be trained in all relevant domains.	20
6	Bidder's Personnel (Qualification and **Relevant Experience) Qualification (PhD = 10 points, MS = 7 points & BS = 3 points) Relevant Experience > (10) Years = 10 points, (5 - 9) Years = 7 - 9 points, (2 - 4) Years = 3 - 6 points <2 years = 2 points < 1 year = 0	20
	Total:	100

6.1. The objectives of acquiring the analyses on cuttings/cores, flow back /produced water, are to analyze mineralogical/geochemical/GIIP/reservoir-pressure/temperature and shale reservoir characterization of the well and to support operative decision and subsequently provide valuable information for the well logging calibration process and disposal/re-use and environmental implications of flow back/produced water.

6.2. The COMPANY reserves the right to acquire partial or complete services as per requirement listed in each of the group. The contractor has the liberty to choose the all or individual service Group but based on technical & financial qualification criteria. See table 4 & 8.

Table 5 Personnel Qualification – For Lab Analyses/Services

Personnel Data	Company Request	Bidder Offer
Name:	*	(+) *
Date of Birth:	*	(+)
Languages:	English	(+)
Present Position	*	(+)
Experience against desired service	Min Four(4) Years	(+)
Academic Qualification	Preferably M.Sc. Geology	(+)
Trainings	*	(+)
Certificates	*	(+)
Training Certified Course	*	(+)
Post Frac. Flow Back Water Quality Analyses As described in table 3		
XRF,XRD and Pyrolysis Analyses	*	(+)
Gas Desorption Analyses at well site	*	(+)
Pressurized Coring and Gas Desorption Analyses	*	
Professional Experience	*	(+)
Well Site/Base Lab for (service)	*	(+)
Details of Pressurized coring & Desorption	*	(+)
E & P Companies For which He/she has worked so far as For each service mentioned above	*	(+)

* To be specified by the bidder

6.3. The COMPANY intends to enter into Rate Running Contract with internationally reputed Well-site Geosciences Contractors (specialists in above said analysis) to acquire their services purely on “As & When Required Basis within Pakistan”, primarily for a period of one (01) year, extendable up to three (03) on mutual agreement. However, certain samples for NORM/trace element etc. may be transported to abroad at contractors expense. Contractor is bound to provide services till the completion of ongoing job/project/well at the time of expiry of this contract.

6.4. The CONTRACTOR shall sign an agreement with the COMPANY to provide fully operative Well-site Geosciences Laboratory/Unit, Equipment / Tools / Gadget(s) with fully experienced and fully qualified crew, purely on “As & When Required Basis within Pakistan”, during the contract period, in accordance with good industry practice and TOR (Term of Reference)/Scope of Work as per Tables 1 & 3. The services will be imparted utilizing state of the art technologies in most efficient manner as per TOR. The CONTRACTOR may be offered further jobs, on completion of the assigned work, subject to his quality of work and performance on this particular assignment. See table 6 for equipment condition and criteria.

TABLE 6 Contractor’s Equipment Specification

Serial #	Equipment	Company Request	Bidder Offer
1	Water Quality/Flow Back Water/Produced Water/NORM/Major & Trace Elements	*	(+)
	Equipment Manufacturer	*	(+)
	Type/Model	*	(+)
	Technical Features	*	
	Measurement Units	%	(+)
	Analysis time (including sample preparation)		(+)
2	XRF/XRD/Geochemical Rock Analyzer		
	XRD Resolution	*	(+)
	XRD Range	*	(+)
	Accuracy	*	
	Detection Limits	*	
3	Pressurized Coring & Desorption	*	(+)
	Manufacturer	*	(+)
	Type/Model	*	(+)
	Technical Features	*	
	Measurement Units	%,SOP's	(+)
4	Core Desorption (Desorption)		
	Manufacturer		
	Type/Model		
	Technical Features		
	Measurement Units		

- 6.5. CONTRACTOR, after signing the contract agreement with the COMPANY, is legally & morally bound to provide the fully operative Well-site Geosciences Laboratory/Unit, Equipment / Tools / Gadget(s) with fully qualified, fully trained and fully experienced Crew to perform the services as per “TOR” and requirement of the Company, within 40 (forty) days mobilization notice period for the provision of Laboratory/Unit, Equipment / Tools / Gadget(s) & crew(s) in Pakistan, this time period is only for new company which has no Base Lab/field Lab in Pakistan. However upon requirement, certain Samples may be transported abroad for analyses after the consultation of OGDCL professionals and contractor will be solely responsible for their expense.
- 6.6. The COMPANY shall provide sufficient quantum of work in accordance with its drilling program purely on “As & When Required Basis within Pakistan” without any kind of guarantee for minimum scope of work. The CONTRACTOR should be ready to meet all requirements outsourced by the COMPANY, and therefore, make available adequate resources for this purpose. But the COMPANY is not bound to take any kind of obligation(s) for grant of job(s) or any other business to the CONTRACTOR during the contract period.

