



**OIL & GAS DEVELOPMENT COMPANY
LIMITED
REQUEST FOR QUOTATION
(SERVICES)**

OGDCL House, Jinnah Avenue, Islamabad Pakistan

- Description:** Integrated Seismic Data Interpretation, Structural Geological Modelling and Fracture Modelling Analysis of Soghri and Fateh Jang E.L's.
- RFQ No.:** PROC-SERVICES/CB/EXPL-6400000084/2022
- Services required For:** Soghri and Fateh Jang E.L's
- Bidding Procedure:** Single Stage Two Envelope
- Evaluation Criteria:** Quality & Cost (**80%** weightage for Technical Evaluation & **20%** for Financial Evaluation)
- Tax:** All applicable Taxes except ICT/PCT
- Bid Validity:** 180 days from Technical bid opening.
- Bid Bond Amount:** USD 5,500/-
- Bid Bond Validity:** 210 days from Technical bid opening
- Duration of Contract / Completion Period:** 01 Year
- Payment Terms:** Payment will be made against verified invoices.

Item No.	Description	Unit	Total Price (USD)
10	Integrated Seismic Data Interpretation, Structural Geological Modelling, and Fracture Modelling/ Analysis of Fateh Jang and Soghri Exploration blocks.	Lump Sum	

TERM OF REFERENCE

FOR

HIRING OF SERVICES FOR 2D SEISMIC DATA REPROCESSING UPTO PRE-STACK TIME MIGRATION

1. Introduction

Oil & Gas Development Company Limited (OGDCL) hereinafter referred to as “The Company” is the national prime body of the country’s E&P sector. The company is the local market leader in terms of exploration, development, reserves, production and acreage. The company is listed on the London’s Stock Exchange since December 06, 2006 and hence susceptible to international investment environment.

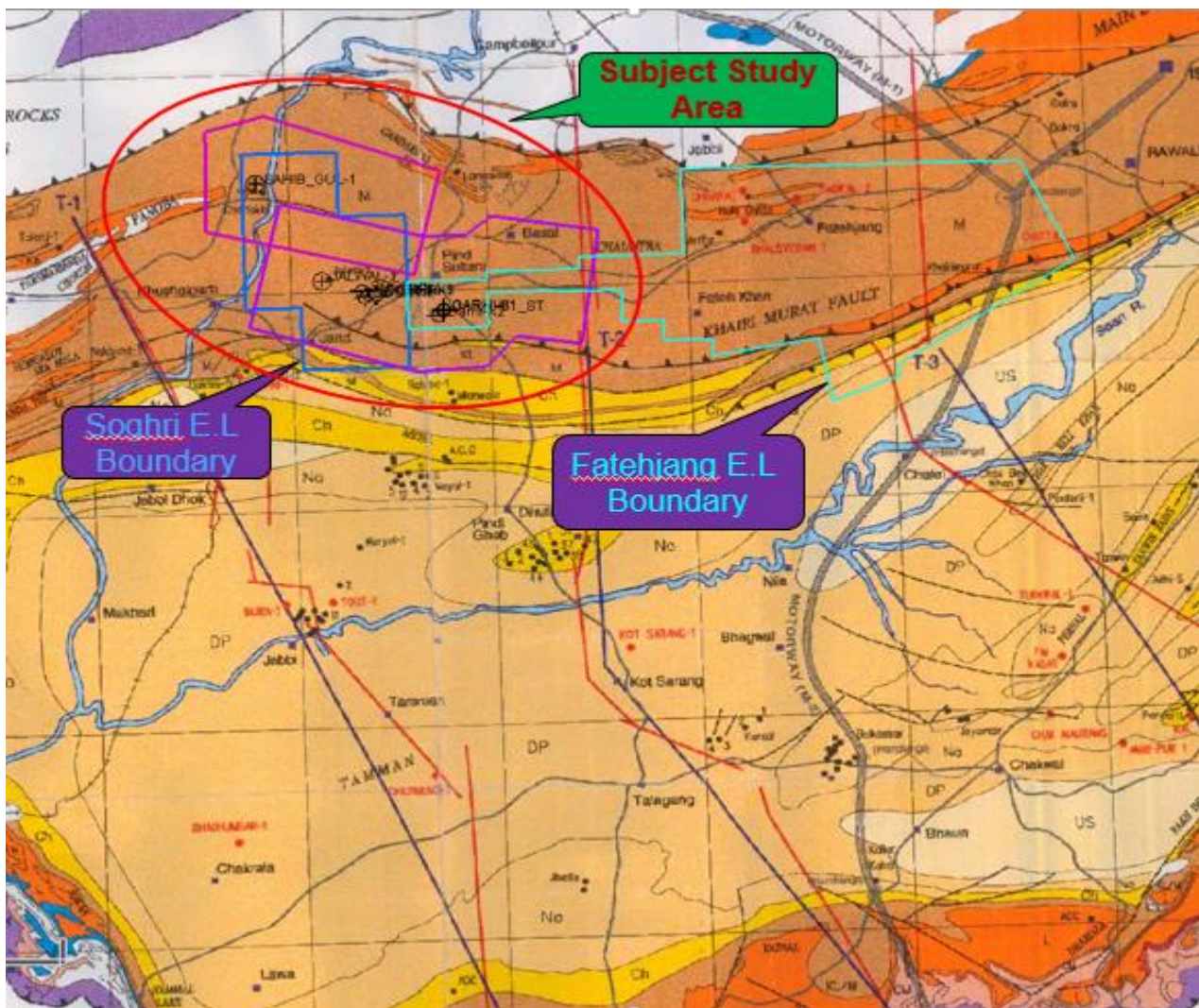
To expedite exploration activities, the company invites well reputed bidders to submit quotations for the services of “**Integrated Structural Geological Modelling, Seismic Interpretation, and Fracture Modelling/ Analysis of Fateh Jang and Soghri Exploration blocks**”.

