

OIL & GAS DEVELOPMENT COMPANY LIMITED



TENDER ENQUIRY NO. PROC-SERVICES/CB/EXPL-4961/2021

HIRING OF SERVICES FOR 2D-3D STRUCTURAL GEOLOGICAL MODELING STUDY OF THE GURGALOT BLOCK

Note:

Bid bond of **USD 6,000/- (US Dollar Six 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.



OIL & GAS DEVELOPMENT COMPANY LIMITED.

TERMS OF REFERENCE (TOR)

For

**HIRING OF SERVICES FOR
2D-3D STRUCTURAL GEOLOGICAL MODELING STUDY OF
THE GURGALOT BLOCK.**



**Oil & Gas Development Company Limited, Pakistan
(OGDCL)**

ANNEXURE "A"

1. Introduction

Oil & Gas Development Company Limited (OGDCL) is the national Oil & Gas Company of Pakistan and a prime body of the country's E&P sector. The Company is the local market leader in terms of exploration, services, development, reserves, production and acreage. The Company is listed on the London Stock Exchange since December 06, 2006 and hence susceptible to international investment environment. The Company is confronting the challenges of a volatile E&P industry and the aggressive exploration program, it is necessary to be equipped with latest technology and research work with modern tools. To expedite the exploration activities the OGDCL invites well reputed and interested bidders to submit quotations for the services of Structural Geological Modeling (2D & 3D) of Gurgalot Block, as outlined in these terms of reference.

Gurgalot Block located in Kohat District of KPK and Attock district of Punjab province is a joint venture of OGDCL (75%), POL (20%), and GHPL (5%), OGDCL serving as the operator.

2. Objective

A comprehensive 2D-3D structural modelling study is required for the Gurgalot Block in-order to understand the identification of the complicated structural styles, its kinematics, inferred geometry and possible detachments of the sub surface structures, keeping in view the Eocene salt tectonics in the area because of which surface folds don't mimic with the sub surface folds/structures. Thus, salt flow maps v/s depth for the region must be developed and understand while finalizing the structural models in 3D domain.

The study mainly focuses on (2D & 3D) structural modelling, which will be developed by integration of the surface & sub surface G&G data (GFW reports/maps, satellite imageries, surrounding wells data and 2D/3D Seismic) to have better constrain of the kinematic consistency of seismic interpretation and timing of the regional deformational phases. The study will include 2D, 3D regional Geoseismic cross-section construction from different directions ideally up to MBT (Main Boundary Thrust), along with its kinematic restoration and validation in 3D domain.

3. Scope of Work and Technical Features (Detailed Technical Evaluation Criteria)

3.1 The following are main objectives of Gurgalot Block outsource project;

Structural Modelling in 2D & 3D domain:

- 3.1.1 To build viable, admissible & deformed-state balanced Geo-seismic structural transects across of the Gurgalot Block at the scale of 1:50,000 (with no vertical exaggerations) in 2D & 3D domain along selected regional transects (~10-15 regional lines) showing structural geometry up to the top of the oldest platform sequence exposed in the anticlinal cores with proper conversion of the true dip data to apparent dip will be required during the section construction in order to understand their 3-D geometric behavior. It is expected to perform advance seismic interpretation (Well to seismic tie, Horizon & Fault interpretation along with validation, QC & mapping), of the different vintages of available 2D/3D seismic data in Gurgalot block in time and depth domain, preparation of velocity models followed by time to depth conversions.
- 3.1.2 Need to perform in-depth structural synthesis of the block with regional sections (May use seismic & well data of the adjacent blocks/fields "TAL, Nashpa, Mela & Chanda"). To test, validate and improve seismic interpretation by using the advance modeling tools and analyzing the seismic data of the adjacent producing blocks, need to perform regional correlations specially for Eocene strata (package) which behaves dishromonically in the Kohat basin to understand the kinematic consistency of the seismic interpretation and timing of the trap mechanism
- 3.1.3 To identify the pitfalls of seismic data during interpretation, which can be misinterpreted as a geological feature due to salt tectonics and complicated deformational episodes (compression-tranpression) in the region.
- 3.1.4 To generate Eocene's (Bahadur Khel) Salt flow map v/s depth for the region in order to understand salt tectonics, its thicknesses and Eocene basal detachment.
- 3.1.5 To identify exploration challenges by modelling/balancing the Eocene-Paleocene-older strata keeping in view the different complex deformational episodes in the region.
- 3.1.6 To restore/balance structural models in order to identify the synthesis of the structures, sequence/timing of faulting/detachments, amount of shortening, depth of the detachments and role of salt tectonics as well as needs to perform reconstruction of the structural evolution while carrying out depth conversion of the Geoseismic sections/transects at regional level (along the crests & plunges of the structures).
- 3.1.7 To determine the structural timing, geometry and kinematics of trap formation, fault movement, salt tectonics and to provide Structural evolution through geologic time (syn & post depositional) as well as its implication on petroleum plays to properly delineate their sub surface geometry at the level of potential reservoirs (Top Lockhart formation level).