- 6.7. Equipment for all services should be updated and certified from international standards. Technical/any other fault/error in equipment's during service operations or standby time, no extra cost will be charged. However contractor may claim **maximum 40% standby** charges of their professionals/equipment if there are any delays due to company side. Contractor is responsible to share all details of each equipment according to their service. For all analysis, the CONTRACTOR will have to provide a complete documentation about the technical characteristics of the tool proposed and detailed procedure for data processing and data analysis and a comprehensive report may be prepared for the Company. Mob/De-mob of professionals/equipment of each service (A,B,C,D) may be included (if any) in financial bid format in unit cost under the heading of Day rate professionals.
- 6.8. If COMPANY is not satisfied with the performance of CONTRACTOR, the CONTRACTOR will be informed to improve the deficiencies. If the CONTRACTOR fails to improve the quality up to the satisfaction of the COMPANY, the rate running contract will be terminated.
- 6.9. During the period of Rate Running Contract, the CONTRACTOR shall be solely responsible for all kind of Permits/licenses, obtaining valid work visa(s) and timely security clearance of its expatriates from concerned agencies/departments.
- 6.10. The CONTRACTOR is responsible for the compliance with the requirements set forth in this TOR and with applicable laws and regulations. Nothing in this specification shall relieve the CONTRACTOR of the responsibility for performing, in addition to the requirements of this specification, such analysis, tests, inspections and other activities that it considers necessary to ensure that the product, and workmanship are satisfactory for the service intended, or as may be required by common usage or good practice. Modification to the requirements of this specification may be proposed by the CONTRACTOR during the bidding phase, provided they are submitted to COMPANY for approval, with the support of proper documentation during the bidding phase.
- 6.11. The cost of all kind of Consumables, Equipment Rent, Backup Spares, Sample Preparation Kits, Rig up Accessories, all kind of packing material is included in Analyses Charges at well site as well as at base lab. CONTRACTOR is solely responsible to provide at Base Lab and well-site, enough backup spares & consumables in separate storage container to cover all kind of Calibrations, Sample Preparations, and rig up, Preventive & Corrective maintenance and to face the most common failures. At Base Lab only analyses rates will be applicable.

7. TECHNICAL BID

CONTRACTOR should submit the bid completed in all aspects in stipulated time. Incomplete bids will be rejected. Contractor shall mention Onsite / base Laboratory, all equipment, gadgets, tools, accessories, consumables, spare parts, sample preparation kits, qualified & trained personnel, technical assistance, hardware/software, peripherals, etc, and documentation necessary to carry out Cutting Analysis services, Core Analysis at well-site(s), Flow Back/Produced water analyses at well site /base lab as requested by the “COMPANY“. See table 7 Base Lab.

7.1. Dedicated software for data interpretation and reporting at base lab as well as at well-site (Table 7).

7.2. The services at well-site must be performed by **two specialists for Groups A, B, C and D** covering the daily drilling and/or coring activity round the clock, 24hrs/day.

Table 7 Contractor’s Base Lab

S #	Particulars	Company Request	Bidder Offer
1	Purpose of Facility	Required	(+) *
2	Head Office/Administration Technical interface with Company Personnel	*	(+)
3	Location of Operating Base	*	(+)
4	HSEQ Documentation	*	
5	Storage of Equipment & Tools	*	(+)
6	Maintenance of Equipment	*	
7	Storage of spares parts/equipment	*	(+)
8	Calibration of Sensors	*	(+)
9	Calibration and repairs of all electrical/electronic equipment	*	(+)
10	Proactive Address to Equipment Malfunction	*	
11	Lab Staff/Crew	*	
	* To be specified by the bidder		

7.3. All kind of Gadgets, spares, consumables, accessories, sample preparation kits, tools needed during the execution of the services (included calibration kit for the equipment) have to be considered included in the Analyses rates.

