

PARTEX OIL AND GAS



**CONTRIBUTING TO THE
OIL AND GAS INDUSTRY IN
ABU DHABI**

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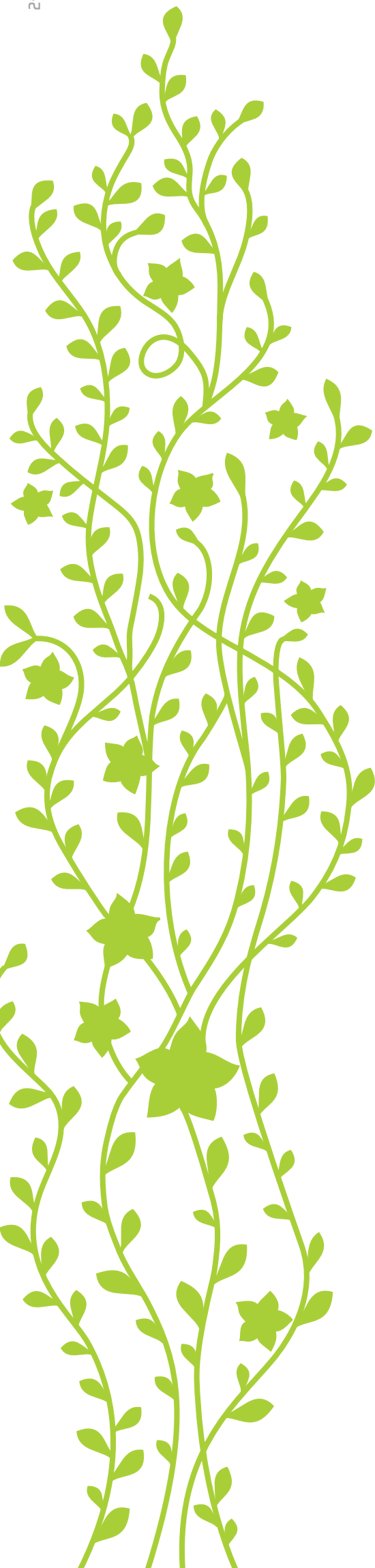
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A PARTNERSHIP TIMELINE

1939

Onshore oil concession awarded to Petroleum Development (Trucial Coast) Ltd.

1950

Ras Sadr - 1 - The first exploration well drilled in Abu Dhabi.

1960

First commercial oil discovery - Bab field.

1962

Second commercial oil discovery - Bu Hasa field.

**PARTEX OIL AND GAS: AN OLD PARTNER OF ADNOC IN ABU DHABI
WITH A LONG TERM VISION**







**A HISTORY OF SUCCESS
WE ARE PROUD OF**

Celebrating the 75 years of active involvement of Partex in the Abu Dhabi oil and gas industry, this document aims to recall the history of a very successful partnership, covering a wide range of technical contribution and support, including the secondment of highly skilled staff to the Abu Dhabi operating companies, in which Partex has participating interests, ADCO and GASCO.

This partnership is not limited to technology alone. Either through Partex or its sole shareholder, the Calouste Gulbenkian Foundation, it also involves cultural, educational, research and art initiatives of relevance to Abu Dhabi.

We believe that Partex has a role to play in the future of the Abu Dhabi's oil and gas industry, while contributing to other aspects of the society.

**A LEGACY THAT NEEDS
TO BE PRESERVED**

It is also our firm belief that this history of success and all its achievements represent a vastly rich legacy. A knowledge and experience that needs to be preserved and translated into the new challenges which the Abu Dhabi oil and gas industry will be playing in the increasingly complex projects of the decades to come.

*Top right: Ras Sadr - 1: The first exploration well drilled in Abu Dhabi.
Middle right: First Shipment of Abu Dhabi Oil in 1963. The "Esso Dublin" was loaded with 261,000 barrels of Murban Crude, which were offloaded at the Milford Haven Refinery in Wales.
Left and below: Drilling operations in Onshore Abu Dhabi.*



A PARTNERSHIP TIMELINE

1963

First shipment of crude (Murban) exported from Jebel Dhanna terminal.

1965

Third commercial oil discovery - Asab field.

1978

Abu Dhabi Gas Industries (GASCO) incorporated as Joint Venture among ADNOC, Shell, Total and Partex.

1979

ADCO became the operating company for the onshore oil concession.

1981

The GASCO Bu Hasa plant was commissioned in January. First cargo of Ruwais plant was loaded in June.

PARTEX IN ABU DHABI



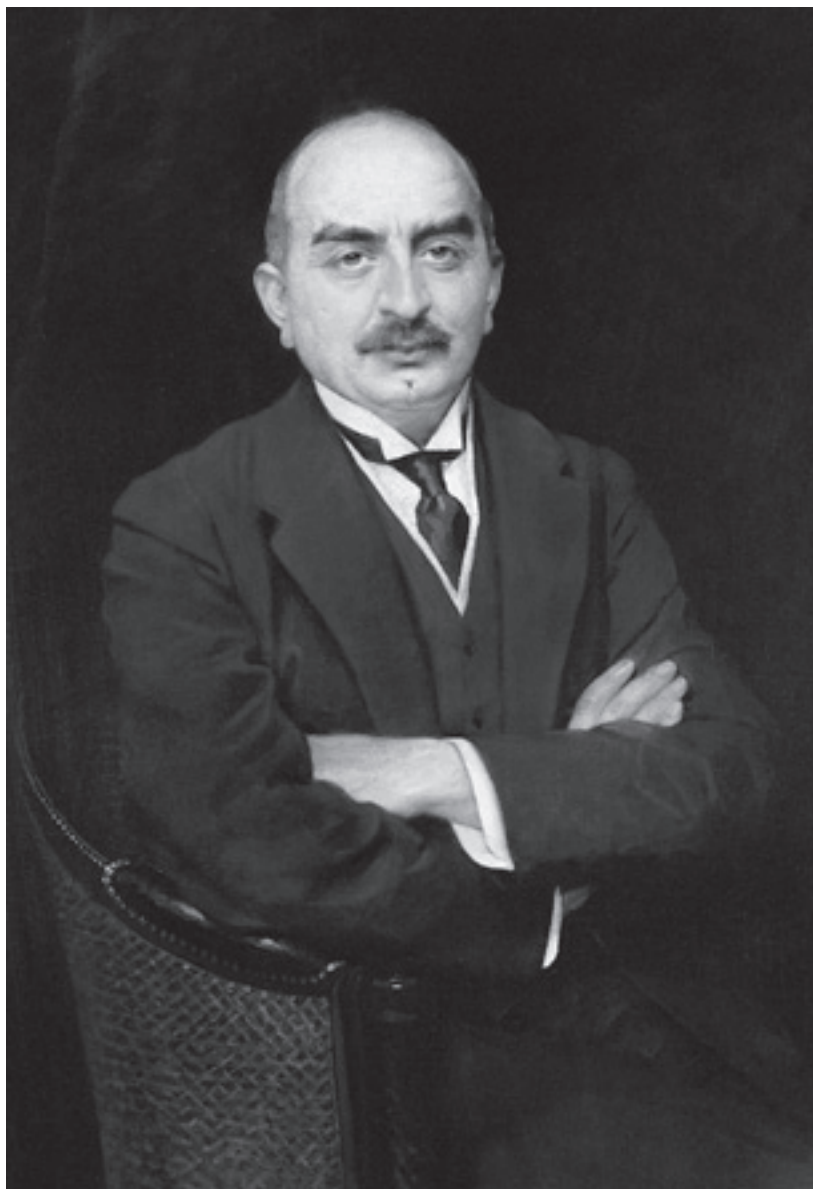


HISTORY OF A PARTNERSHIP

Partex has been involved in Abu Dhabi's oil and gas industry since 1939. The Founder of the Group, Mr. Calouste Gulbenkian, was instrumental in establishing the bridge between the Emirate of Abu Dhabi and the International Oil Companies in order to set-up a constructive approach for the Joint Venture of the onshore concession, that later would be designated by *ADCO Concession*. Partex inherited this vision from its Founder and throughout the years, in spite of being a *minority shareholder*, Partex fulfilled its role as a mediator among Major Companies, always seeking a positive consensual outcome, endeavouring to establish a common view and working as a facilitator of the alignment with ADNOC and the interests of Abu Dhabi.

PARTEX IDENTITY

Partex has a very long history with more than 70 years of experience in the oil industry; it is an old partner of the Middle East governments and national oil companies since the beginning of the exploration of oil and gas in the region. It is important to stress that, although Partex is not a major, it is an oil and gas group with a unique feature in the industry: all its profits revert to its sole shareholder, the Calouste Gulbenkian Foundation, which uses them for the benefit of mankind, through Education, Science, Culture and Social projects and initiatives.



