



MEMORANDUM OF UNDERSTANDING

BETWEEN

**The Gujarat Energy Research and Management Institute
Gandhinagar
("GERMI")**

AND

**Department of Petroleum Technology
Indian Institute of Technology (Indian School of Mines)
Dhanbad
("IIT(ISM)")**

**UNDERTAKING JOINT PROJECTS, RESEARCH, DEVELOPMENT AND
TRAINING IN THE FIELD OF ENERGY**

1st January, 2020

MEMORANDUM OF UNDERSTANDING

THIS Memorandum of Understanding (this "MoU") is made on 22 Day of January in the year 2020 at IIT (ISM) place Dhanbad

BETWEEN

GUJARAT ENERGY RESEARCH AND MANAGEMENT INSTITUTE, registered under the Societies Registration Act, 1860 and the Bombay Public Trust Act, 1950 having its office at GERMI Building, PDPU Campus, Knowledge Corridor, Raisan, Gandhinagar, Gujarat – 382007, India (hereinafter called "**GERMI**") which expression shall include its successors in interest/business and permitted assigns) of the ONE PART;

AND

INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES) is a public engineering and research institution located in Dhanbad. Department of Petroleum Technology, which is constituent department of Indian Institute of Technology (Indian School of Mines) Dhanbad was started in the year 1957 to make its mark in the Oil and Gas Industries in the country.

The vision with which the school was started was to impart knowledge to the young minds and develop capable resources to be offered to the oil and gas industry in the form of skilled manpower. The school's strong partnerships with regional government bodies and research institutes like IRS-ONGC, GSPC, and ISR etc. opens wide opportunities for researchers and academicians to get involved in the world class research which helps them to grow and excel in their professional career.

GERMI and IIT (ISM), for the purpose of this MoU, are hereinafter individually referred to as "Party" and collectively referred to as the "Parties."

WHEREAS,

- a) GERMI is a Scientific and Industrial Research Organization recognized by the Department of Scientific and Industrial Research (DSIR), Govt. of India catering to both renewable and non-renewable energy sectors.
- b) GERMI envisage promoting pilot projects, patenting and incubation of ideas as well as innovations. It is having three major research wings, namely, Petroleum Research Wing, Renewable Energy Research Wing and Environment & Climate Change Research Wing.
- c) GERMI has an established knowledge base and experience in various energy-related fields in order to execute projects, research, development, policy and regulation, training and education, incubation and so on for both government as well as private sectors.
- d) GERMI has established the Data Interpretation Center (DIC) at its premises, fully equipped with software and hardware to take up projects for Exploration and Development for oil and gas.
- e) GERMI has developed capabilities in the field of: -
 1. G&G Studies
 - Technical evaluation, Volume estimation & Risking
 - Petrophysical data analysis and evaluation

- G&G data Interpretation and Reservoir Characterization
- Static Modelling
- Reserves Estimation
- Appraisal & Field Development Planning
 - Dynamic Simulation
 - Estimation of Production profiles
 - Formulation of Development plans
- Techno-commercial analysis
- Risk analysis and Ranking
- EOR Screening
 - EOR screening based on the database analysis
 - Quantification of EOR potential
 - Dynamic Simulation of EOR methods
 - Risks and risk mitigation of EOR methods
 - Preparation of Pilot for EOR
 - Techno-Economic analysis including capex, opex and sensitivity of key economic parameters

2. Seismic Data Processing

- 2D and 3D Seismic Data Processing (PSTM and PSDM)

3. Special Studies

- Pre & Post Stack (Deterministic & Stochastic) Inversion
- AVO Analysis
- Porosity Estimation (using seismic and log data)
- Conversion of seismic volume into TOC volume (using core & log data and 3D Seismic data)
- Poisson's Impedance studies
- Identification of brittle zones through young's modulus & Poisson's ratio and seismic data for delineation of fracture zones.
- Texture attributes for lithology discrimination
- Fault & Fracture analysis
- Multi-Attribute Analysis
- Well Property prediction
- Spectral Decomposition
- Geobody Delineation
- Pre-Drill Pore Pressure Prediction using Seismic Velocities

4. Software Development

- Development of Plugins for Seismic data processing and Interpretation

5. 2D/3D Survey design and Optimization of parameter

6. Farmin and Farmout of Oil and Gas fields.

7. Due Diligence of E&P fields

8. Geochemical Studies

- Surface Geochemical prospecting for hydrocarbon exploration

- a. Adsorbed soil gas
- b. Microbial
- c. Trace metal
- Stable carbon isotope studies
- Routine core analysis
- Oil, gas and water characterization
- Source rock characterization
- EOR Screening

AND WHEREAS

- f) The IIT(ISM) offers a host of Academic Programmes of considerable relevance such as Engineering in Mining, Petroleum, Mining Machinery, Electrical, Electronics, Computer Science & Engineering, Mechanical, Civil, Mineral, Environmental Science & Engineering, Chemical at under-graduate and postgraduate levels. It also offers higher degrees in Management and Humanities. Additionally, it is acknowledged for International Standards in its areas of core competence, viz. Mining, Oil and Gas, Mineral, Mining Environment, and Mining Equipment.
- g) The Department of Petroleum Engineering at Indian School of Mines was established in the year 1957 to make its mark in the Oil and Gas Industries in the country. Subsequent developments, under the able guidance of a series of distinguished educators, renowned personalities from oil and gas industries and scientists, have led the department to the forefront of research and teaching in petroleum engineering. Since commencement, the Dept. has produced more than 1200 undergraduate (B.Tech) students and about 275 post graduate students which includes both M.Tech and Ph.D. The department has made its mark in the oil and gas industries in the country and presently the ex-students are occupying very senior position in different government, public sector undertakings and private organization.