7.4. The above analysis will be performed into a dedicated unit / lab. CONTRACTOR must provide a documented system to ensure Quality Control verification.

7.5. CONTRACTOR must provide a verified documents of calibrated up to date/ new equipment’s for all kind of services. See Table 6.

7.6. All equipment must be intrinsically safe and explosion proof, according to the hazardous area classification at RIG LOCATION as per international industry practices.

7.7. The successful bidder must have a mobile unit in Pakistan preferably for Group A, Group-B, Group-C and Group D. In case a successful bidder has not existing lab or

mobile unit in Pakistan, it should be made available in Pakistan within 40 days after award of Contract. If contractor fails to establish local/mobile lab in Pakistan, Second bidder will be considered on same financial rate as the first contractor for the continuity of the analyses.

- 7.8. REPORTING & DOCUMENTATION FOR ANALYSES OF GROUPS "A", "B", "C" AND D.
- 7.9. Special emphasis MUST be given to the accuracy of all kind of Report(s), logs and Data.
- 7.10. The COMPANY will not accept erroneous Report(s), graphs, logs, data, tables & charts etc in any case. Contractor solely responsible for accurate reports, logs, charts, plots, maps. Contrarily OGDCL has the right to deduct invoice expense accordingly.
- 7.11. The CONTRACTOR(s) shall include in Technical Bid the "Specimen" of all kind of proposed reports, logs, Data presentation Formats, Plan of Work for the Project, etc.
- 7.12. The CONTRACTOR shall provide Inception report analysis of the existing data no later than one week after the start of project followed by Daily/Weekly progress reports and Final Report.
- 7.13. Draft copies of the final reports referred to above must be submitted to within two (2) weeks after the end of operations to the designated official of the COMPANY. The reports must be written in English. The designated official of the COMPANY is responsible for approving the reports.
- 7.14. The final report is submitted within 1 month of receiving comments on the draft final report from the designated official of the COMPANY.
- 7.15. During the execution of the service, CONTRACTOR shall provide to the "COMPANY" hard & soft copies (both) of the following reports/logs free of charge.
- 7.16. The Logs shall also include the data received off-line from 3rd party (other Service CONTRACTOR present at WELL SITE).
- 7.17. At the end of the well a Final Report must be provided to the COMPANY either as digital format (both Microsoft Office format and PDF Image File) and paper copies (five copies plus extra copies if requested).
- 7.18. Details about the information and parameters included in the above Log and Reports will be agreed between COMPANY and CONTRACTOR before the start of job/work.
- 7.19. CONTRACTOR shall maintain an extra (digital) copy of all report and digital data acquired for 7 (seven) years. After this period the documentation shall be destroyed by CONTRACTOR after written authorizations by COMPANY.
- 7.20. After submission of the final reports of the results of the analysis of the samples to OGDCL, the contractor shall stand responsible for another 90 days (from the date of final submission) for any correction, editing, revision, formatting or any other change

suggested by OGDCL.

- 7.21. The cost of Reports & Documentation is included in Operational/analyses Day Rate. Contractor shall stand responsible to provide digital & soft copies of logs, charts, maps and all kind of excel sheet & data should be in required format.
- 7.22. Daily Report/s should be vetted from well site OGDCL concerned professional.
- 7.23. Payment to the contractor will be made at actual against verified invoices in Pakistani Rupees.

8 OGDCL PARTICIPATION AND SKILL TRANSFER

Relevant OGDCL Professionals will be attached with the CONTRACTOR from time to time for necessary input and complete training at Contractor's Lab. Contractor is bound to provide suitable office/lab space and equipment to the OGDCL professionals during the contract period & execution of services as prescribed above without any kind of financial burden on part of the COMPANY. These include methodology how these services will be carried out, including the main methods to be used to collect data, analysis, handling instrument, and record and report information. At least two professionals of OGDCL are required to be attached for training. Minimum time duration for training for each Group Service from 2 to 3 weeks or as per OGDCL instructions.

9 INELIGIBILITY

The Contractors/Bidders/Firms/Companies/Vendors and their representatives having conflict of interest with OGDCL would not be entertained.