Top right: Calouste Gulbenkian
Right down: In the Calouste Gulbenkian Foundation Research Center
Left: Calouste Gulbenkian Foundation Headquarters

CULTURAL AND EDUCATIONAL INITIATIVES

Partex and its shareholder, the Calouste Gulbenkian Foundation, developed along the years important projects in cooperation with Abu Dhabi entities, which are briefly described below.

EMIRATES FOUNDATION

The Gulbenkian Foundation through its affiliate, the Partex Oil and Gas Group, established a Cooperation Agreement with the Emirates Foundation, which has led to joint support of various programmes, such as:

- School Libraries Project in UAE, through which grants are awarded to various schools throughout the United Arab Emirates to develop school libraries.
- The SunAid Project: Both Foundations are sponsoring a pilot project from SunAid, a non-profitable organization, aiming at providing sustainable, self-sufficient solar energy solutions which create significant impact in the social, health, environmental and economical condition of under-privileged populations.
- Partex and the Gulbenkian Foundation are also discussing with the Emirates Foundation the possibility to cooperate in the areas of Life Sciences and Biomedical Research. This may be relevant for the training of young UAE nationals, to attract international scientists and to launch programmes that can play an important role in the prevention and cure of hereditary genetic diseases.

The second yearly ceremony of the Emirates Foundation for Philanthropy to honour the foundation's philanthropists was held in September 2009.

At the occasion, H.H. Sheikh Abdullah Bin Zayed Al Nahyan, Foreign Affairs Minister and Chairman of the Foundation stressed the importance of the partnership between the public and private sectors to support new social initiatives in fields that are important to the UAE's future.

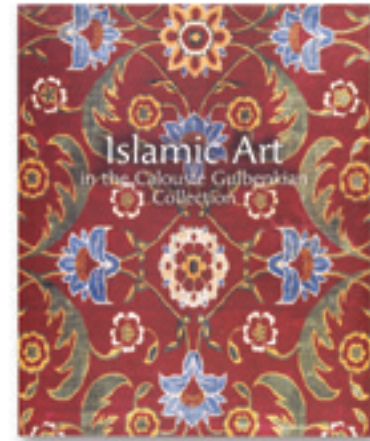
ISLAMIC ART EXHIBITION HELD IN ABU DHABI CULTURAL FOUNDATION IN 2004

Developing the work done to encourage international awareness of its collection, the Calouste Gulbenkian Foundation, in association with its subsidiary Partex Oil and Gas (Holdings) Corporation, exhibited Islamic Art at the Abu Dhabi Cultural Foundation, from 17th January until 18th February 2004. H.H. Sheik Zayed bin Sultan bin Khalifa Al Nahyan inaugurated the Exhibition, which included 55 pieces from a broad range of Islamic arts, produced between the late twelfth and the twentieth centuries in the same geographical areas as those represented in the Calouste Gulbenkian Museum's permanent exhibition, which demonstrates the exceptional quality of the Islamic section of the Collection. It simultaneously confirms the firm belief that culture is one of the finest means of communication between different peoples.

At the occasion, the Director of the Cultural Foundation highlighted the importance of such an initiative for the promotion of the knowledge of Arabic and Islamic roots in the Emirates.

GOLDEN WEB

Partex, in close cooperation with Mubadala, has contributed to the initial financing of the Golden Web project which aims to create an internet based network contributing to a better understanding of the history of peoples and specifically of Islam and its role in world history.



A profusely illustrated catalogue was published (in English and Arabic editions) to accompany the exhibition.



Top: H. H. Sheikh Zayed bin Sultan bin Khalifa Al Nahyan and Dr. Emílio Rui Vilar, President of the Calouste Gulbenkian Foundation, at the inauguration of the exhibition.

Above: In September 2009 Partex received the Emirates Foundation Donors Recognition Award.

Below right: H. H. Sheikh Abdullah Bin Zayed Al Nahyan, and Partex Middle East representative, Mr. José Pereira.



A PARTNERSHIP TIMELINE

1984

Khuff gas discovery at Hail.

1986

ADCO implementated the Bu Hasa miscible gas injection (MGI) pilot, the first project of this kind in the Gulf region aimed at the maximization of reserves.

GASCO's 500th shipment from Ruwais, in October.

1987

ADCO completed full field development of Bu Hasa and Asab.

PARTEX COMMITMENT TO ABU DHABI OIL AND GAS OPERATIONS





TECHNICAL SUPPORT TO OPERATIONS

Throughout the years Partex has been committed to the success of ADCO and GASCO operations by making our most experienced people available for representation (committees, workshops, peer reviews, technical seminars, audits, etc.), ensuring a continuity of knowledge which can maximize the quality of Partex support.

Technical support to ADCO has been pursued by visits from Partex technical representatives to promote the knowledge transfer and technical capabilities of Partex in different areas of expertise.

Partex gives Research & Development a strong role in its technology area. Partex technology for Reservoir Characterization, Produced Water Treatment and Crude Oil Degassing & Stabilization are being introduced in ADCO. A Seismic Inversion study on the Bu Hasa field was recently awarded to Partex, to start by early 2011.

Partex support to GASCO operations has been and will be continued, along the 20 years of the Joint Venture, especially in the areas of Engineering and Materials/Corrosion and Asset Integrity.

In particular, the training of UAE Nationals in Lisbon, represents an opportunity for further cooperation in the area of knowledge transfer.

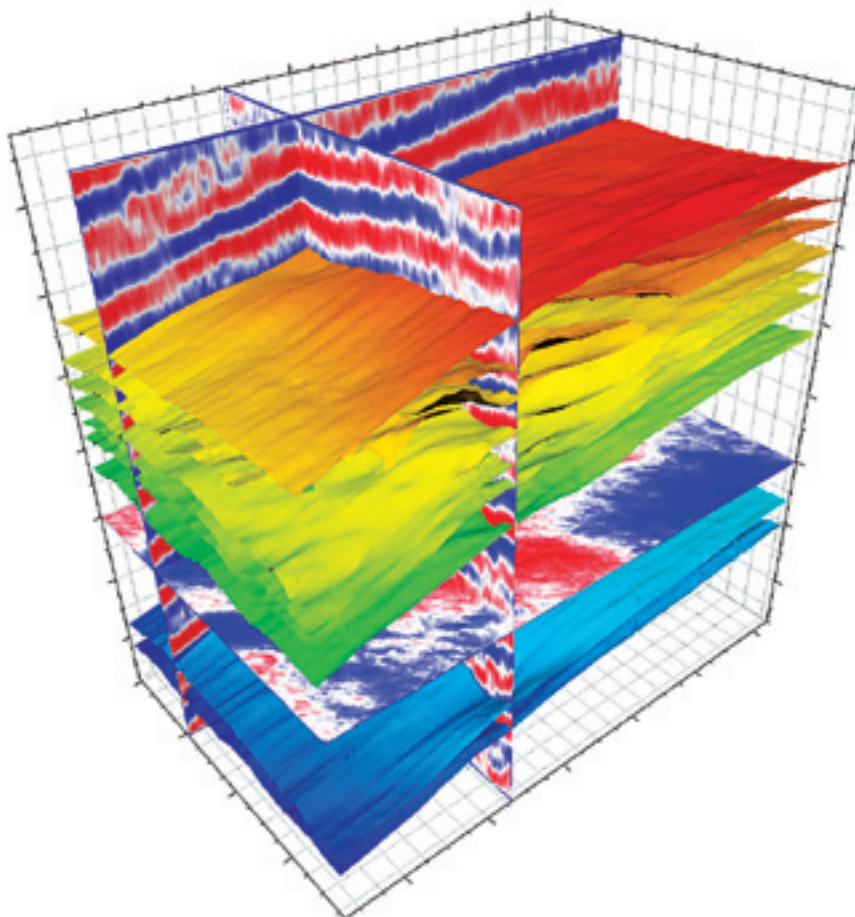
The support of Partex to Abu Dhabi has been also pursued through the representation in technical conferences in the Gulf countries and organization of technical workshops with the Petroleum Institute and ADNOC.