- 3.1.8 To conduct 2D/3D kinematic modelling including balancing, restoration, backward and forward modeling in 3D domain using state-of-the-art balancing techniques for highly deformed fold & thrust belts.
- 3.1.9 To use kinematic algorithms for restoration and forward modelling including block restoration, flexural slip, simple shear unfolding, simple shear, tri-shear, fault parallel flow and fault bend fold move-on-fault including sedimentation and erosion events, Jigsaw restoration and tri-shear move-on-fault model deformation associated with propagating fault tip. Contractor may decide most suitable any other kinematic algorithm for this purpose.
- 3.1.10 To interactively define the faults modelling within Eocene-shallow up to surface sections and deep rooted with in platform sequence separately. To compute their correlations, genesis, displacement, throw, sealing potential, shear angle, propagation angle, tri-shear angle, sediment deposition and erosions during forward modelling.
- 3.1.11 To determine the total shortening along all the (10-15) regional Geo-seismic transects as well as mention the restored / deformed length of individual horizons.
- 3.1.12 To develop accurate fault trajectories and calculate depth to detachment using two separate methodologies; the area and bed length balance technique (White et al., 1986; Mitra, 1993), and the constant - slip technique (Williams and Vann, 1987).
- 3.1.13 Dry hole analysis of the exploration wells drilled in the area based on the study results.

3.2 Bidders/Venders Capabilities

- 3.2.1 It shall be examined the following points in details, that whether the services offered by the bidders/vendor's comply with the technical objectives mentioned above. The following technical features/criteria of the bidders/vendor's detailed specifications will be compared with the bidder's expertise & past projects delivered, which will be submitted with the bid. The services provider must have;
- 3.2.2 Experience of working on such type of highly deformed complicated fold & thrust belt involving salt tectonics in Pakistan OR similar basins in the world regarding structure modelling, balancing & restoration. (The bidders/vendor's must provide the details of projects with bid submission).
- 3.2.3 Expertise in advanced seismic structural interpretation, validation & QC, fault seal & reactivation risking, framework & cellular model building, transmissibility modelling, geomechanical fracture prediction pertinent to highly deformed fold & thrust belts involving salt tectonics.
- 3.2.4 Expertise in integrating G&G data of the exploration blocks and regions sit in the highly deformed fold & thrust belts involving salt tectonics, in order to perform seismic interpretation in Kohat Foreland Fold & Thrust belt (Kohat Basin), facilitate/revise the existing seismic interpretations, 2D&3D structural

- model building, kinematic restorations & validations, rock's fractures, stress analysis, fault seal analysis within Gurgalot Block, Kohat Basin, Pakistan
- 3.2.5 Ability to build structural model, validate, balance, restore and analyses structural cross-sections at a local and regional scale including salt & mud diapirisms through geological time with in the highly deformed fold & thrust belts involving salt tectonics
 - 3.2.6 Ability to perform backwards and forwards modeling through time and assess the timing of critical geological events especially in complex tectonic regime with in the highly deformed fold & thrust belts involving salt tectonics.
 - 3.2.7 Ability to re-construct faults, fault trajectories, depth to detachment evaluation for complex tectonic zones with in the highly deformed fold & thrust belts involving salt tectonics.
 - 3.2.8 Ability to model development for complex zones and determining deformation rates, the geometric and evolutionary feasibility of area on the basis of model, areas of geological uncertainty and constrain the system evolution with in the highly deformed fold & thrust belts involving salt tectonics.
 - 3.2.9 Ability to model ductile deformation associated with a propagating fault tip in complex tectonic zone.
 - 3.2.10 To have experience of modeling various fracture types, including those due to exhumation, thermal contraction, compaction and tectonic deformation.
 - 3.2.11 Ability to characterize fracture networks by carrying out quantitative analysis in the highly deformed fold & thrust belts involving salt tectonics.
 - 3.2.12 Having experience to carry out predictive mechanical stratigraphic modeling on present-day and palaeo-bathymetric surfaces with reservoir quality map and 3D surface outputs with in the highly deformed fold & thrust belts involving salt tectonics.
 - 3.2.13 Having the experience in projects to achieve a best fit to well data and relevant seismic attribute data, generate stacked flows to reduce uncertainty surrounding lateral reservoir connectivity and stratal stacking patterns.
 - 3.2.14 Experience to assess interaction between tectonics and sedimentation, quantitative analysis of grain size distribution and net-to-gross.
 - 3.2.15 Experience to generate diagram and map of faults throws, heaves and slips, fracture predication, stress/strain analysis, fault seal analysis.

