

OIL & GAS DEVELOPMENT COMPANY LIMITED



TENDER ENQUIRY NO. PROC-SERVICES/CB/EXPL-4594/2019

**HIRING OF SERVICES FOR LAB. ANALYSIS OF ROCK SAMPLES
(CORE AND CUTTINGS)**

Note:

Bid bond of **USD 120,000/- (US Dollar One Hundred Twenty Thousand Only)** to be submitted with the technical bid.

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

1. Terms of Reference/Scope of Work for Hiring of Services for Lab. Analyses of Rock Samples (Cores and Cuttings)

OGDCL is a leading E & P company of Pakistan and working all over the country. OGDCL drills a number of wells each year and cuts conventional and sidewall cores in potential horizons of **conventional and unconventional hydrocarbons**. OGDCL intends to acquire the services for analysing rock samples (cores and cuttings) for reservoir characterization (especially relevant to Shale Gas/Tight Gas), routine core analyses (RCA) and special core analyses (SCAL) with emphasis on geo-mechanics. The tentative list of required analyses is given in table 1. The bidder may include more analyses for complete evaluation of cores and cuttings for unconventional hydrocarbon resources assessment. In this connection, bids from eligible and recognized service companies or R & D institutes working in Pakistan or abroad (having a base office in Pakistan) are required. 2. The objective of acquiring advanced and reliable laboratory analyses on cuttings and/or cores is mineralogical/ geochemical, petrophysical properties of rocks for shale gas/tight gas and also conventional reservoir characterization to support operational decisions regarding calibration of data, establishing Hydraulic Frac Design and treatment strategy.

1.1. Scope of Work

Tentative List of required Lab Analyses for Flush Cuttings and Cores (Table 1) are required on CALL OUT basis for a period of three years (Contract extendable with mutual consent) on OGDCL wells all over Pakistan (Bid Format):-

1.2. Services/Analyses at Base Lab

Contractor should keep in mind the following:-

- 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).
- Core & other data Transportation/Shipping (provide protection against damage Environmental change, mechanical vibration, mishandling, etc) and all relevant matters which are required to be considered necessary for the analyses mentioned in table 1.

Analyses and their Integrated & Assessment Report/s (drafts and final versions in soft and hard copies) of all analyses carried out on each core/well will be required free of cost and following terms and conditions will be fulfilled by the Contractor/Bidders.

2. General Terms and Conditions

- 2.1. Bids are required from interested contractors to analyze the Cores and Cuttings on as and when required basis at Contractor's lab. facility.
- 2.2. It is noted that \pm 5 wells have been / being drilled by OGDCL annually in which one to four cores are cut routinely. A number of rock samples are also available at OGDCL Core House, Islamabad.
- 2.3. Contractor is responsible to collect/handle and to and fro transport the core samples from Core House (Islamabad) to Contractor's Lab facility and no extra charges will be claimed.
- 2.4. Queuing of OGDCL rock samples by Contractor will be discouraged and once the samples are received in Contractor's Lab/Office, analyses of OGDCL rock samples will be started at the earliest possible time but not later than three days. The queuing of rock

- samples may affect the invoice of the contractor under the clause late/incomplete deliverables of the contract.
- 2.5. Once the analytical job is taken up/ assumed, the Contractor is responsible to submit the draft analyses/ progress report weekly.
 - 2.6. In case, report and analyses of core/s are found substandard, it will be rejected immediately and no invoice will be cleared. However, minor typo-editing and format mistakes may be corrected, and contractor is bound to correct as per industry practice and to the entire satisfaction of OGDCL professionals.
 - 2.7. All the work, calculations, charts, graphs, tables, diagrams, figures and text regarding analyses will be shared with OGDCL only.
 - 2.8. Confidentiality and privacy of OGDCL data will be the prime responsibility of the contractor and any breach of it will be liable to strict action as deemed fit by the company.
 - 2.9. Final Report of the analyses of a core should include the work, calculations, charts, graphs, tables, diagrams, figures and text regarding analyses.
 - 2.10. OGDCL professionals may visit the contractor/s facility and arrangement to ensure the relevant equipment and trained staff availability.
 - 2.11. The **contractor** shall sign an agreement with the **company** to provide fully operative Geosciences Laboratory/Unit, Equipment / Tools / Gadget(s) with 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. For certain analyses, rock samples may be shifted abroad at Contractor’s expense, after the approval of OGDCL/relevant authority. 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 previously completed assignment.
 - 2.12. The **contractor** shall provide the fully operative 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 30 (thirty) days notice period (first time) for the provision of Laboratory/Unit, Equipment / Tools / Gadget(s) & crew(s) in Pakistan (Tables 2 – 4).
 - 2.13. The **company** shall provide sufficient quantum of work in accordance with its drilling program as well as rock samples present in Core House purely on “As & When Required Basis” 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.