OUR COMMITMENT IN TERMS OF SECONDMENT

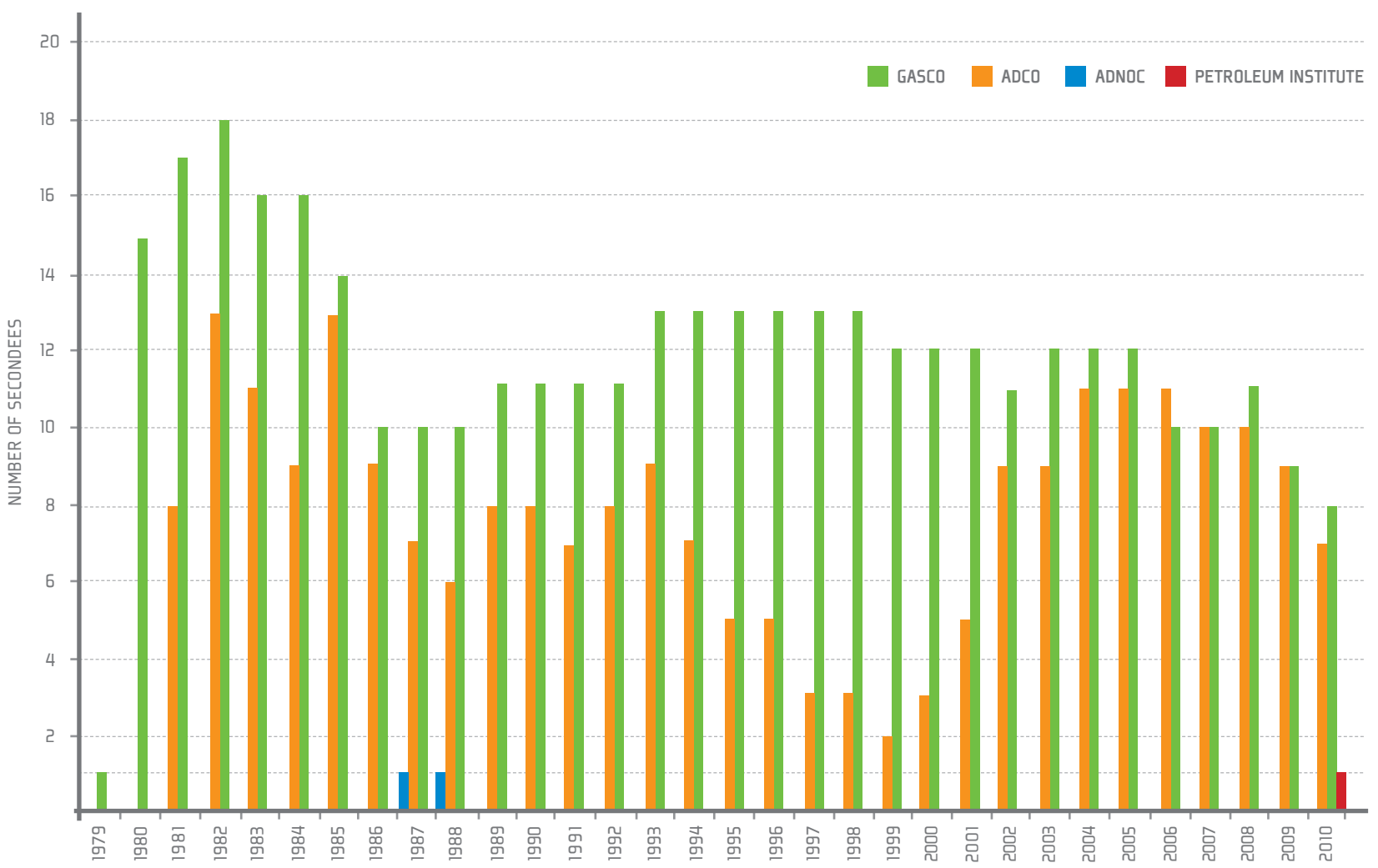
The commitment of Partex is to support the operations with highly qualified seconded and support staff, who are knowledgeable in their areas of expertise and able to transfer technology, to train young UAE nationals, to build a good atmosphere and foster the exchange of ideas and concepts, thus contributing to the progress of ADCO and GASCO.

Several of the Partex secondees had a key role in pioneer projects, in terms of the application of new technologies in the region, such as the first miscible gas injection project in the Bu Hasa field, the application of an integrated system of reservoir characterization technologies and the study of the regional stratigraphic trends.

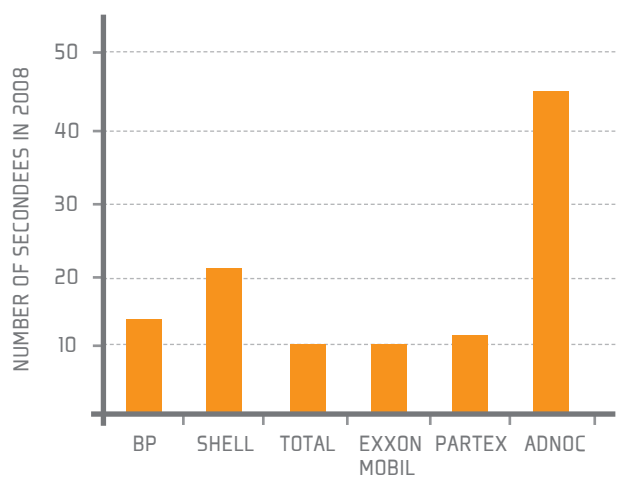
Seismic Interpretation



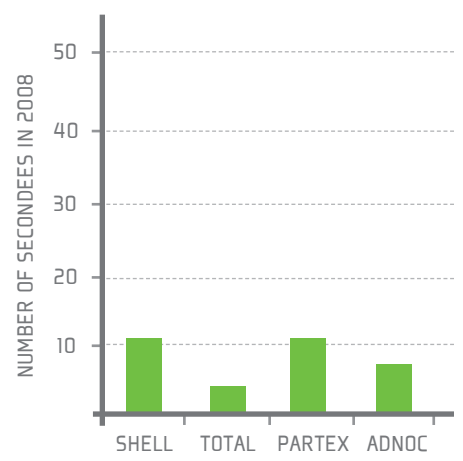
PARTEX SECONDMENT HISTORY IN ABU DHABI - 1979/2010



ADCO



GASCO



These figures show that Partex has a strong expertise presence in the operating companies, well above its participating share, a clear sign of the Partex commitment to the development of the oil and gas industry in Abu Dhabi.

CONTRIBUTION TO TRAINING

Partex is also committed to support the training of UAE nationals using different approaches namely cross-posting of UAE nationals, organization of Technical Seminars and Workshops and work with ADCO, GASCO, ADNOC and the Petroleum Institute, to share Partex R&D projects.

Training in Applied Statistics Volumetrics and Oil Reservoir Characterization and Modelling was recently conducted by Partex, following a request by ADCO.

Introduction to Geostatistics for Oil Reservoir Characterization

To provide the fundamental and main geostatistical tools necessary for oil reservoir characterization. Estimation of the main trends of internal properties and stochastic simulation of porosity and permeability are the main topics of this introductory course on reservoir characterization.

Advanced Stochastic Modelling of Oil Reservoirs

To provide the most recent and advanced methodologies of stochastic modelling to assess complex reservoirs. Modelling non-stationary phenomena, models integrating seismic data, models of fracture networks, models integrating production data Methodologies and case studies are treated using Geostatistical Modelling Software [CMRP].





A PARTNERSHIP TIMELINE

1991

The Five Years Maintenance Planning Programme was introduced throughout GASCO.

1993

ADCO commissioned three additional storage tanks at Jebel Dhanna with a crude capacity of one million barrels each.

Commencement of early production scheme from Jarn Yaphour field.

Completion of Bab field oil development project and celebration of the 30th anniversary of the first crude shipment.

1994

ADCO commissioned the early production scheme from Rumaitha Shanayel and Al Dabb'iya.