Administratively, the project area is located in Islamabad, Rawalpindi, Attock and Kohat districts of Pakistan. Geologically, the area lies in Potwar Basin which is a foreland fold-and-thrust belt situated in the Upper Indus Basin in Northern Pakistan. The Potwar Basin is bounded to the north by the Main Boundary Thrust (MBT) and to the south by Main Frontal Thrust (Salt Range Thrust). Kalabagh Dextral and Jhelum Sinistral faults mark its western and eastern boundaries respectively. The study area lies specifically in the northern part of Potwar Basin called Northern Potwar Deformed Zone (NPDZ). The most deformed sequence is observed in the NPDZ with tight folds, overturned folds and triangle zones with imbrication and duplex structures.

Following is the list of available data.

Available data set in project area:

3D Seismic Data (PSTM, PSDM)	1008 Sq.kms
2D Seismic Data	>1000 L Km
VSP/Check Shot Data	Available in (04) wells
Total Number of Wells in Project Area	09
Conventional well logs	about (09) wells
Image logs	about (09) wells
Geological Maps	Geological Map of project area & adjacent blocks are available
<i>Note: Table is showing the minimum available data. The data (seismic and wells) of adjacent blocks would also be provided as per requirement.</i>	



Location Map along with 3D seismic survey area boundaries

2. Objectives

The main objectives of the study are:

To carry out Integrated Structural Geological Modelling, Seismic Interpretation, and Fracture Modelling/ Analysis which will be developed by integration of surface & sub-surface G&G data. The study will include cross-sections construction, geological structural model building, kinematic restoration and validation.

The study will determine the structural and kinematic concept of the structures in the area by the:

- 2.1. Identification of tectonic blocks with the same type of structure.
- 2.2. Determination of structure-forming faults and sliding horizons that form each of the identified blocks.
- 2.3. Selected blocks, structural and kinematic elements should be reflected on the seismic profiles.
- 2.4. Understanding the causes of failure and proposing possible way forward for successful borehole intervention job in existing dry holes and proposal of new wells in project area for future exploration by integration of all available G&G data.
- 2.5. Building fracture model for identification, characterization, distribution and orientation of fractures on the basis of available G&G Data sets i.e. wells, seismic & structural analysis and to propose ideal well trajectories to cut through maximum fractures.

3. Scope of Work

Following are the required processes but not limited to:

- 3.1. Review available G&G data (vintage seismic data in time and depth domains, geological field work report, end of well reports, well logs, well completion reports and well testing results etc.).
- 3.2. Petrophysical interpretation of all available raw wireline logs will be available; however, image log interpretation of one well be required from the contractor.
- 3.3. Perform advance seismic interpretation (well to seismic tie, horizons & fault interpretation along with time/ depth mapping) of the available 2D/3D seismic data in time and depth domain.
- 3.4. Perform seismic and well data conditioning, if required, to reduce noise and to extract a clear understanding of the subsurface imaging.
- 3.5. Perform well to seismic tie by generating synthetic seismograms.
- 3.6. Seismic interpretation of exploration blocks will be performed by the contractor by using 3D seismic data (PSTM & PSDM), and 2D vintage data may also be used wherever required. Horizons interpretation should be performed on true amplitude picking preferably by auto-pick. However, in areas of poor data resolution the horizons may be picked manually keeping in view the structural configuration and geometry of the area.
- 3.7. Seismic structural interpretation should properly follow the sense of structural balancing and restoration.
- 3.8. Uncertainty analysis will be required for velocity modelling approach.
- 3.9. Analyze the validity and kinematics of the seismic interpretation by identifying space problems and structural inconsistencies using structural restoration and balancing techniques.
- 3.10. Validate the fault geometries and kinematics using geometric fault prediction to model the fault trajectories.
- 3.11. Apply sequential restoration of conditional interpretations using 2D kinematic restoration techniques such as fault slip and hanging wall restoration as well as transform operations where individual fault blocks are individually undeformed and then combined to assess space problems and structural inconsistencies.
- 3.12. Test various fault propagation, tri-shear, and fault bend forward modelling scenarios to model the proper hanging wall shape based on the fault trace.
- 3.13. Analyse and evaluate scenarios for the presence of secondary faults in the hanging wall that may play a significant role in geometrical compatibility.
- 3.14. Calculate strain distribution as well as dip and curvature in key areas as proxies to analyze the fracture distribution as well as secondary faults.
- 3.15. Calculate shortening rates along the faults trends to define changes in kinematics.
- 3.16. Reconstruct the deformation history and structural sequence and create a coherent structural model geometry and evolution of the different structures present in the exploration block.
- 3.17. Build viable, admissible and balanced geo-seismic structural models.

- 3.18. Build fracture model for identification, distribution, characterization and orientation of fractures on the basis of available well data, seismic data, structural model and stress analysis.
- 3.19. Prepare transects (at least 20) passing through project area selected by the company and then conduct restoration/ balancing along each geo-seismic transect with multiple scenarios and produce final most appropriate geologically viable & geometrically admissible balanced structural cross-sections.
- 3.20. Carry out dry hole analysis and suggest possible way forward for successful borehole intervention job.
- 3.21. Identify new leads and prospects for future exploration with description of associated risks.

4. Bidders'/ Vendors' Capabilities

It shall be examined in detail, that whether the services offered by the bidders'/ vendors' comply with the technical objectives mentioned above. The following technical features/ criteria of the bidders'/ vendors' detailed specifications will be compared with the bidders'/ vendors' expertise & past projects delivered, which will be submitted with the bid. The services providers must have:

- 4.1. Experience of working on integrated projects including Structural Geological Modelling (2D&3D) and Fracture Network Modelling in exploration blocks for E&P companies.
- 4.2. Expertise in advanced seismic structural interpretation, validation & QC, fault seal & reactivation risking, framework & cellular model building and fracture prediction.
- 4.3. Expertise in integrating G&G data of the exploration blocks and regions to perform seismic interpretation in complex tectonic zone, facilitate/ revise the existing seismic interpretations, 2D&3D structural model building, kinematic restorations & validations, rock's fractures, stress analysis and fault seal analysis.
- 4.4. Ability to build structural model, validate, balance, restore and analyze structural cross-sections at a local and regional scale including through geological time.
- 4.5. Ability to perform backwards and forwards modelling through time and assess the timing of critical geological events especially in complex tectonic regime.
- 4.6. Ability to re-construct faults, fault trajectories and depth to detachment evaluation for complex tectonic zones.
- 4.7. Ability to model ductile deformation associated with a propagating fault tip in complex tectonic zone.
- 4.8. Ability to measure horizon areas and volumes in 3D models to estimate reservoir volumes, sweet spots and to optimize oil volumes in exploration blocks.
- 4.9. To have experience of modelling various fracture types, including those due to exhumation, thermal contraction, compaction and tectonic deformation.
- 4.10. Ability to characterize fracture networks by carrying out quantitative analysis with volumetric.
- 4.11. Experience to generate diagram and map of faults throws, heaves and slips for fracture prediction, stress/ strain analysis, fault seal analysis and sediment transport modelling.

- 4.12. Having ability for the wireline logs processing and interpretation particularly FMI logs.
- 4.13. To have experience in identification of new leads and prospects in Fold and Thrust Belts with the help of structural models and all available G&G data sets.

5. Deliverable & Reports (Hard & Soft Data)

On completion of the project, vendor will provide the following final deliverables:

- 5.1. Final seismic data (horizons, surfaces, fault sticks, fault polygons and different models) and structural transects/models of the project compatible with (Petrel, Decision Space & Structure Solver/ T7/ Flex DECOPM).
- 5.2. Final report containing workflow, data analysis, results, discussion in detail with desired figures and enclosures (2 hard copies + 2 soft copies).

