

Indian Geotechnology - TNO

Evaluating the Potential of Oil and Gas Fields Field Development Planning

Summary

To better serve the emerging private oil and gas exploration and production industry in the Indian subcontinent, a Joint Venture Company will shortly be established between Harsh Oil & Gas Consultants Private Ltd, and TNO Institute of Applied Geoscience in The Netherlands which is part of the independent Netherlands Organization of Applied Scientific Research TNO, employing some 4500 hi-tech staff, and having its headquarters in Delft, The Netherlands.

Harsh Oil & Gas Consultants Private Ltd have actively engaged themselves in identifying E&P opportunities in India and in serving the downstream sector following the recent change in governmental policy with respect to E&P.

TNO has acquired a solid international reputation for its R&D and consultancy activities on geophysical data acquisition, processing and interpretation, on reservoir characterization and engineering, and also for its innovative work on E&P information systems.

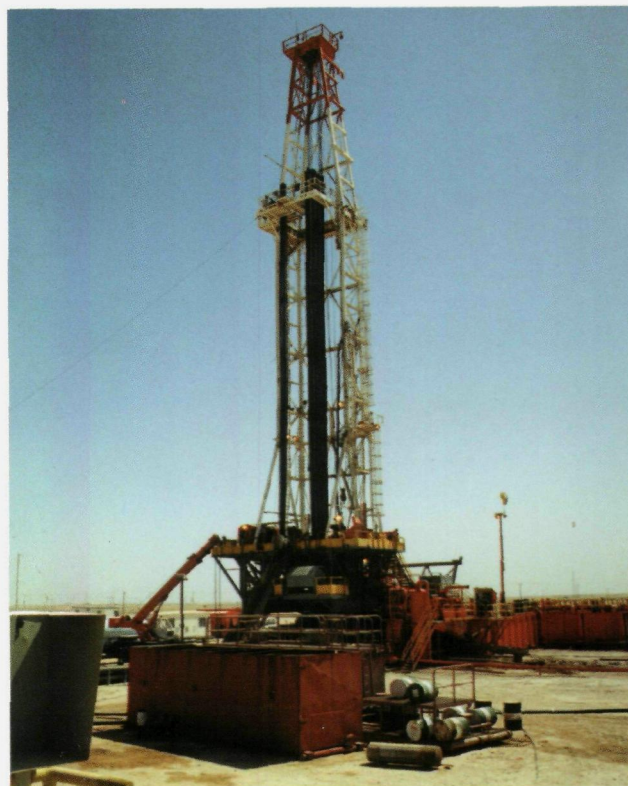
The Joint Venture, Indian Geotechnology - TNO (IG-TNO) will be established in New Delhi and will promote its services aimed at assisting both private and national E&P companies in evaluating oil and gas prospects and in maximizing their return on investment from existing fields.

Evaluating your subsurface resources

IG-TNO offers four types of services in three disciplines for a better evaluation of your reservoirs.

The **services** are:

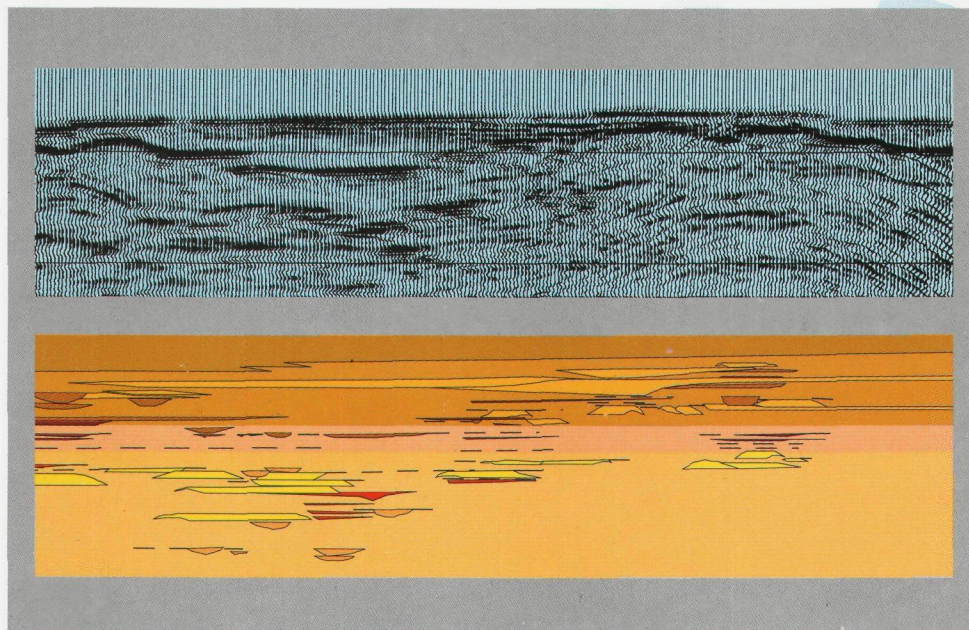
- Technical consultancy
- Knowledge transfer, training
- Contract R&D
- Field Services