SHARING OF TECHNOLOGY



PARTEX CONTRIBUTION FOR RESERVOIR MANAGEMENT, FIELD DEVELOPMENT PLANNING AND R&D PROJECTS

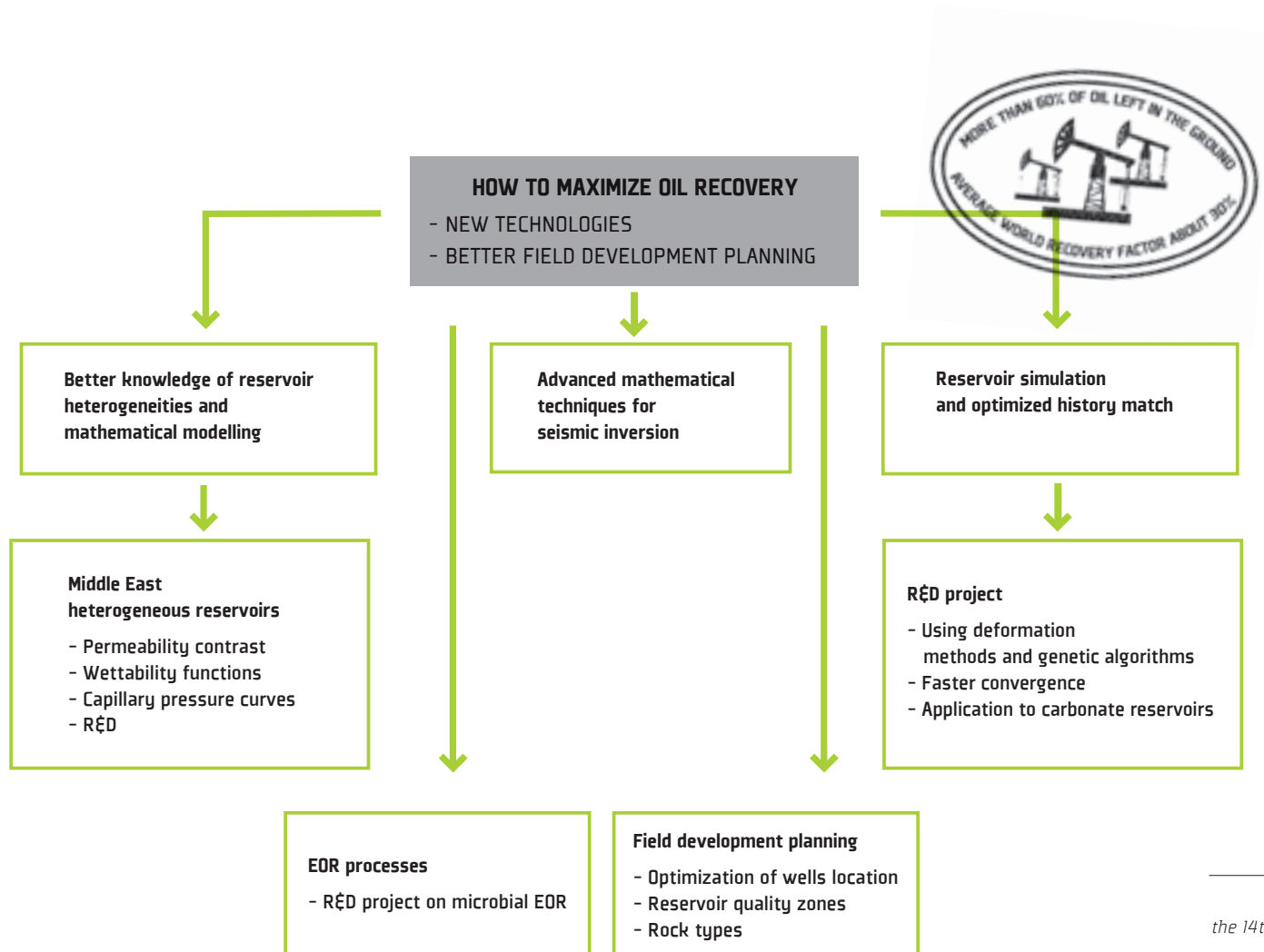
ADCO is a world class operator and needs to remain so in a future of more complex projects, based on the application of new technologies, the access to the best expertise and the contributions of its shareholders. The success of ADCO rests on an open model for technology transfer and a strong interaction among ADNOC, the International Shareholders and the Operating Companies. In modern times, the sharing of technology and knowhow is the foundation of progress.

The commitment of Partex to contribute to ADCO operations post-2014 in terms of Technology and R&D projects is to reinforce the current background of activities related to ADCO Reservoir challenges.

- R&D projects in Reservoir Characterization
- **Seismic Inversion Algorithm that was tested in Bu Hasa allowing to understand the reservoir heterogeneities. Presently conducting a study for ADCO on Seismic Inversion Technology;**
- **Project on the Characterization of Fractures for Carbonate Reservoirs;**
- **Studies on the optimization of oil production from Thamama B reservoirs;**
- **In other parts of the world, Partex developed projects related to Enhanced Oil Recovery (EOR);**
- **Project on Geostatistical History Matching;**
- **Projects in the area of Surface Facilities like Crude Oil Degassing and Stabilization;**
- **Microbial technology for heavy oil upgrade and water treatment;**
- **Water Bacterial Treatment.**

Partex R&D projects in Reservoir Characterization developed with the Technical University of Lisbon aimed at building more reliable Reservoir Models integrating Geological, Petrophysical and Seismic Information, led to applications to fields like Asab, Bu Hasa, Sahil and Shah, relevant to the understanding of reservoir performance and optimization of field development.

Partex developed a Seismic Inversion Algorithm that was tested in Bu Hasa and, for the first time, the location and shape of the Dense non-reservoir rocks present in Bu Hasa, which affect the fluids flow and inhibit production, could be mapped. The impact of this approach can improve the oil recovery of Bu Hasa, a major field with 25 billion barrels of oil in place, in which a simple 1% improvement in the recovery factor results in additional production of more than 250 million barrels of oil.



Slide Presented at the 14th ADIPEC CEO Summit, November 2010

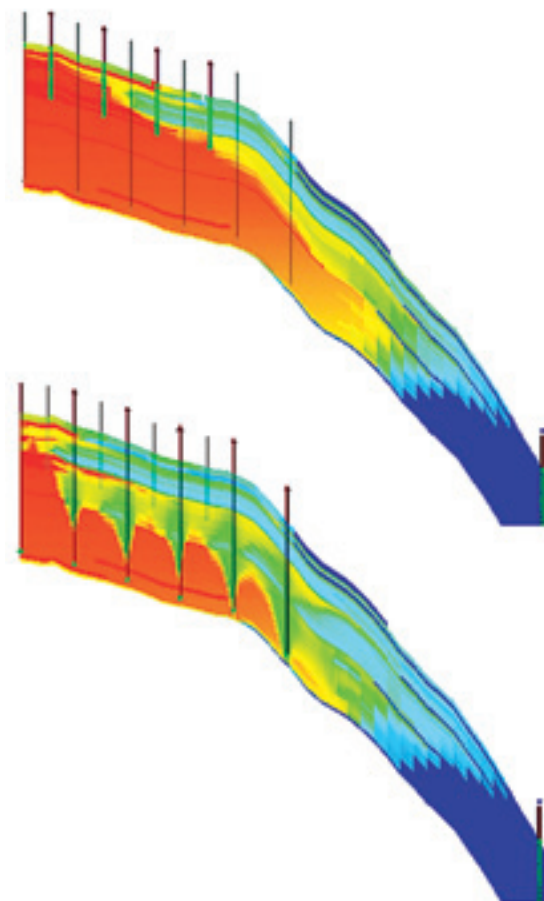
Partex developed a project on the Characterization of Fractures for Carbonate Reservoirs, which has an impact in understanding the role of fractures in fields like Sahil or Shah and how this knowledge can help optimize production and oil recovery.

Sweep Efficiency in Thamama B Reservoirs is one of the most critical issues in the maximization of Abu Dhabi oil reserves. Due to the contrast of permeability between Thamama B Upper and Lower reservoirs zones, efforts have been made by Partex to address this issue in order to understand reservoir performance and improve recovery from the Lower Thamama B. Partex has launched a Reservoir project focused on that issue and results have been shared with ADNOC and ADCO. A better understanding of the fluid mechanisms in the Thamama B can give some insight about the location of bypassed oil, identification of the areas not swept by water and improvements to be introduced in the design of the well completions. With the Reservoir project on Thamama B Lower and the R&D projects on Reservoir Characterization aiming at to integrate geological and seismic information,