- 2.14. 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 of service within one week time up to the satisfaction of the **company**, the rate running contract will be terminated and Contractor may be penalized.
- 2.15. 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.
- 2.16. 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.
- 2.17. The cost of all kind of Consumables, Backup Spares, Sample Preparation Kits, Rig up Accessories, all kind of packing material is included in daily operating charges at (well-site)/cost of analyses (at base lab). **Contractor** is solely responsible to provide at Geosciences Lab Services (Lab Base), and enough backup spares & consumables in separate storage container to cover all kind of Calibrations, Sample Preparations, Preventive & Corrective maintenance and to face the most common failures (Tables 3-4).
- 2.18. The analyses will be performed into a dedicated 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”.
- 2.19. **Contractor** must provide a documented system to ensure Quality Control verification.
- 2.20. All equipment must be intrinsically safe and explosion proof, according to the hazardous area classification at Contractor’s Lab location as per international industry practices.
- 2.21. Special emphasis must be given to the accuracy of all kind of Report(s), Logs and Data.
- 2.22. In any case, the **company** will not accept erroneous Report(s), Graphs, Logs, Data, and Tables & Charts etc.
- 2.23. 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.

- 2.24. 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.
- 2.25. Draft copies of the final reports referred to above must be submitted within two (2) weeks after the end of operations to the designated official of the **company**. The reports must be written in English. After thorough study of report, the designated official of the **company** may approve/disapprove the report/s.
- 2.26. The final report/s is/are submitted within 1 month of receiving comments on the draft final report from the designated official of the **company**.
- 2.27. During the execution of the service, **contractor** shall provide to the “**company**” hard & soft copies (both) of the following reports/logs free of charge.
- 2.28. Contractor will be responsible for Core Handling, Sampling & Preservation (Define depth allocation, maintain core integrity, Preserve core properties, effective core stabilization & preservation methods at Base Lab etc).
- 2.29. Core Description (Texture, core recovery, core logs, core image, digitized data, Oil fluorescence/cut, etc) and following may be provided.
- 2.29.1. Integrated Core Analysis Daily Reports
 - 2.29.2. Integrated Core Analysis Composite Logs/Core Logs
 - 2.29.3. Graphs, tables, cross plots and composite logs for measured, calculated and interpreted results.
 - 2.29.4. Reports of evaluated and interpreted results including recommendations.
- 2.30. The **company** reserves its right to acquire partial or complete services listed in the Table 1 as per company requirement. The Company may increase and decrease the scope of work.
- 2.31. At the end of analyses of the core/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).
- 2.32. 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.
- 2.33. **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**.
- 2.34. 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.

2.35. The cost of Reports & Documentation is included in Analyses Rate.

3. OGDCL PARTICIPATION AND SKILL TRANSFER

3.1. 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, record and report information. However, logistics & lodging etc. of OGDCL professionals will be borne by the Company.

3.2. As it is mentioned in table-1, lab analyses are further divided into four categories. In each category minimum two professionals of OGDCL are required to be attached/ participated for training. The minimum time duration for participation/training for each category is given below which may be extended for complete training of OGDCL professionals as per feedback of the OGDCL professional/s and Contractor.

Category	Training/ Participation of OGDCL Professional
I.	Minimum 20 working days
II.	Minimum 20 working days
III.	Minimum 25 working days
IV.	Minimum 35 working days

3.3. The contractor may propose the time line for complete training of OGDCL professionals.

4. INELIGIBILITY

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

5. CONTRACTOR'S PERSONNEL REQUIREMENTS FOR LAB Analyses SERVICES

Following personnel will be required essentially:

5.1 Two (02) specialists, having at least five years post qualification relevant experience in advanced Core Analyses (mentioned in table 1, university degree in earth sciences

preferably in geology or M.Sc. Geology and able to communicate in English fluently (both spoken & written). Other requirements of specialist are given in Table-2.