Department has state of art laboratories, the one of its kind in the country. The Laboratories are equipped with instruments viz., Long Core Apparatus, PVT Apparatus, Gas Chromatograph, Triaxial Core Holder, Capillary Pressure Apparatus, Cement Consistometer, Displacement Pump, Core Cutting Drill Press, Brookfield Viscometer, Rheometer, Tensiometer E P & Lubricity Tester, HP HT Filter Press, UV-Visible Spectrophotometer, Plate Distillation Column, Ruska Porosimeter, Ruska Air Permeameter, Ruska Liquid Permeameter, Hessler Core Holder, High Pressure Syringe Pump etc.

- h) The Parties, because of their diverse capabilities have determined that they would benefit from a MoU, for the purpose of competitively responding to any Solicitation, in order to develop the best technical and management approaches, fully responsive to the requirements of the prospective Customers.
- i) Parties wish to establish a cooperative and supportive team in which each will devote adequate resources including but not limited to skilled manpower, capital equipment, facilities, and other resources to timely support the objectives of this MoU; and
- j) Each party hereto, having carefully assessed the capabilities and interests of the other have concluded that it is feasible to make a mutual effort in the preparation of the documents for the purpose of pursuing common opportunities.

- k) This MoU does not restrict any party from engaging in any activities, which are not connected with the Proposal or the Project submitted under this MoU.

NOW THEREFORE, the Parties here to do agree as follow:

1. PURPOSE OF THIS MEMORANDUM

- a. The objective of this MOU is to express the willingness of both parties to engage in an effort to promote the competitiveness of GERMI and IIT(ISM) and their activities to develop and expand business in oil and gas industry. Specific activities under this MOU will be identified through consultation between the two parties. GERMI agrees to provide technical assistance to assist IIT(ISM) to carry out activities that will improve or expand oil and gas business. As a preliminary activity, GERMI and IIT(ISM) will work on Subsurface Consultancy Projects and Lab Services as per client/project requirements. The results of this exercise will assist GERMI and IIT(ISM) with knowledge and experience sharing, which will provide capacity building support. After finalizing the project, technical and financial support agreements for specific activities will be developed **through a participatory process**.
- b. This MoU also aims at providing regular exchange of information, innovation, knowledge, technological developments, management programmes, skills development and providing services for Geological, Geophysical and Geochemical exploration which contribute to mutual benefits.

2. SCOPE OF UNDERSTANDING

GERMI and IIT(ISM), through this MoU, are envisaging exploring joint initiatives based on the following understanding:

- 2.1. Explore, undertake and support each other in initiatives including but not limited to projects, research, development, policy and regulation, training and education, incubation and so on in related areas.
- 2.2. Develop state-of-the-art expertise within GERMI and IIT(ISM) on latest applicable technologies and their application for the exploration, development and exploitation in mining sectors.
- 2.3. Jointly disseminate the diverse knowledge and experience gained from projects to the other organizations intending to undertake similar initiatives.

3. AREAS OF SERVICES

Following are the important areas of services to be carried out by GERMI:

- 3.1. Reservoir Characterization
- 3.2. G&G Data Analysis for Prospect Identification.
- 3.3. Advanced Petrophysical Analysis.
- 3.4. Static modelling for Reserves Estimation, Reserve Categorisation, Auditing and Certification.
- 3.5. Techno-Economics and Field Development.
- 3.6. EOR Schemes and Screening.
- 3.7. FDP Preparation.

- 3.8. Seismic Data Processing.
- 3.9. Seismic Data Acquisition, Designing & Quality Check.
- 3.10. Software Development, Developing Plug-in for Seismic Software and Interpretation Softwares.
- 3.11. FIFO Management.
- 3.12. CBM, prospect identification and Reserve estimation.
- 3.13. Laboratory studies.

4. AWARD OF CONTRACT

The Parties will enter into a separate agreement after the award of the contract from a third party. The terms and conditions of the agreement will generally be consistent with this MoU. Both the Parties will sign a back to back agreement with each other for the commercial, legal & operational aspects of the contract including EOR screening, Consultancy, R&D, on the job training and assistance on evaluation of fields.