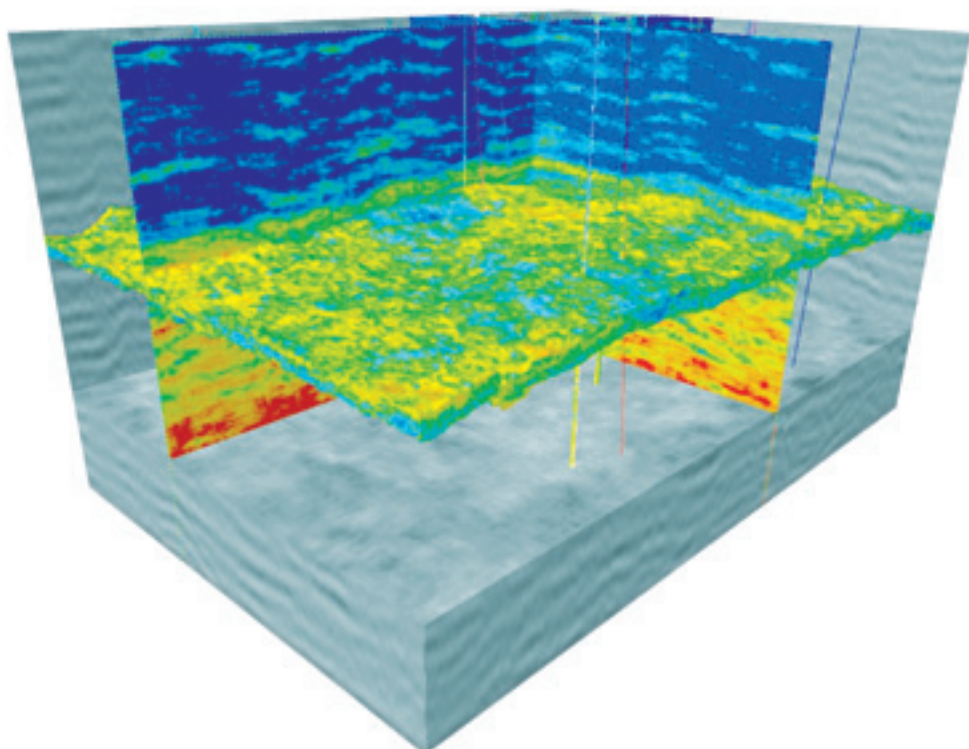
Partex is well placed to assist ADNOC and ADCO on finding ways to address this issue and improve Thamama B Lower oil recovery.

Partex developed Enhanced Oil Recovery (EOR) projects in other areas of the world. The next 20 years of ADCO concession will be different from the past and one way to improve oil recovery in ADCO reservoirs is to implement Enhanced Oil Recovery projects. Partex has skills in the area of Compositional Simulation and Miscible Gas Injection and has experience in the development of Reservoir Simulation Models tailored for Miscible Gas Injection projects, like the Harweel development in Oman. This experience can be relevant for the future of all ADCO fields, especially for Bab, Bu Hasa and NEB.

Partex conducted a project in Geostatistical History Matching that is important for future ADCO Reservoir Dynamic models, because it allows a consistent history matching optimization in mature fields with hundreds of wells and large dynamic and production data bases, avoiding the time-consuming and never ending process of model calibration.



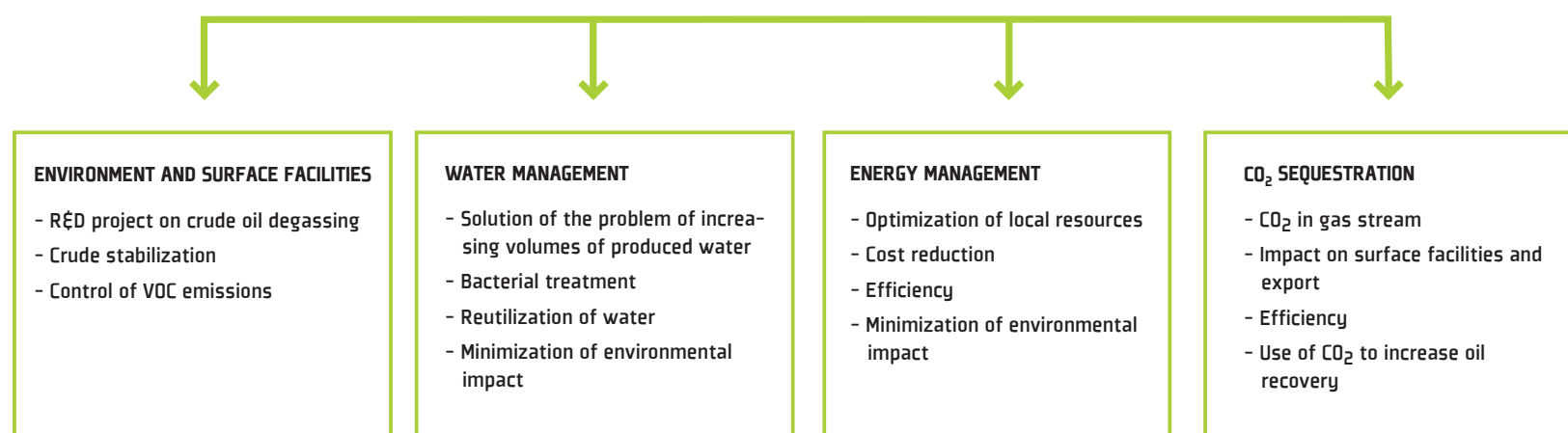
*Water Injection Development:
Modeling of Water
Front Advance*



*Global Seismic Inversion.
Explore the seismic data to
the limits.
Partex has its own Seismic
Inversion Methodology.*

**PARTEX BID ON ADVANCED TECHNOLOGY
IN CHALLENGING AREAS**

*Slide Presented at
the 14th ADIPEC CEO Summit,
November 2010*



Partex developed projects in the area of Surface Facilities such as Crude Oil Degassing and Stabilization, aimed at improving the separation of gas from the oil stream, to stabilize the crude, to reduce the economic loss of gas being released to the atmosphere during the exporting process, leading to the improvement of the environment quality.

These projects have been discussed with ADNOC, ADCO and the Petroleum Institute in several workshops and technical seminars. The commitment of Partex is to reinforce the R&D projects in these technical niches, provide the knowledge and technology gathered from the research to ADNOC and ADCO staff and train UAE nationals on these areas of expertise.

Partex is sponsoring a R&D MEOR (Microbial Enhanced Oil Recovery) Project with Portuguese Universities. The satisfaction of the increasing oil demands will require higher energy efficiency and improved oil recovery factors.

In view of that, Partex decided to develop an economical, simple and environmentally clean MEOR technology that can be applied to increase the oil production and the recovery factor of oil fields. The MEOR technology is based on the use of a microbial culture that can:

- reduce oil viscosity in site, eliminating the use of solvents and dispersants which can be toxic to the environment;
- generate gases [CO₂] that increase reservoir pressure, thus improving oil displacement;
- generate organic acids that dissolve rock improving permeability;
- improve the displacement through the production of biopolymers,
- alter wettability, reducing residual oil;
- produce bio-surfactants that decrease surface and interfacial tension. This is a recent R&D Project launched by Partex in cooperation with Aveiro and Minho Universities in Portugal.

Water Bacterial treatment is a technology that Partex is studying. The increasing water production in oil fields is an area of concern both for economical and environmental reasons. Presently circa 10% water cut is being produced in Abu Dhabi. This water needs to be injected underground or used at surface and its treatment is of the utmost importance both for cost and environmental reasons. PARTEX is undergoing studies and tests for treatment of produced water in order to make it suitable for injection and ultimately for agricultural and human consumption.

To achieve this objective, several steps are being followed, which include bacterial treatment for hydrocarbon removal with appropriate bacteria, not harmful to water quality and utilization.



PARTEX MAIN STUDIES AND PROJECTS IN ABU DHABI

GEOLOGICAL AND GEOPHYSICAL

- Jarn Yaphour 3D Seismic Interpretation in ADCO
- Habshan Fractured Reservoir Study in ADCO

RESERVOIR STUDIES

- Thamama B Lower – Oil Recovery Optimization in ADCO
- Fractured Reservoirs – Development of New Mathematical Models to Improve the Confidence in Simulation Input Data – Sahil Field in ADCO
- Shah Simsima Stochastic Modeling in ADCO;
- Regional Aquifers Simulation – Bu Hasa, Asab and Bab Fields in ADCO
- Vertical Communication in Thamama B Reservoirs in ADCO

QUALITY CONTROL

- Development and Implementation of Inspection Procedures Manual in GASCO
- Quality Assurance System in ADCO
- Materials management system audit in ADCO

PROJECT MANAGEMENT

- Ruwais Debottlenecking in GASCO
- Water Injection and Power in ADCO
- Construction supervision of industrial units in GASCO
- Construction supervision of the GASCO head office building
- Construction supervision of ADCO headquarters expansion
- Construction supervision of water injection and power project in ADCO
- Construction supervision, commissioning and start up of Asab Water Injection Revamping Project in ADCO
- Project management of Ruwais Debottlenecking in GASCO, covering basic detailed engineering, construction and commissioning

BASIC ENGINEERING

- Design of Jebel Dhanna Tank Drainage and Spillage Control System, including roads network and retention embankments in ADCO
- Construction Supervision of GASCO Industrial Units in GASCO