6. Validation and Acceptance of Project Work/ Completion

The project will be accepted and considered as completed, subject to the acceptance of company's professionals keeping in view the performance of the contractor in accordance with the technical objectives set in term of references (TOR).

7. Delivery/ handing over of Project Reports, Models etc.

- 9.1. All reports regarding project (hard & soft copies) shall be delivered/ handed over from vender's/ contractor's destination to OGDCL designated destination in Islamabad by vender's/ contractor's own responsibility.
- 9.2. Technical documents shall be supplied by the bidder/ vendor to OGDCL in English Language and safe/ standard media.
- 9.3. Kick-off meeting and other meetings will be held at the Key Milestones.
- 9.4. During the course of study, a weekly progress report is to be submitted.
- 9.5. Project kick-off meeting to be arranged within two weeks from the date of award of contract. Video conference will be held as per requirement of the company. The contractor shall warrant that the project data/ outputs provided to OGDCL shall (1) contain no hidden files (2) no replicate (3) no alter, damage or erase any data.
- 9.6. The soft media (hard disk/ DVD etc.) of the project dataset and outputs should be free of defects.

8. Presentation on project completion

- 9.7. Contractor to share the draft report at the project completion for the OGDCL management's review.
- 9.8. After draft report finalization (by incorporating the comments of the company) and as soon as the project objectives are fully achieved, the detailed presentation of technical findings must be delivered to the company's representatives.

9. Project Completion Time Frame

The delivery and implementation of the project is time sensitive. It is expected that the contractor shall be able to complete the project in every aspect (G&G data analysis, Seismic Data Interpretation, Validation, Model Building, Restoration/ Balancing,

Fracture Modelling/ Analysis etc.) within 180 calendar days from the date of major portion of data handing over.

10. Confidentiality/ Data Collection/ Inputs

- 10.1. The contractor shall warrant that the project data is confidential and not to be provided to any other company.
- 10.2. The contractor shall be solely responsible for confidentiality, loss or damage of data due to any reason including fire, theft of any documents/ cartridges/ soft copies and other important documents/ CDs etc. pertaining to the contract, while in their custody or control.
- 10.3. CA/ NDA document will be signed between the Contractor & Client to cater the confidentiality.
- 10.4. The provided data should be returned to OGDCL once the project is completed while all copies of data be destroyed when the project is completed abiding the clause of confidentiality.

11. Technical review /skill transfer of professionals in project

- 11.1. OGDCL's professionals shall visit contractor's office/ center for QC/ technical inputs/ skill transfer about the project at different stages. Two professionals will visit during Seismic Data Interpretation phase, and two professionals will visit during Structural Geological Modelling, and Fracture Modelling/ Analysis stage. Duration of each visit would be 02 weeks.
- 11.2. The contractor shall provide workable project schedule (total turnaround time) in the form of Gantt chart containing phase-wise participation schedule of company's professionals. Contractor will be bound to take all necessary measures to facilitate the company's participation process, however, cost of traveling and lodging will be borne by the company.
- 11.3. Contractor shall provide office space, computers and internet facility to the company's QC professionals.

12. Payment Schedule

- 12.1. Payment will be made after completion/ acceptance of the project results/ outputs in every aspect.
- 12.2. Payment for project will be made against verified invoices after delivery of services/ final product, based on the rates quoted in the respective bid.
- 12.3. Prices must be quoted inclusive of all taxes, duties, courier charges and levy etc. except provincial sales tax/ ICT tax on services where applicable will be borne by OGDCL on actual.
- 12.4. Any additional required job/ task pertaining to the project improvement will be done by the contractor without affecting the cost of the project.

13. Bid Evaluation

- 13.1. All bids/ proposals shall be evaluated technically and financially.

- 13.2. The technical evaluation will be based on the technical evaluation table (Annexure-I). The potential bidders are required to strictly follow the sequence of Technical Evaluation Criteria and submit their proposals accordingly.
- 13.3. The total qualifying scores are 70% and the bidder(s) obtaining less than 70% points in total or less than 60% in any category shall be rightly rejected.
- 13.4. After completion of technical evaluation, the financial proposal of only the technically responsive / qualified bidder(s) shall be opened and evaluated.
- 13.5. For final bid evaluation, 80% weightage would be given to technical evaluation at Annexure-I and 20% for financial evaluation at Annexure-II. The lowest bidder will get the maximum points in financial evaluation and others would be ranked on sliding scale. The points obtained in technical evaluation and financial evaluation will then be combined and the contract will be awarded to the bidder obtaining maximum points.