The **disciplines** are:

Geophysics

- Data Acquisition
- Data Processing
- Processed data Interpretation
- Data Visualization



Petroleum Engineering

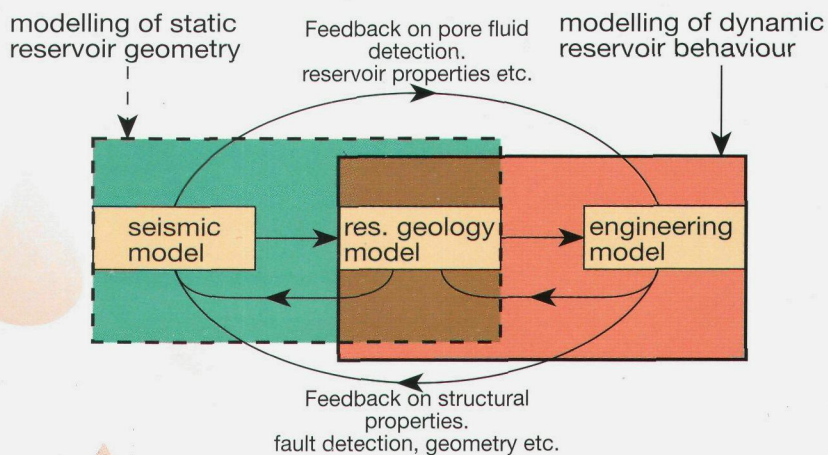
- Exploration Geology
- Reservoir Geology
- Petrophysics
- Reservoir Engineering & Simulation
- Production Engineering

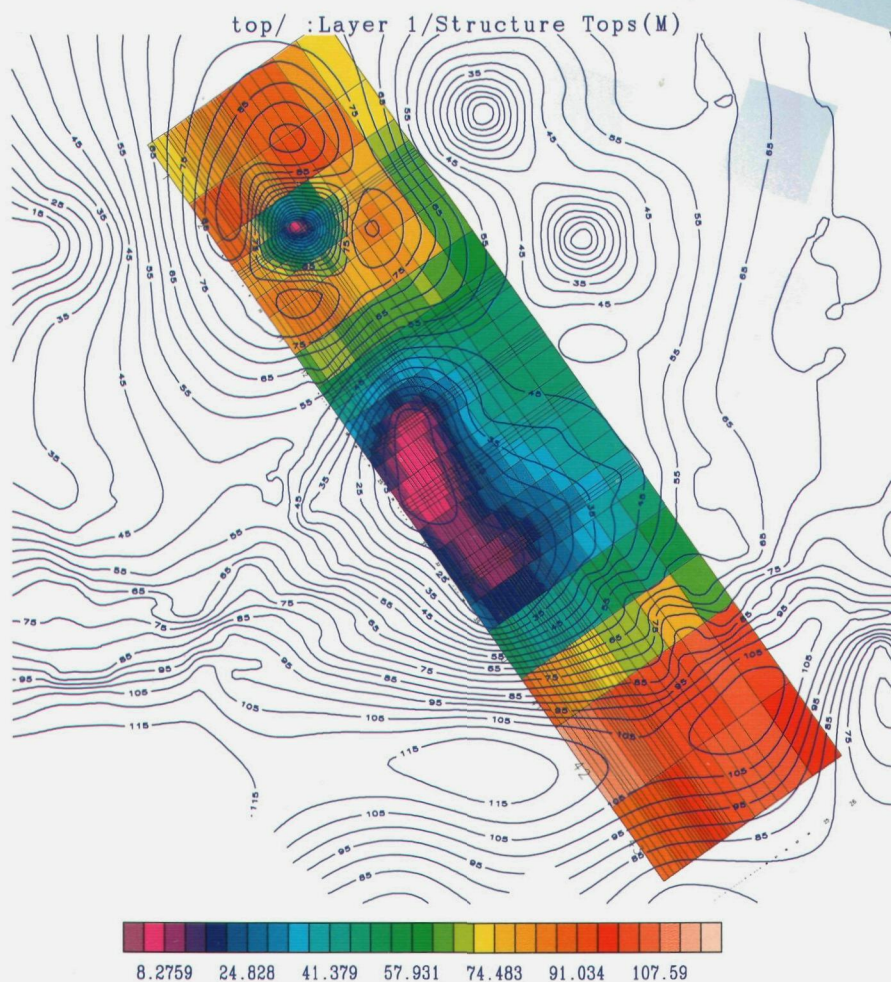
E&P Information Management

- Business Modelling
- System Modelling
- Software Engineering Standards
- System Evaluation
- System Development
- System Integration
- Oracle database
- POSC-training (TNO is a certified POSC trainer)