HAZOP, SAFETY AND INTEGRITY AUDITS

- Inspection and maintenance audit on four GASCO associated gas treatment plants (Bab, Bu Hasa, Asab and Ruwais)
- Inspection and maintenance audits of the GASCO gas pipelines and all cathodic protection systems
- Participation in shareholders Audit Teams to evaluate current level of Asset Integrity management within GASCO and ADCO

INFORMATION SYSTEMS AND TECHNOLOGIES

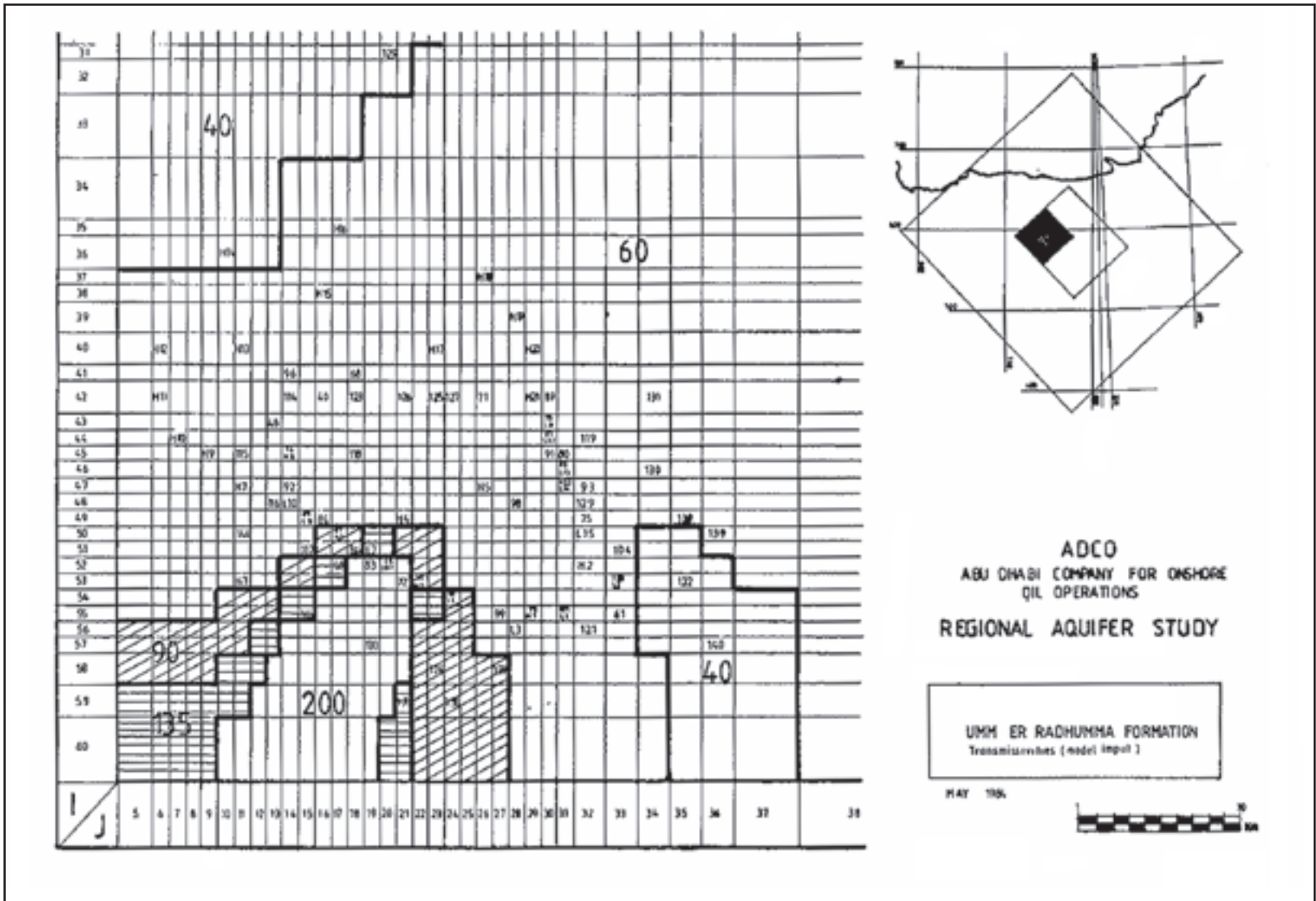
- Strategic Planning of ADCO Information Systems
- ADCO Hardware/Software Configuration and Selection
- Computerisation of the Accounting, Financial and Human Resources Functions in ADCO
- Documentation Management Study in GASCO

ORGANISATION AND MANAGEMENT

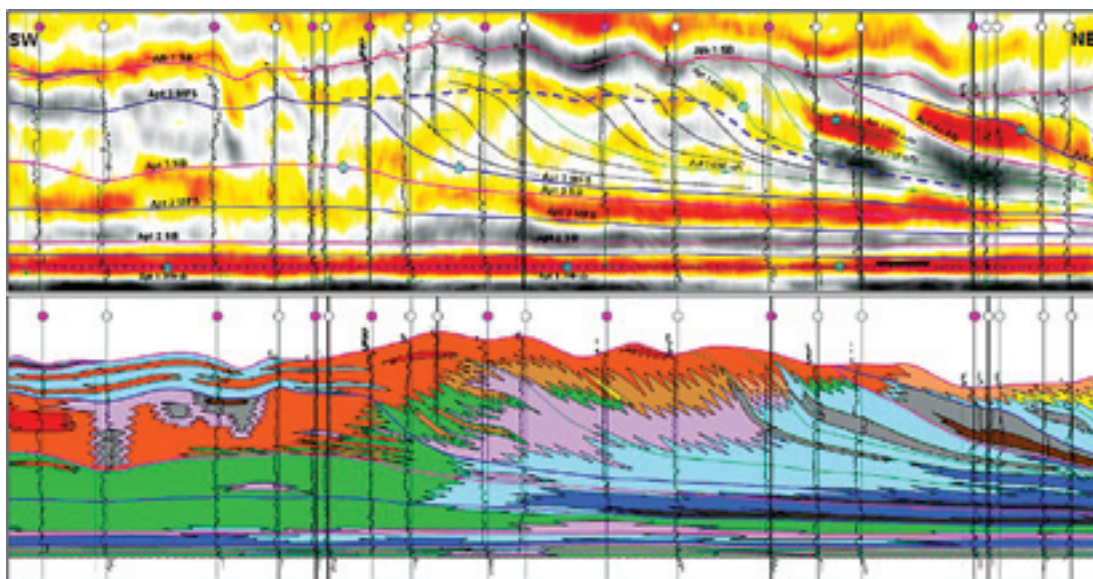
- Reorganisation of the ADCO Financial and Personnel Functions
- Design and Implementation Support of the ADCO Microfilming Centre
- Feasibility Study, Detailed Design and Implementation Support of the GASCO Microfilming Centre
- Development of the Management by Objectives System in GASCO

OPERATION AND MAINTENANCE OF FACILITIES

- Participation in inspection activities of ADNOC's UMM-AL-NAR refinery
- Development and implementation of Inspection Procedures Manual, and organisation of Inspection and Corrosion Services in GASCO
- Permanent technical assistance in the Maintenance and Inspection management in GASCO
- Development and implementation of a computerised condition Monitoring System at Asab associated gas plant in GASCO
- Inspection and maintenance audit on four associated gas treatment plants (Bab, Bu Hasa, Asab and Ruwais) in GASCO
- Technical assistance in management, organisation, planning and scheduling of overhaul and modular shutdowns in GASCO
- Participation on the commissioning and start-up of associated gas treatment plants in GASCO
- Selection of alternative corrosion inhibitors to be used in associated gas treatment plants in GASCO



Transmissibility distribution in the UER aquifer formation from the 1983 Partex Model - One of the first reservoir simulation studies in ADCO, executed by Partex.