Cat. No	Description of Technical Information	Qualifying Criteria	Max. Marks
1	Company History & Profile (mention the list of projects (name, location, client name and year) executed in the mentioned time)		20
	No. of years' experience of land Seismic Data Interpretation, Structural Geological Modelling, and Fracture Modelling/ Analysis using G & G data, belonging to highly deformed Fold and Thrust Belt/ Salt Tectonics (compressional regime area).	30 or more than 30 years = 20 marks 20 to 29 years = 10-19 marks 12 to 19 years = 6-9.5 marks Less than 12 years = 00 marks	20
2	No of relevant Projects Completed		30
	No. of integrated projects completed in last 15 years covering Seismic Data Interpretation, Structural Geological Modelling, and Fracture Modelling/ Analysis. (Only integrated projects executed in compressional regime will be counted).	20 or more than 20 Projects = 15 marks 14 - 19 Projects = 9 - 14 marks 9 - 13 Projects = 4 - 8 marks Less than 9 Projects = 0 marks	15
	No. of integrated projects completed in last 5 years covering Seismic Data Interpretation, Structural Geological Modelling, and Fracture Modelling/ Analysis. (Only integrated projects executed in compressional regime will be counted).	10 or more than 10 Projects = 15 marks 7 - 9 projects = 10 - 14 marks 4 - 6 projects = 7 - 9 marks Less than 4 Projects = 0 marks	15
3	Manpower (Qualification of 16 Years Degree in Geophysics/ Geology) and having experience in 2D-3D Seismic Data Interpretation, Structural Geological Modelling, and Fracture Modelling/ Analysis using G & G data.		40
	Team Lead having experience of Seismic Data Interpretation, Structural Geological Modelling, and Fracture Modelling/Analysis of the areas belonging to highly deformed Fold and Thrust Belt/Salt Tectonics (Please attach resume listing projects (project name, location, client name and year) executed during last 25 years to justify experience).	25 or more than 25 years' experience and PhD in relevant field = 10 marks 20-24 years' experience and PhD in relevant field = 5-9 marks 15-19 years' experience and PhD in relevant field = 2-4 marks Less than 14 years = 0 marks	10
	Lead Geoscientist having experience of Seismic Data Interpretation, Structural Geological Modelling, and Fracture Modelling/ Analysis in the areas belonging to highly deformed Fold and Thrust Belt/Salt Tectonics (Please attach resume listing (project name, location, client name and year) executed during last 25 years to justify experience).	20 or more than 20 years' experience= 10 marks 15-19 years' experience = 5 - 9 marks 11-15 years' experience = 2 - 4 marks Less than 11 years' experience= 0 marks	10

	Permanently employed team members having experience of integrated projects involving Seismic Data Interpretation, Structural Geological Modelling, and Fracture Modelling/ Analysis using G & G data. (Please attach resume of each professional mentioning projects (project name, location, client name and year) executed during last 25 years to justify experience).	At least 04 professionals (2 Geophysicists & 2 Structural Geologists) having Experience more than 14 years=20 marks Experience of 10 -14 years = 11-19 marks Experience Less than 10 years = 0 marks	20
	Software		10
4	Software/ Module version used for 2D-3D Seismic Data Interpretation, Structural Geological Modelling, and Fracture Modelling/ Analysis. List of all the available software/module must be Provided.	Latest available = 10 marks 01 to 02 years old = 06 marks More than 02 years old = 0 marks	10

14. Other Terms & Conditions

- 14.1 The bidders should submit the profile of firm/ company, details on technical staff, list of major clients and details on similar projects related to E&P sector completed.
- 14.2 The bidders/ contractors may submit their bids for subject study in JV/ consortium if they fulfill the criteria mentioned in TORs and have working experience in past on similar projects in mutual collaboration.
- 14.3 The bidders should submit the detailed workflow of the company past experience and nature/ types of projects being executed.
- 14.4 The contractor shall allocate a dedicated team for this project. At the time of award of contract, the contractor must ensure to provide professionals of the same level on which they have been awarded the contract.
- 14.5 The company shall not be held liable for any expenses incurred with the preparation or submittal of the proposals or any subsequent discussion and / or negotiations.
- 14.6 The bidders should submit the precise bid document, both hard and soft copies, keeping in view the evaluation criteria (Annexure-I) avoiding unnecessary details.