- 5.2. 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, will be the sole responsibility of the **contractor** at **contractor's** account.
- 5.3. 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.
- 5.4. 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.
- 5.5. 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 of each crew member on each crew change.
- 5.6. 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.
- 5.7. 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.

Table (1) Lab Analyses for Flush Cuttings and Cores

Sr. No.	Analyses	Category
1	Complete X-Ray Diffraction (XRD) Bulk and Clay Typing	I
2	Description of Core Lithology/ Thin Section Petrography/ Photography	
3	Grain Density and Bulk Density	
4	Maceral Reflectance, Visual Kerogen and Thermal Alteration Index	
5	Shale Adsorption Isotherm (6-Point) at less than and greater than (Greater than 85°C)	
6	Rock-Wise SM ED-XRF Elemental Analysis and Chemostratigraphy	
7	Routine Core Analyses (porosity & permeability- horizontal and vertical)	II
8	Shale Properties Analysis w/Additional Perm – Package*	
9	Acoustic (Ultrasonic) Velocity Test	
10	Computer Tomography (CT) Monitored Fracture Conductivity and Embedment Test on a plug sample:	III
11	Capillary Pressure	
12	Centrifuge capillary pressures	
13	Electrical Properties: Formation Factor (a and m) - 2 terminal method (at net confining stress) Resistivity Index (n): 2 terminal method – plug sample (at net confining stress)	
14	Mercury Injection Capillary Pressure:	
15	NMR Core Analysis	
16	Petrophysical Correlation Measurements	
17	Core Geo-mechanics, Core Mechanical Properties	
18	Formation Damage	
19	Propant Embedment Test	
20	Shale Stability Test (Roller Oven Time Test)	
21	Tri-axial Compressive Strength Test	
22	Wettability Determination	
23	Brazilian Test	
24	Critically Stress Fracture Test	

Notes:-

- The number of samples and type of analyses given in tables 1 and 8 are only for evaluation purpose and for comparison. Calculation is based on assumption that three (03) conventional cores (27m) will be cut per well. It is also assumed that five (05) wells will be drilled yearly.
- OGDCL reserve the right to change the scope of work regarding number of samples at any time.

- OGDCL reserve the right to **change the scope of work regarding number of samples** at any time.
- OGDCL reserves the right to terminate the Contract at any time during the contract period in case the quality of analyses/report or stipulated timelines are not satisfactorily maintained by the contractor.
- The bidder may include more categories of analyses for complete evaluation of cores and cuttings for unconventional hydrocarbon resource assessment as per latest prevalent industry practices.
- Payment will be made at actual against verified invoices.
- Bid bond of **USD 120,000/- (US Dollar One Hundred Twenty Thousand Only)** to be submitted with the technical bid.
- The master set of tender documents (services) uploaded on OGDCL website (www.ogdcl.com) is the integral part of this TOR.
- Bidders must submit their rates as per financial format mentioned in Table 8.

Table (2) Personnel Qualification – For Lab Analyses/Services

Personnel Data	Company Request	Bidder Offer
Name:	*	(+) *
Date of Birth:	*	(+)
Languages:	English	(+)
Present Position	*	(+)
Experience as Advanced Cutting & Core Analyses Specialist	Min Four(4) Years	(+)
Academic Qualification	Preferably Geology M.Sc.	(+)
Trainings	*	(+)
Certificates	*	(+)
Training Certified Course	*	(+)
Advanced Cutting Analysis	*	(+)
Advanced Core Analysis	*	(+)
Professional Experience	*	(+)
Advanced Analysis on Cuttings	*	(+)
Advanced Analysis on Cores	*	
Onsite Core Analysis	*	(+)
Lithology Description	*	(+)
E & P Companies For which He/she has worked so far as Advanced Core Analysis Specialist	*	