10 CONTRACTOR'S PERSONNEL REQUIREMENTS FOR GROUP "A", "B" "C" & GROUP "D" SERVICES

Following personnel will be required essentially:

- 10.1. Two (02) specialists for Flow back/Produced water are required if the analyses are planned to be carried out at well-site (Group A). In case, NORM / other elements will be carried out at contractor's base lab, only one person is sufficient to collect the Flow back/Produced water in stipulated time. Two specialists are required for each Group (B to D) having at least five years post qualification relevant experience, along with four year university degree in earth sciences preferably in geology or M.Sc./Mphil/PhD Geology and able to communicate in English fluently (both spoken & written). Each specialist will work 12 hrs shift duty/day and no payment for off days will be made. However, if the delay is due to Company, 40% day rate of contractor professionals will be paid along with provision of meals, lodging and other daily life necessities.
- 10.2. Company's Professionals, shall visit the Contractor's Lab Facility in order to ensure the presence of updated/calibrated equipment, trained/experienced professionals.
- 10.3. Contractor's professionals are responsible to handle water, cuttings and core samples (before and after analyses), geological description (cuttings and core samples), photography of samples with scale are required etc. Standby day rates of professionals for each services at well site will not be more than 40% at well site.
- 10.4. Group A, B, C and D services are as and when required basis.
- 10.5. Crew change is based as dictated by operational conditions or as mutually agreed. All

kind of crew transportation (cost of Air tickets, pick & drop, etc) to and from the work location, transit time, journey time, hotel stay, etc, etc, will be the sole responsibility of the CONTRACTOR at CONTRACTOR's account. However, on site boarding/ lodging and meals will be provided by the COMPANY as per prevailing industry practices.

- 10.6. In time Security Clearance of Expatriates (Contractor's Personnel) in line with the laid down security procedure of the COMPANY & Government of Pakistan is the sole responsibility of the CONTRACTOR, within stipulated time period.
- 10.7. The CONTRACTOR should have an effective liaison with the COMPANY on daily basis to discuss all kind of issues and concerns to resolve them accordingly.
- 10.8. The COMPANY will not compromise on crew competency, attitude, behavior, demonstrated technical skills, communication skills (both spoken & written English), requisite qualification, relevant work experience, equipment's performance, accuracy of data, etc. The CONTRACTOR's personnel are bound to obey the safety regulations & labor laws.
- 10.9. The CONTRACTOR is bound to include Personnel's Resumes along-with their fresh colored photographs and COMPANY reserves the right to lock the resumes for future reference. The CONTRACTOR is also bound to provide the resumes with relevant experience of each crew member on each crew change.
- 10.10. If any incompetent or disobedient or ill-mannered person of CONTRACTOR is found deployed for any of these services at well-site , the COMPANY reserves the right to advise the CONTRACTOR to replace him forthwith on CONTRACTOR's expense and deduct on invoice 100% of the established rate for that specific category (Flow/Produced water Analyst , Cutting Analysis Specialist or Core Analysis Specialist or Pressurized Core Specialist) for each day till such time that its suitable replacement, acceptable to the COMPANY, is physically provided at work location, by the CONTRACTOR at contractor's own expenses.
- 10.11. The CONTRACTOR shall at all times be responsible for ensuring that the personnel provided to perform the services are appropriately qualified hold valid certifications, are adequately trained including "training for handling of acid and solvent", and that the validity of such qualifications, certifications and training are maintained throughout the entire Contract Period. In addition, for the personnel working at RIG LOCATION, the following courses are required:
 - Basic Fire Fighting
 - Basic First Aid
 - Basic Course H₂S
 - Basic monitoring techniques, safety procedures and use of protection equipment as breathing apparatus and escape set.
 - Personnel shall be certified according to Law of Pakistan for the specific role.

- 10.12. The CONTRACTOR shall supply, on COMPANY request, certificates of good health, qualification and competence for each employee assigned to special works according to local laws and regulations. The personnel shall be fully conversant with the applicable procedures and operating instructions and must be able to speak, read and write in English language.
- 10.13. The CONTRACTOR is solely responsible for all kind of accidental insurance coverage, traveling expenses, health insurance. However, minor first aid will be available at work location.
- 10.14. Queuing of OGDCL rock samples by contractor will be discouraged and once the samples are received in contractor's Base Lab/office, analyses of OGDCL rock samples will be started at the earliest possible time but not later than two days. The queuing of the rock sample may affect the invoice of the contractor under the clause late/incomplete deliverables of the contract. For mobile services/units/well-site backup of equipment is necessary and delay is not acceptable more than three hours.