4. Deliverable & Reports (Hard & Soft data)

On the completion of the intended project, the bidder/vendors should provide the complete suits of Final Reports (FR) along with tables, enclosures, maps,

figures (hard & soft copy), along with following chapters with deliverable's i.e.
;

4.1 Structural Geological Modeling:

4.1.1 All interpreted/revised seismic lines, balance & restored structural models enclosure/figures/maps/sections in 3D surfaces of the Platform sequences along with the all selected transects with tables showing shortening, all data used & analyzed during interpretation/conversions and model building/restoring, time-depth relations for well to seismic tie analysis, edited and simulated well logs and maps.

5. Validation and Acceptance of Project Work/Completion

5.1 Once the project is completed, OGDCL professionals shall have the opportunity to validate/examine the bidders/vendors performance to determine whether it functions in accordance with the technical objectives sets in term of references (TOR).

6. Delivery/Handover of Project reports, models and process data

6.1 All reports regarding project (hard & soft copy) shall be delivered/handed over from vender/contractor destination to OGDCL designated destination in Islamabad by vender/contractor own responsibility.

6.2 Five (05) sets (Hard & soft along with editable formats (Shape files, ASCII, Las, SEG-Y, grids etc.) of final reports (FR), tables, enclosures, maps & figures at the completion of project must be submitted by the bidder/vendor.

6.3 Project model's data shall be provided by the contractor compatible with 2D&3D structural / geological modeling software's (Petrel, Decision Space & Structure Solver/T7/Flex DECOPM).

6.4 Kick off meeting and the Meetings will be held at the Key Milestones

6.5 During the course of study, a weekly video conference (VC) will be held to update on the progress of project along with submission of fortnightly reports.

7. Presentation on project achievement at the end

7.1 Contractor to share the Draft report at the project completion for the OGDC/JVPs/Management review and comments shared will need to be incorporated in the report

7.2 After Draft report finalization and as soon as the projects objectives are fully achieved the detailed presentation of technical findings must be delivered to the client's concern representative at contractor or client office (Or through MS teams in case COVID-19 pandemic continues), before dispatch of the final report, data and then after delivery/handover of the project materials/outputs/reports, a brief presentation must be delivered to the OGDCL higher management and joint venture (JV) partners by the Bidder/Vendor representative at the OGDCL head office Blue Area, Islamabad.

7.3 The contractor shall ensure that the project should address all the questions, which will be raised by the management & partners.

8. Project Completion Time frame

The delivery and implementation of the project is time sensitive. It is expected that the contractor be able to complete the project in every aspect (G&G data analysis, Validation, Model Building, Restoration/Balancing etc.) within 150 calendar days (05 months) from the day of data handover and its acknowledgement by the contractor.

9. Technical Documents and Instructions

Technical documents shall be supplied by the bidder/vender to OGDCL in English Language and safe/standard media.

10. Warranty

- 10.1 The contractor shall warrant that the project data is confidential and not to be provide 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 Neither the contractor is liable to reproduce the same data for any other business reasons other than specified by the Client.
- 10.5 The provided data should be returned to OGDCL once the project is completed while all copies of data be destroyed once the project been completed abiding the clause of confidentiality.
- 10.6 The contractor shall warrant that the project data/outputs provided to OGDCL shall (1) contain no hidden files, (2) not replicate (3) not alter, damage, or erase any date.
- 10.7 The media (hard disk/DVD etc.) on which the soft copy of the project dataset and outputs is provided shall be free of defects.