* To be specified by the **bidder**

TABLE (3) Contractor's Lab

Serial No.	Particulars	Company Request	Bidder Offer
3.1.	Purpose of Facility	Required	(+) *
3.2.	Head Office/Administration Technical interface with Company Personnel	*	(+)
3.3.	Location of Operating Base	*	(+)
3.4.	HSEQ Documentation	*	
3.5.	Storage of Equipment & Tools	*	(+)
3.6.	Maintenance of Equipment	*	
3.7.	Storage of spares parts/equipment	*	(+)
3.8.	Calibration of Sensors	*	(+)
3.9.	Calibration and repairs of all electrical/ electronic e equipment	*	(+)
3.10.	Proactive Address to Equipment Malfunction	*	
3.11.	Lab Staff/Crew	*	

* To be specified by the **bidder**

Table (4) Base Laboratory & Advanced Cutting Analyses Equipment List

Serial No.	Equipment	Company Request	Bidder Offer
4.1.	XRD	*	(+)
	Manufacturer	*	(+)
	Type/Model	*	(+)
	Technical Features	*	
	Measurement Units	%	(+)
	Analysis time (including sample preparation)	Maximum 1 hr per sample	(+)
	XRD Resolution	*	(+)
	XRD Range	*	(+)
	Accuracy	*	
	Detection Limits	*	
4.2.	XRF	Required	
	Manufacturer	*	(+)
	Type/Model	*	(+)
	Technical Features	*	
	Measurement Units	ppm or %age	(+)
	Analysis time (including sample preparation)	Maximum 10 mins	(+)
	Detection Limits	*	

* To be specified by the **bidder**

The contractors should give complete details of all the analyses by considering the details given in tables 4 and 5.

Table (5) Description of Details of XRD and XRF for CONTRACTOR'S Guidance. Contractor should give complete details regarding the analyses mentioned in table 1 as per SOP/industry practice.

Serial No.	Description	*Contractor to Specify Yes/No
5.1.	Contractor will be solely responsible for providing, correctly calibrated & correctly operative X-Rays Diffraction (XRD) Instrument for Mineralogy with all kind of sample preparation equipment. The XRD instrument should be capable to obtain mineralogy data directly from cuttings at Wellsite and or base lab. The mineralogy quantified by well-site sample XRD includes:	
5.1.1.	Quartz and Opal	
5.1.2.	Feldspars-Plagioclase, K-feldspar	
5.1.3.	Total Clay + Types of Clay (Kaolinite, Illite, Vermiculite, Smectite, Chlorite, Montmorillonite etc)	
5.1.4.	Carbonates – Calcite, Dolomite, Siderite	
5.1.5.	Pyrite	
5.1.6.	Sulfates – Anhydrite, Gypsum, Barite	
5.1.7.	Apatite	
5.1.8.	Halite	
5.1.9.	Mica types of mica (Muscovite and biotite)	
5.1.10.	Glauconite.	
5.1.11.	Diffraction of each sample.	
5.2.	Contractor will be solely responsible for providing, correctly calibrated & correctly operative X-Rays Fluorescence (XRF) Instrument for Elemental Composition with all kind of sample preparation equipment. The XRF instrument should be capable to make elemental analysis at well-site and or base lab and should be capable of measuring the following oxides and elements with accuracy and precision. Elements between Magnesium and Uranium are to be identified including:-	
5.2.1.	Major Elements – SiO ₂ , TiO ₂ , Al ₂ O ₃ , MgO, Fe ₂ O ₃ , MnO, CaO, Na ₂ O, K ₂ O, P ₂ O ₅ , SO ₃ , Cl.	
5.2.2.	Trace Elements – V, Cr, Co, Ni, Cu, Zn, Ga, As, Rb, Sr, , Zr, Nb, Mo, Ba, Be, Hf, Pb, Th, U	

Table (6) Any Additional analyses which are required for exploration and development of unconventional hydrocarbons (Tight Gas/Shale Gas).

Analyses	Description	*Contractor to Specify Yes/No

All expenses inclusive for sample analysis at lab.

6. TECHNICAL EVALUATION CRITERIA:

Table 7 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.