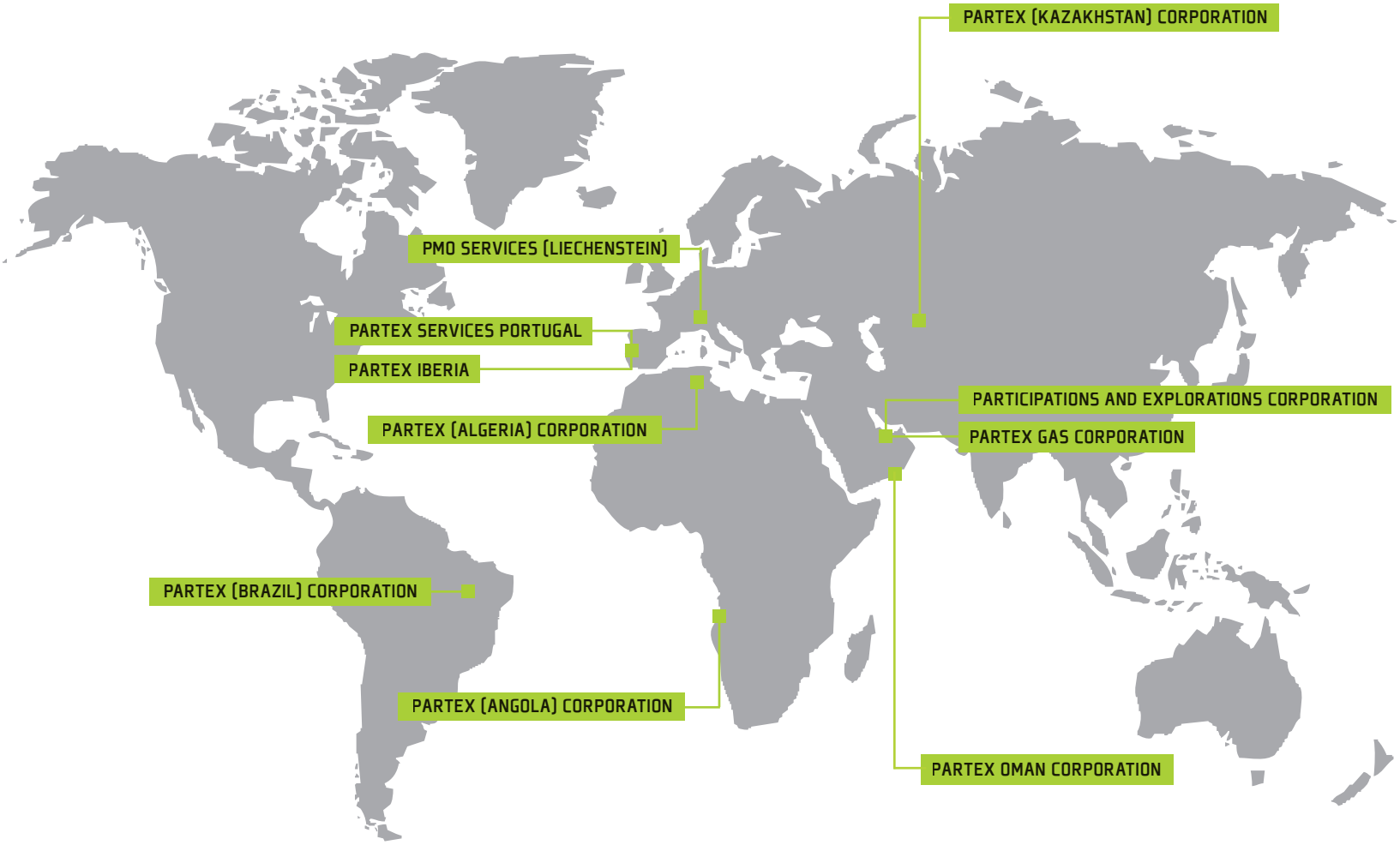
Seismic section and geologic model of one of the largest Abu Dhabi fields

KNOWLEDGE TRANSFER FROM OTHER AREAS OF THE WORLD

Partex has exploration and production projects in other areas of the world, involving aspects that are relevant to the Abu Dhabi reservoirs. Partex has always pursued a policy of importing to Abu Dhabi the learnings and technological approaches used in those projects.

- Oman EOR projects in mature and marginal fields
- Oman heavy oil field

- Brazil onshore marginal fields: a challenge for commercial development
- Brazil ultradeep offshore
- Angola ultradeep offshore
- Algeria onshore gas
- Kazakhstan tight reservoir requiring hydraulic fracturing operations. Focus on field development planning optimization
- Portugal deep offshore exploration







A PARTNERSHIP TIMELINE

1996

Commissioning of Bu Hasa and Bab North gas injection projects, and completion of construction of the 4th main oil pipeline.

2001

ATHEER, a fully owned ADNOC company, was integrated with GASCO in April.

GASCO's 2500th ship loaded at Ruwais.

2002

ADCO completed Asab Zone A/B pilot gas injection, Bab new additional manifold, Bab infrastructure upgrade, Bu Hasa two additional manifolds and Huwaila multiphase pump installation.

PARTEX COMMITMENT TO KNOWLEDGE DEVELOPMENT IN ABU DHABI



CONTRIBUTION TO THE PETROLEUM INSTITUTE

Partex is also committed to reinforce our relationship with the Petroleum Institute (PI) in Abu Dhabi, namely through initiatives like the sponsoring of professorships, organization of joint seminars and workshops, transfer of technology and visits to Partex. At the request of ADNOC, one of the secondees of Partex in ADCO was transferred to the Petroleum Institute as Partex Chair Professor in 2009.

Partex delivered a workshop in the Petroleum Institute on 25 November 2010 under the theme "Reservoir Characterization and Modelling". It covered key areas of the upstream oil & gas business such as carbonate reservoir characterization, seismic inversion, reservoir simulation and automated history matching.

A second workshop on "Asset Integrity" was held on the 15th and the 16th of November 2011, also at the Petroleum Institute.

A course on "Applied Carbonate Sedimentology", held at the PI, was organized and conducted by Partex and promoted by ADNOC, with strong support from ADCO and PI. It incorporated technical sessions, laboratory work and a field trip.

These events are part of a PI - PARTEX initiative of knowledge sharing between academia and industry. The workshops and the course were well received by many participants from PI, ADNOC and the Abu Dhabi Operating Companies.

A visit to Portugal of a professor and 3 students of the Petroleum Geosciences Department of the PI was organized by PARTEX from April 2 to 7, 2006. During the visit to Partex head-office, the PI Team had the opportunity to get familiarized with the different activities of Partex, both globally and in particular with two of the R&D projects that Partex is developing in collaboration with Instituto Superior Técnico (IST) of Lisbon: 1) "Shah Simsima Fracture Study Model based on Inversion and Seismic Facies Analysis" and 2) "Stochastic Seismic Inversion".

A geological field trip was organized to South of Lisbon to observe and study the main outcrops of the southern part of the Sedimentary Lusitanian Basin. In the Arrábida region, the PI Team observed and discussed several sedimentological features from Triassic to Tertiary, important dinosaur track sites, and evidences for the complex tectonic evolution of this basin.

Further visits to Portugal of the students of the Petroleum Institute, especially the ones that are in the last years of their education, will be planned by PARTEX in order to promote contacts with Portuguese technical institutions.



Aspects of the geological field trip of Petroleum Institute students

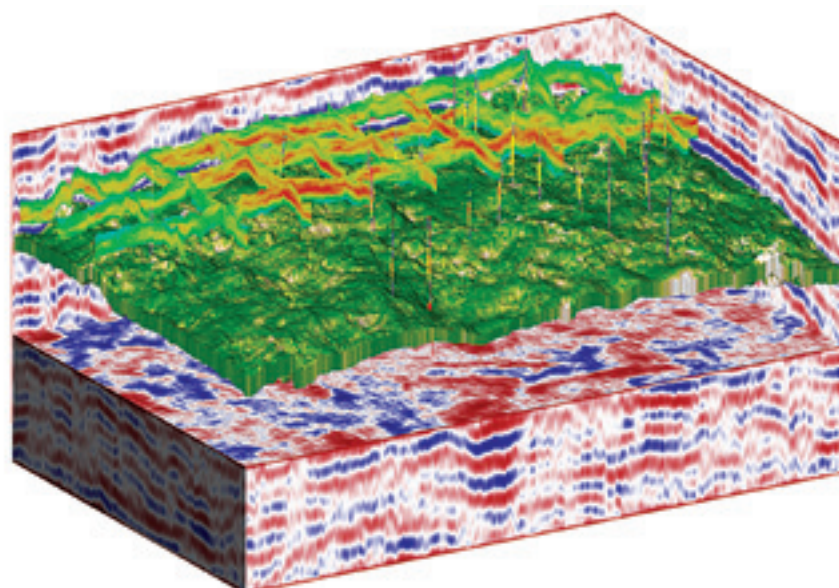
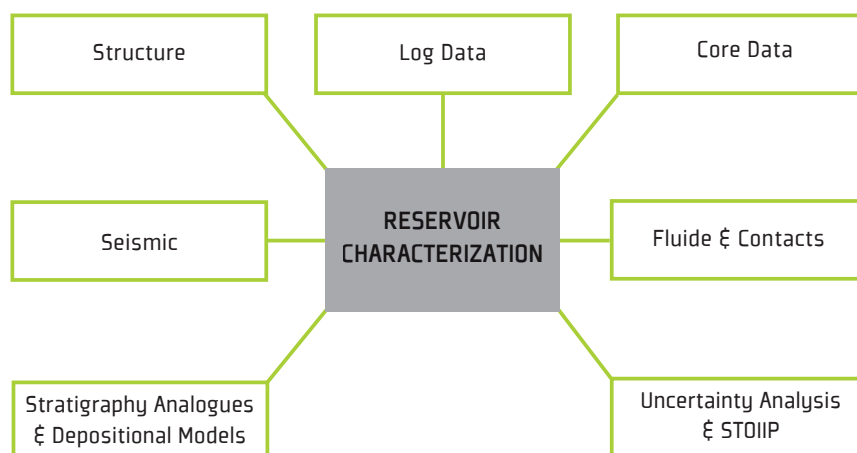