11. Supervision of professionals regarding project technical workflow

- 11.1 Contractor must provide detailed workflow of the project with milestones based on critical decision-making gates and meetings will be held on the key milestones to achieve agreement between the parties.
- 11.2 Three (03) OGDCL professionals & 01-02 representatives from each JV partner shall be participating in the project main center of the contractor. However keeping in view the prevailing situation due to COVID-19 pandemic, QC visit may be cancelled and QC may be carried out through video conferences. The schedule of visits and/ QC through video conferences may be devised later on.

- 11.3 Supervision/observation during the project should be two (02) weeks for 01 time during the project duration involving workflow familiarization and project progress with experts of contractor.
- 11.4 Contractor will take all necessary measures regarding visas (invitation letters & residence booking etc.) and shall courier to the OGDCL Head Office in Islamabad from abroad. Any delay in the departure of OGDCL professionals due to visa/tickets problems would have to be accommodated by the Contractor in their project plan.
- 11.5 Contractor shall provide office space, computers, internet facility and international telephone/fax facilities to the OGDCL/JV visiting professionals
- 11.6 Traveling expenses (air tickets) regarding the visit of OGDCL/JVPs geoscientists to the contractor's offices shall be responsibility of the OGDCL/JVPs.
- 11.7 Expenses during supervision/guidance period, boarding, and lodging of OGDCL/JVPs geoscientists shall be responsibility of OGDCL/ JVPs.

12. Payment Schedule

- 12.1 Payment will be made after completion of the project in every aspect i.e. after acceptance of the project results/outputs.
- 12.2 Payment for project will be made against verified invoices after delivery of services, based on the rates quoted in the respected 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/in the same project cost.

13. Bid Evaluation

14. All bids/proposals shall be evaluated technically and financially. Technical proposal shall be reviewed first to determine its technical responsiveness and conformity with the requirement of TOR. After completion of Technical Evaluation, the Financial Proposal of only the technically responsive / qualified bidder(s) shall be opened and evaluated. The bids requiring substantial modifications to make it responsive shall be rejected out rightly. Weightage for technical and financial evaluation will be 80 % and 20 % respectively. The lowest bidder will secure the maximum points in financial evaluation and others will be ranked on sliding scale. The points obtained in technical and financial evaluation will then be combined and contract will be awarded to the bidder obtaining maximum points.

14.1 Technical Evaluation

- 14.1.1 The technical evaluation shall be based on the specifications mention under the heading of "Scope of Work & Technical Features" of this document.

14.1.2 Below are the “criteria” for technical evaluation. Overall 100 points have been assigned for qualifying criteria. The qualifying points are 70% total in all tabulated description below. The bidder (s) obtaining less than 70% points in total and 60% in each category shall be out rightly rejected. All bidders are requested to submit their bids considering the evaluation criterion.

Technical Evaluation Criteria			
S#	Description	Qualifying Criteria	Max Points
1	Integrated Structural Geological Modelling (2D & 3D), Fold & thrust Belts involving salt tectonics (Restoration & Balancing)	<u>No of relevant Projects Completed in the last 20 Years</u> 20 or more than 20 Projects = 30 Points 15 to 19 Projects = 24-28 Points 10-14 Projects = 15-23 Points Less than 10 Projects = 00 Points	30
2	Company Experience in the Highly Deformed fold belts involving salt tectonics based on list of relevant projects provided by bidder	20 years or more than 20 years of experience = 20 Points 10 -19 years of experience = 10-18 Points Less than 10 years’ experience = 0 Points	20
3	Company having worldwide centres	5 or more than 5 centers = 05 Points 3-4 centres = 03 Points 1-2 centres = 0 Points	5
4	Software/Module version used for the Structural modelling. List of all the available software/module must be Provided	Software/Module version used Latest available = 05 Points 01 to 02 years old = 03 Points More than 02 years old=0 Points	5

6	Professional's Experience (team lead) in the Relevant Fields/ structural modelling of the highly deformed fold & thrust belts involving salt Tectonics. (at least 16 years of education of each team member in relevant field is compulsory)	20 or more than 20 years of experience = 20 Points 15 to 19 years of experience = 15-17 Points 10-14 year experience = 10-13 Points Less than 10 years' experience = 0 points	20
7	Number of Professionals having more than 10 years of Experience in Relevant Fields/structural modelling of the highly deformed fold & thrust belts involving salt halokinesis. (at least 16 years of education of each team member in relevant field is compulsory)	6 or more than 6 professionals =10 Points 4 - 5 professionals =6-7 Points Less than 4 professionals =0 Points	10
8	Time to complete the study	within 150 Days = 10 Points 150- 180 Days = 06 Points more than 180 days = 00 Points	10
Total marks			100