Table 7: Technical Evaluation Criteria

Serial No.	Description	Points
7.1.	*Lab Equipment and its back-up: New Equipment will be given maximum marks	10
7.2.	*No. of Shale Gas, Shale Oil, and Tight Gas projects for Lab. Analyses *No. of Shale Gas, Shale Oil and Tight Gas > (10 – 15) projects = 16 – 20 points, (6 – 10) projects = 10 – 15 points, (3 – 5) projects = 7 – 9 points, (2 – 3) projects = 5 – 6 points, less than (2) projects = 0 points. Bidder/s involved in newly established Work Flow (with demonstrable innovation backed by R&D) from Lab analyses Complete Production Cycle. of Shale Gas, Shale Oil and Tight Gas Projects will be additional benefit. <ul style="list-style-type: none"> No. of Shale Gas, Shale Oil and Tight Gas Projects carried out using Pre-existing Work Flows, from Subsurface to Complete Production Cycle 	20
7.3.	Experience of the firm / Bidder Experience (10) Years = 20 points, (9 – 8) Years = 17 – 19 points, (7 – 6) Years = 13 – 16 point, (6 – 5) Years = 11 – 12 points, (4 – 3) Years = 10 – 8 points, (3 – 2) Years = 7 – 5 points and <2 years = 0 points.	20
7.4.	Work plan of each analyses including manning schedule	10
7.5.	Training/ Skill transfer plan to OGDCL Professionals <ul style="list-style-type: none"> Training for 20 – 35 working days in Pakistan or abroad. OGDCL professionals participating in Lab analyses to be trained in all relevant domains.	20
7.6.	Bidder's Personnel (Qualification and **Relevant Experience) Qualification (PhD = 10 points, MS = 7 points & BS = 3 points) Relevant Experience > (10) Years = 10 points, (5 – 10) Years = 7 – 9 points, (2 – 4) Years = 3 – 6 points and <2 years = 0 points	20
	Total:	100

7. FINANCIAL EVALUATION CRITERIA

The Financial Proposal of the technically qualified bidder(s) shall be considered and evaluated. The cost will be evaluated upon entire project completion lump sum cost basis including third party cost; materials cost all type of taxes etc. 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 for award 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 to make it responsive shall be rejected outright.

Table 8: Financial Bid Format

Sr. No.	Analyses	Unit Cost (US \$)/ Sample	No. of Samples for One Yearly	No. of Samples for Three Yearly	Total Cost for One Year (US \$)	Total Cost for Three Year (US \$)
8.1.	Complete X-Ray Diffraction (XRD) Bulk and clay typing		100	300		
8.2.	Description of Core Lithology / Thin Section Petrography / Photography		500	1500		
8.3.	Grain Density and Bulk Density		100	300		
8.4.	Rock-Wise SM ED-XRF Elemental Analysis and Chemostratigraphy		100	300		
8.5.	Routine Core Analyses (porosity & permeability- horizontal and vertical)		500	1500		
8.6.	Shale Properties Analysis w/Additional Perm – Package*		100	300		
8.7.	Acoustic (Ultrasonic) Velocity Test		100	300		
8.8.	Computer Tomography (CT) Monitored Fracture Conductivity and Embedment Test on a plug sample:		36	108		
8.9.	Capillary Pressure		50	150		
8.10.	Centrifuge capillary pressures		50	150		
8.11.	Electrical Properties: Formation Factor (a and m) - 2 terminal method (at net confining stress) Resistivity Index (n): 2 terminal method – plug sample (at net confining stress)		36	108		
8.12.	Mercury Injection Capillary Pressure		36	108		
8.13.	NMR Core Analysis		50	150		
8.14.	Petrophysical Correlation Measurements		50	150		
8.15.	Shale Adsorption Isotherm (6-Point) at less than and greater than (Greater than 85°C)		25	75		
8.16.	Maceral Reflectance, Visual Kerogen and Thermal Alteration Index		100	300		
8.17.	Core Geo-mechanics, Core Mechanical Properties		50	150		
8.18.	Formation Damage		36	108		
8.19.	Propant Embedment Test		25	75		
8.20.	Shale Stability Test (Roller Oven Time Test)		50	150		
8.21.	Tri-axial Compressive Strength Test		36	108		
8.22.	Wettability Determination		50	150		
8.23.	Brazilian Test		25	75		
8.24.	Critically Stress Fracture Test		25	75		
Total			2230	6690		