11 FINANCIAL EVALUATION CRITERIA

The Financial Proposal of the technically qualified bidder(s) shall be considered and evaluated. Financial evaluation will be carried out on quality and cost base method (i.e. 30% to weightage to financial and 70% weightage to technical marks) on group wise basis. The cost will be evaluated upon entire project completion lump sum cost basis including third party cost; materials cost all type of taxes etc against each group. The financial portion shall carry over-all 30% weightage in final technical cum financial evaluation for award of contract. The bidder with lowest financial offer shall be given full 30% marks and 70% weightage will be given to the technical proposal. The Score will be calculated by applying sliding scale formula. The bidder attaining highest marks in technical cum financial evaluation will be awarded the job. Bidders should quote their rates as Financial Bid Format given in Table 8.

The bids requiring substantial modifications/additional price notes shall be rejected outright. The following number of analyses/samples is only for budgetary/financial evaluation purpose.

Table 8: Financial Bid Format

Sr. No.	Analyses	Unit Cost (US \$) /Sample	No. of Samples for One Year	Total Cost for One Year (US \$)
Group A				
1	Produced Water/Post Frac Water Quality Analyses		35	*
2	NORM Analyses		35	*
3	Major and Trace Element Analyses in Flow Back/Produced water		35	*
4	Day Rate of two Professional to collect/analyze Flow Back/ Produced water at Well-site only (for 30 days, for calculation only)		30 days	*
	Total Cost for Group-A inclusive of all applicable taxes, duties etc. except PST/ICT Tax on Services in Pakistan			
Group B				
1	Complete X-Ray Diffraction (XRD) Bulk and Clay Typing, rock/core sample photography, Identification of all minerals/element present in rock sample		300	*
2	XRF Identification of all minerals/element present in rock sample		300	
3	Geochemical Evaluation (pyrolysis)		300	*
4	Day Rate of 2 Professionals for XRD and XRF at Well-site only (for 30 days, for calculation only)		30 days	
	Total Cost for Group-B inclusive of all applicable taxes, duties etc. except PST/ICT Tax on Services in Pakistan			
Group C				
1	Canister Gas/Desorption Analyses, rock/core sample photography (TOR Serial No. 4)		30	*
2	Core Description, Handling, Preservation (for 100 meters for calculation only) if required		100 meters	*
3	Day Rate of 2 Professionals for Desorption Analyses: Canister Gas/ Pressurized Core at Well-site only (for 30 days, for calculation only)		30 days	*
	Total Cost for Group-C inclusive of all applicable taxes, duties etc. except PST/ICT Tax on Services in Pakistan			
Group D				
1	Pressurized coring and Desorption Analyses, rock/core sample photography (TOR Serial No. 5)		20	*
2	Day Rate of two Professionals to provide pressurized coring & Desorption at Well-site/Base Lab if req. (for 30 days, for calculation only)		30 days	*
3	Core Description, Handling, Preservation (for 100 meters for calculation only) if required		100 meters	*
	Total Cost for Group-D inclusive of all applicable taxes, duties etc. except PST/ICT Tax on Services in Pakistan			

Notes:

* To be specified by the **bidder**

- Prices must be inclusive of all applicable taxes/duties levies etc. except PST/ICT tax on Services in Pakistan. PST/ICT where applicable will be paid/reimbursed by OGDCL at actual.

Note:

2. Amount of Bid bond shall be

USD 3,600/- (US Dollar Three Thousand Six Hundred Only)	for Group-A.
USD 14,000/- (US Dollar Fourteen Thousand Only)	for Group-B.
USD 2,400/- (US Dollar Two Thousand Four Hundred Only)	for Group-C.
USD 10,000/- (US Dollar Ten Thousand Only)	for Group-D.

3. Following annexures must be attached with the technical bid ,
- a. Bid bond, bidding form, Integrity & ethics undertaking, Affidavit duly signed & stamped by Public Notary, Data Summary sheet (unpriced), Unpriced financial rate format, Duly signed & stamped unpriced Draft Contract and tender documents.
4. The master set of tender documents (services) uploaded on OGDCL website (www.ogdcl.com) is the integral part of this TOR.