14.2 Financial Evaluation

14.2.1 Financial evaluation shall be carried out on total lump sum project cost basis.

Financial Bid Format

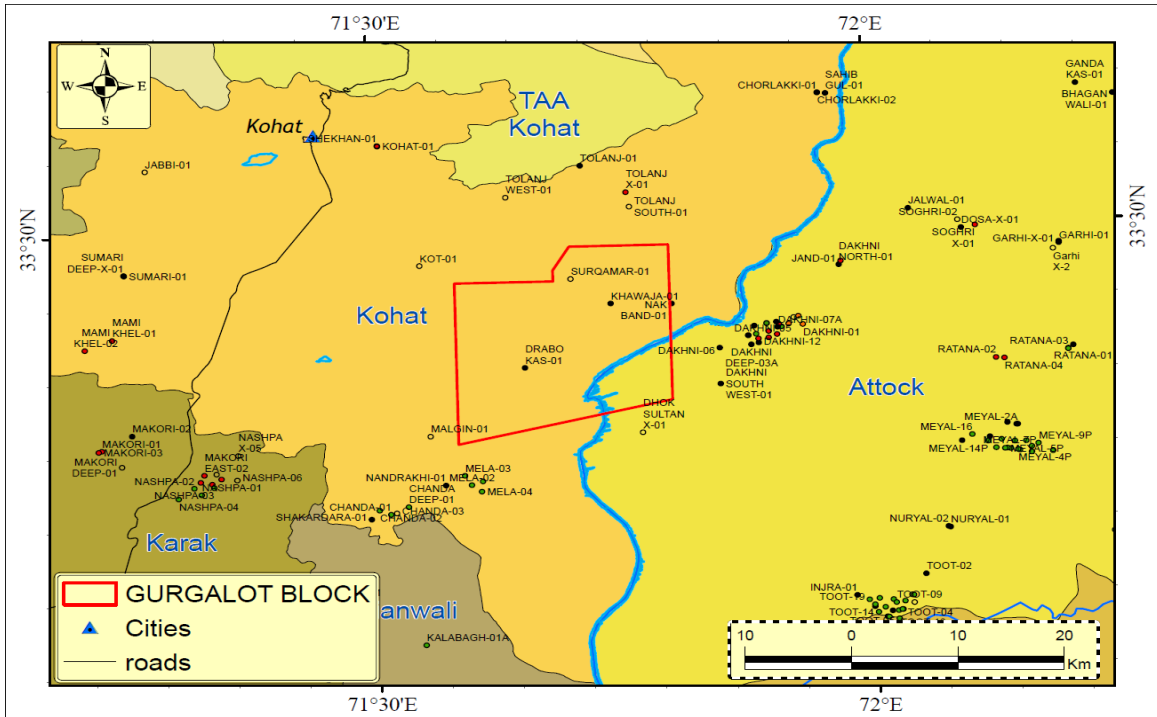
Rates for present study shall be provided as per given table;

S. No	Items	Price (US\$)
1	(2D/3D) Structural Modeling of Gurgalot Block (Seismic Interpretation, Validation/QC, Models building, Structural Restoration/Balancing/forward modelling)	
Lump Sum Cost including all applicable taxes, levies, duties etc. except PST/ICT on services in Pakistan.		