Synergy of integrated study teams

Although the above subdivision suggests a traditional fragmented approach of studying oil and gas reservoirs, IG-TNO assures a fully integrated, multi-disciplinary team effort of specialists who have been exposed to numerous complex field studies. Our integrated teams of geophysicists, geologists and engineers are convinced that frequent feedback between the different disciplines maximize the value of their studies.





Available software

- Microsoft Office Software
- OSF Motif, Uniface software development tool
- Phonetnet + Ethernet, Internet
- ProMax™ seismic processing package
- 2DI™ seismic interpretation
- Quiklog™ geophysical log processing
- Delsi™ seismic processing package
- GeoProbe™ seismic res. characterization
- IPRAS™ exploration prospect ranking
- Workbench™ (SSI) res. evaluation/simulation
- ECLIPSE™ (Intera) reservoir simulation
- WINGS™ (Western Atlas) res. simulation
- HST2D-3D™ thermal reservoir simulation
- INVERS™ induction log inverse modelling
- CLAN™ (Intera) well log interpretation
- FACSIM™ stochastic geological modelling
- GEOMOD™ subsurface data exchange
- GABI™ subsurface parameter estimation
- VFLOW™ well bore hydraulics
- ORACLE™ relational data base system
- GOCAD™ 3D geological modelling tool

Available hardware

- Personal Computers (Macintosh, PC's)
- Several IBM-RS6000 Workstations
- Several SUN-SPARCstation 5
- SUN-SPARCstation 10
- Fast laser printers+wax colour printers/plotters
- Electrostatic continuous paper colour plotters
- Versatec CE-3436 colour plotter
- Versatec 8222-F black and white plotter
- Digitizers
- 35 mm film printer
- All computer hardware is networked (LAN)
- SUMMIT™ hi-res 3D telemetric seismic acquisition instrument + equipment

What makes IG-TNO different?

High standards

Due to TNO's continuing research programme, carried out in cooperation with various European Universities and Research Institutes, IG-TNO is able to incorporate the state-of-the-art in geoscience in its consulting activities.

Direct access to TNO know-how

IG-TNO, through its joint venture partner TNO Institute of Applied Geoscience, has direct access to the full range of technologies available at the TNO Organization. For the E&P industry, the following TNO technology is of particular relevance (i.e. apart from Geosciences):

- Health, Safety & Environment (HSE)
- Building & Construction
- Instrumentation
- High Performance Computing & Networking

Alliances

IG-TNO has alliances with other organizations, enabling it to provide comprehensive services to the petroleum exploration and production industry. One of these alliances is:

KLG-TNO (New Delhi), providing

- Quantitative Risk Analysis (QRA)
- Environmental Impact Assessments (EIA)

Some clients served by the partners

Oil Companies

- Total (geophysical software development)
- Elf Aquitaine (reservoir simulation studies, joint research)
- Saudi Aramco (geophysical software development)
- Petroleum Development Oman (geological consultancy)
- Amoco (joint research on history matching)
- Wintershall Noordzee (reservoir characterization + simulation)
- Nederlandse Aardolie Maatschappij (various EIA's)
- Romanian State Oil Company PETROM
- Suriname State Oil Company STAATSOLIE
- Maersk Olie og Gas (reserves audit Danish CS)
- Nizhnevartovskneftegas Russia (oil field rehabilitation)
- Royal Dutch/Shell (IT training courses)
- Phoenix Geophysics Ltd., Canada

Governments

- Netherlands Ministry of Foreign Affairs (international coop)
- Netherlands Ministry of Economic Affairs
- Yemen Ministry of Oil and Mineral Resources (databases)
- Norwegian Petroleum Directorate (policy studies)
- Energie Beheer Nederland (unitization, reserves audits)

Financiers

- World Bank
- Lasare Frères Paris (Tyumen Task Force)
- ABN/Amro bank (West Siberian oil field evaluation)

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Information on TNO can be obtained via the Internet World Wide Web Service; TNO's address is: <http://www.tno.nl>

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