5. TERM AND TERMINATION

- 5.1. The term of this MoU shall be for 3 (three) years from the date of signing of this MoU ("Effective Date"); provided however, if a Proposal has been submitted to a Client and is under consideration by it upon the expiration of such three (3) year period, this MoU shall continue in force until terminated. For the same there shall be a mutual written agreement between the Parties for the extended period.
- 5.2. Termination of MOU can be done by at least 30 days advance notice by any party or completion of the ongoing project.

6. INTELLECTUAL PROPERTY RIGHTS

- 6.1. Each party who is the owner of proprietary information or its licensor owns and will continue to own all the proprietary information which has been developed or acquired independently of the Proposal under this MoU and all the intellectual property rights therein.
- 6.2. All proprietary information and other material developed in the preparation of the Projects under this MoU and all intellectual property rights therein shall accrue to the Parties who have generated the said rights. No data so generated can be shared with any third party without the consent of the other party.
- 6.3. The receiving party shall only make such copies of the disclosing party's Proprietary Information as are reasonably and necessary in carrying out its activities under this MoU. The Parties shall exercise best efforts to promptly return all such copies to the disclosing party upon request.
- 6.4. During the term of this MoU, the Parties to the extent of each party's contractual and lawful right to do so shall exchange such proprietary, technical and other information as is reasonably required for each to perform its obligations hereunder, on such terms as shall be agreed by the Parties.
- 6.5. Either party may change its designation at any time by written notice to the other party.

7. RELATIONSHIP

- 7.1. Nothing in this MoU shall be deemed to constitute, create, give effect to, or otherwise recognize a joint venture, partnership, or formal business entity of any kind, and the rights and obligations of the Parties shall be limited to those expressly set forth herein. Nothing herein shall be construed as providing for the sharing of profits or losses arising out of the efforts of either or both of the Parties, except as may be provided for in any resultant subcontract agreed to between the Parties. The cooperation of the Parties is for the purpose of complementing their respective capabilities so that Customer may best achieve the Projects' objectives.

8. CONFIDENTIALITY

- 8.1. "Confidential Information" means any documents, materials or information disclosed by one party (the "Disclosing Party") to another party or parties (the "Receiving Party") which (i) is in **tangible, visual, or electronic** form and is marked as proprietary or confidential, or (ii) is communicated orally and is designated as proprietary or confidential at the time of disclosure. Notwithstanding the foregoing, Confidential Information does not include information that: (a) the Disclosing Party makes available to others without restrictions; (b) the Receiving Party rightfully receives from a third party (as can be demonstrated by its written records) which has disclosed such information without any obligation itself to maintain the confidentiality of such information; (c) the Receiving Party has or knows of prior to first receiving the Confidential Information; or (d) the Receiving Party has independently developed without use of or reference to the Confidential Information.
- 8.2. Each Party agrees not to use any confidential information of the other Party except in performance of this MoU and not to disclose such information to third party (other than, as determined by the Receiving Party in good faith, those persons with a genuine "need to know" and who will similarly limit the use and disclosure of the information, such as attorneys, accountants and investment bankers, Board members and certain key employees).

9. LIMITATION OF LIABILITY AND COMMITMENT

- 9.1. Neither party shall be liable for any indirect, punitive, special, incidental or consequential damages in connection with or arising out of this MoU (including, without limitation to loss of profits, use, data or economic advantage of any sort) however arising.
- 9.2. The Parties hereby acknowledge and agree that this MoU is not legally binding. It is not the Parties' intention to create, and nothing herein shall be construed as creating, legal rights and obligations or any commitment, whatsoever.
- 9.3. Any specific initiative undertaken by the two Parties under the scope of this MoU may be structured through a separate agreement defining the various modalities by the Parties for that initiative.

10. INDEMNIFICATION

10.1. Both Parties agree to defend, indemnify and hold the other Party harmless from and against any Claim that the indemnifying party's negligent or wilful acts or omissions resulted in personal injury (including death) or damage to tangible property. The indemnified party will give the other party (i) prompt written notice of any actual or alleged Claim; (ii) sole control of the defence and settlement of such Claim; and (iii) all information, reasonable assistance, and authority to fully defend and settle such Claim. The indemnifying party may not compromise or settle any Claim or consent to the entry of any judgment without the indemnified party's prior written consent, provided that the indemnified party will not unreasonably withhold or delay giving consent.

11. AMENDMENT OR MODIFICATION

11.1. This MoU may be amended or modified at any time through mutual consent of the Parties.

IN WITNESS, whereof the Parties hereto have by their duly authorized representatives executed this Memorandum of Understanding on the date and year first above written.

For and on behalf of

GUJARAT ENERGY RESEARCH AND
MANAGEMENT INSTITUTE
(Director General)



For and on behalf of

INDIAN INSTITUTE OF TECHNOLOGY (INDIAN
SCHOOL OF MINES) DHANBAD
(Director)

Dean (Research & Development)
Indian Institute of Technology
(Indian School of Mines)
Dhanbad - 826004 (INDIA)

Witnesses:

1)  _____

Name: P. H. RAO,

PRS-DIC
GERMI

2) _____

Name: _____