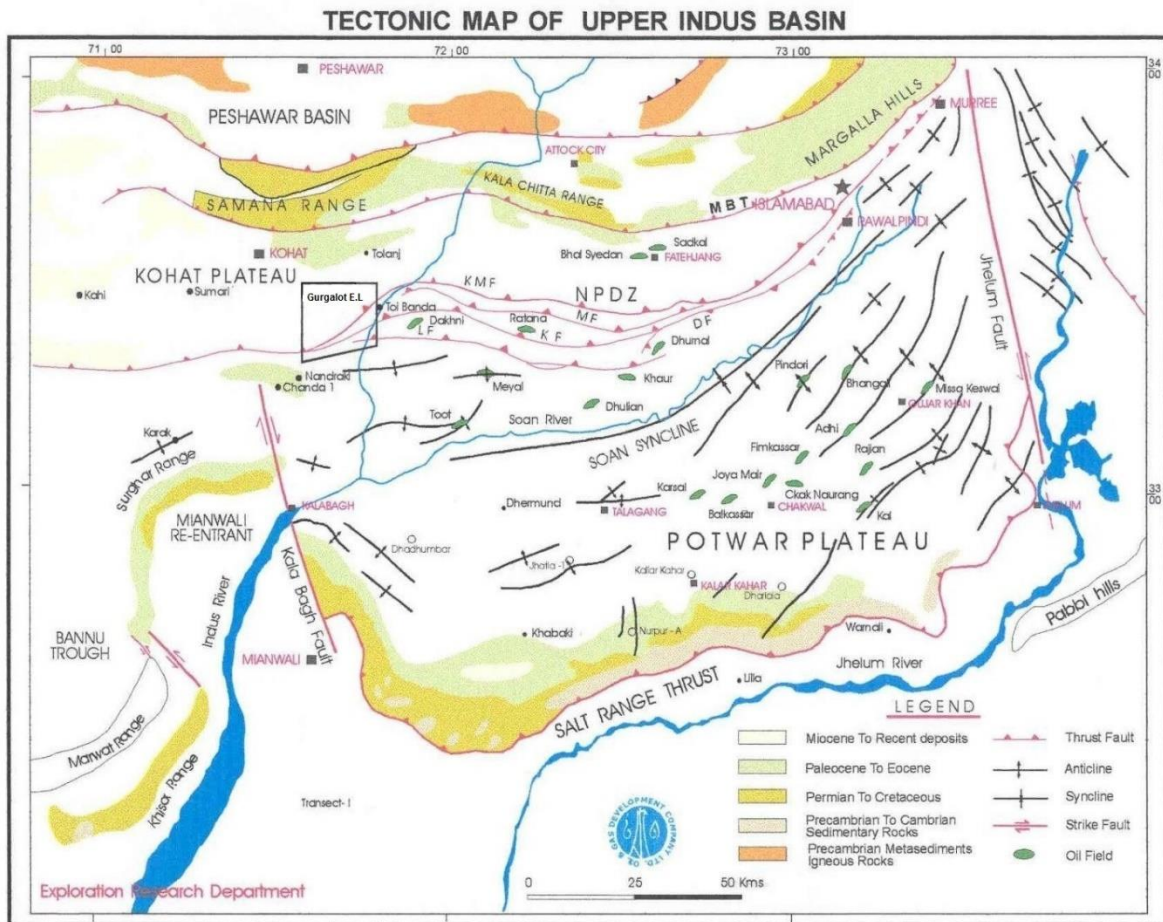
Terms & Conditions

14.2.2 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.

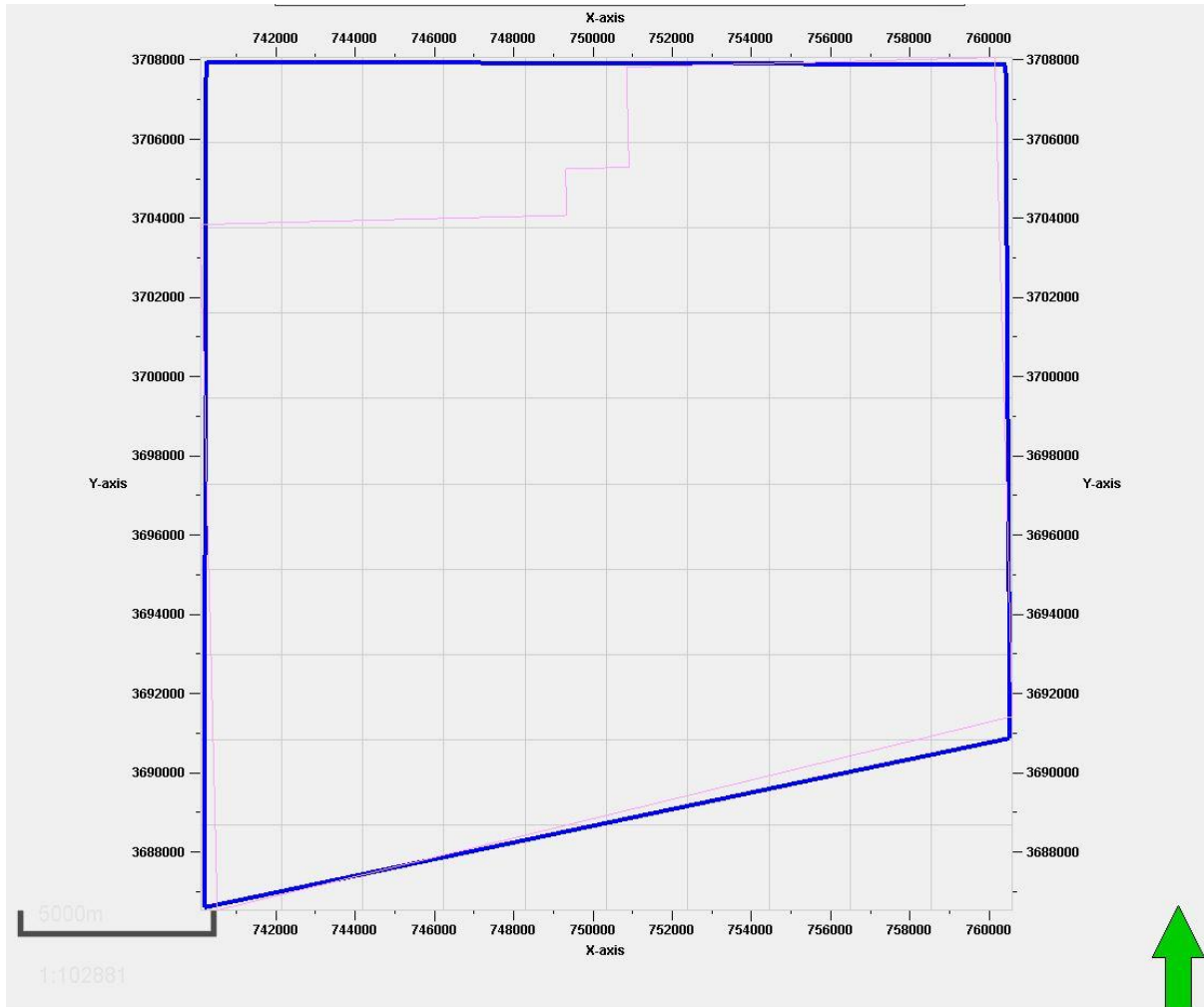
- 14.2.3 The bidders/ contractors may submit their bids for subject study in JV/ consortium if they fulfill the criteria mentioned in TORs and have working experience in past on similar projects in mutual collaboration.
- 14.2.4 The bidders should submit the detailed workflow of the company past experience and nature/ types of projects, which they have execute in the past along with workflow.
- 14.2.5 The bidders should submit one of their delivered project in the past, covering all topics mention above in TOR.
- 14.2.6 The bidders should provide the details on how effective technical services and support shall be provided along with detailed works flows for this study.
- 14.2.7 The contractor shall allocate a dedicated team for this OGDCL 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.
- 14.2.8 OGDCL shall not be held liable for any expenses incurred with the preparation or submittal of the proposals or any subsequent discussion and / or negotiations.
- 14.2.9 The contractor should mention the project execution center.
- 14.2.10 The contractor must have workable schedule and turnaround time for completion of the project.
- 14.2.11 The bidders should submit project schedule in the form of Gantt chart.
- 14.2.12 The contractor must provide schedule for the participation of OGDCL QC professionals.



LOCATION MAP OF GURGALOT BLOCK



TECTONIC MAP OF THE UPPER INDUS BASIN SHOWING GURGALOT E.L.



Polygon showing area of Geological Map, Gurgalot E.L.

DATA SET AVAILABLE IN GURGALOT BLOCK FOR PRESENT STUDY

GURGALOT 3D SEISMIC DATA (PSTM/ PSDM)	320 SQ.KMS
GURGALOT 2D SEISMIC DATA	625 L.KMS
GURGALOT VINTAGE SEISMIC DATA	600 L.KMS
VERTICAL SEISMIC PROFILES	AVAILABLE IN THREE (03) WELLS
TOTAL NUMBER OF WELLS IN BLOCK	04
FORMATION TOPS/ IMAGE AND CONVENTIONAL WELL LOGS	AVAILABLE IN THREE (03) WELLS
ADDITIONAL WELL DATA IN ADJOINING AREAS	AVAILABLE IN TEN (10) WELLS
GEOLOGICAL MAPS	GEOLOGICAL MAP OF GURGALOT E.L & ADJACENT BLOCKS ARE AVAILABLE