*Partex workshop in the Petroleum Institute, in 2010
Left: Partex Middle East representative Mr. José Pereira.
Center: PI Senior Vice-President Dr. Ismael Tag
Right: Participants at the workshop.*

PARTEX TECHNOLOGY AND R&D ACTIVITIES

RESERVOIR CHARACTERIZATION - WORKFLOW IN CARBONATES

Most of the hydrocarbon reservoirs in the Middle East are carbonate rocks. These are complex reservoirs that require special techniques to characterize the fluid flow behaviour and implement successful Field Development Plans. This presentation reveals a workflow to characterize carbonate reservoirs showing examples, mainly from the Middle East, to illustrate ways to handle the carbonate reservoirs complexity and the impact on reservoir development. The construction of 3D geological models to predict reservoir performance, implies an integrated multidisciplinary task involving expertise in reservoir geology, geophysics, petrophysics, geostatistics and reservoir engineering.



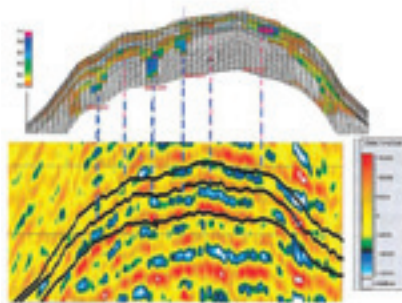
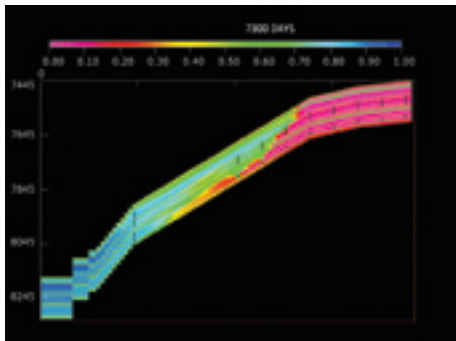
GLOBAL SEISMIC INVERSION: 2 STUDIES OF ONSHORE ADU DHABI

Seismic Inversion is usually used to condition the reservoir model since it is one of the seismic attributes that is closer to the petrophysical properties of the reservoirs, such as porosity. A new version of the stochastic seismic inversion algorithm has been developed by Partex in collaboration with Instituto Superior Técnico (IST) and tested in the Bu Hasa and Al Dabb'iya reservoirs to evaluate the robustness and efficiency of the new methodology.

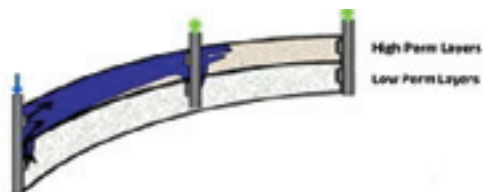
Seismic Inversion

OIL RECOVERY ENHANCEMENT FOR THAMAMA B LOWER IN AN ONSHORE ABU DHABI FIELD – USING CONCEPTUAL MODELS TO UNDERSTAND RESERVOIR BEHAVIOUR

The study objective was to test the issue of waterflood behaviour in ADCO Thamama B reservoirs, namely the impact of high permeability contrast between B-Upper and B-Lower using different capillary pressure models under different wettabilities. A conceptual sector model was applied to test different modelling scenarios and to establish the main reservoir behaviour issues. Simulations tested the role of saturation functions under different wettability behaviours on model sensitivity and the implication of permeability distribution on waterflood performance.

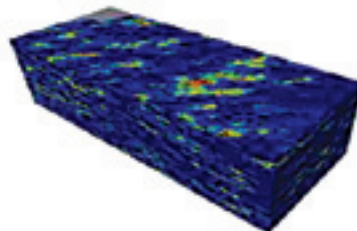
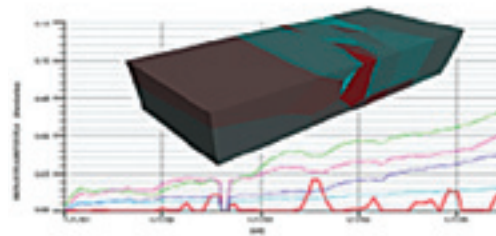


Fluid and Rock Properties to Evaluate Water Front Advance

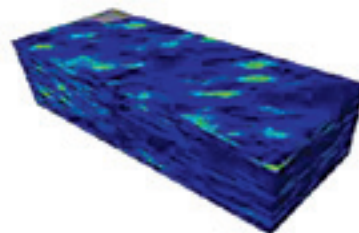


OPTIMIZED HISTORY MATCH – MIDDLE EAST CASE STUDY

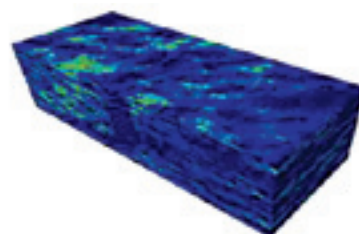
To calibrate the dynamic model with the production data, the history match process can change the petrophysical properties of the model in such way that the geological concepts used to build it are destroyed. The proposed method, based on genetic algorithms and gradual transformation of images with stochastic simulations accelerates the process of history matching.



One example simulation of the composed permeability model



Average cube of the realizations of the composed permeability model 1



Variance cube of the realizations of the composed permeability model

PARTEX TECHNICAL PUBLICATIONS

Partex published many technical papers on Abu Dhabi Oil and Gas projects, in conferences or publications of prestige, namely ADIPEC-OGWA, SPE, AAPG and SEG. Technical papers relevant to Abu Dhabi operations prepared with the contribution of Partex staff comprise the following subjects: Geological and Geophysical, Reservoir Studies, HSE/HAZOP and Safety Audits, Oil & Gas Market, Organization and Management and Well Engineering.

The book "The Universe of the Petroleum Industry – From Exploration to Refining" was written in the Portuguese language by two Partex senior staff. It provides a global coverage of the Oil and Gas Industry and was published in December 2007 by the Calouste Gulbenkian Foundation, the sole shareholder of Partex Oil and Gas. The book is being used by both students and industry staff and has now moved into its second edition. It comprises 26 chapters organized under eight sections covering the following areas:

- Petroleum: Origins and Fundamentals
- Geology and Petroleum Exploration
- Drilling and Reservoir Appraisal
- Oil Field Development
- Production, Transport and Refining
- Natural Gas
- Oil and Gas and the Environment
- Oil and Gas Markets

With the sponsorship of Partex, an English version is under preparation and will be supplied to the Petroleum Institute and other university institutions with which Partex holds a special relationship.



ABU DHABI PETROLEUM EXHIBITION AND CONFERENCE (ADIPEC)

Partex has been involved with ADIPEC since its early start. We watched ADIPEC grow from its inception, as a small conference held in the Abu Dhabi Intercontinental Hotel (where Partex presented a technical paper on Reservoir Studies), to a top event of the oil and gas industry in the world. Partex involvement goes back to the very beginning, contributing with technical papers, posters, chairing of some sessions and participating in the technical and executive committees.

In the last three ADIPEC Exhibitions, Partex had stands to present and discuss the group's new business and technological developments. In ADIPEC 2010 Partex was represented in the Executive Committee and Technical Sub-committees and actively participated in the ADIPEC CEO Summit. Partex already confirmed its participation in ADIPEC 2012.



Partex Stand at ADIPEC 2010



A PARTNERSHIP TIMELINE

2006

LPG 100 million tones produced since the beginning of GASCO operations.

2007

ADCO achieved the highest annual oil production ever.

2008

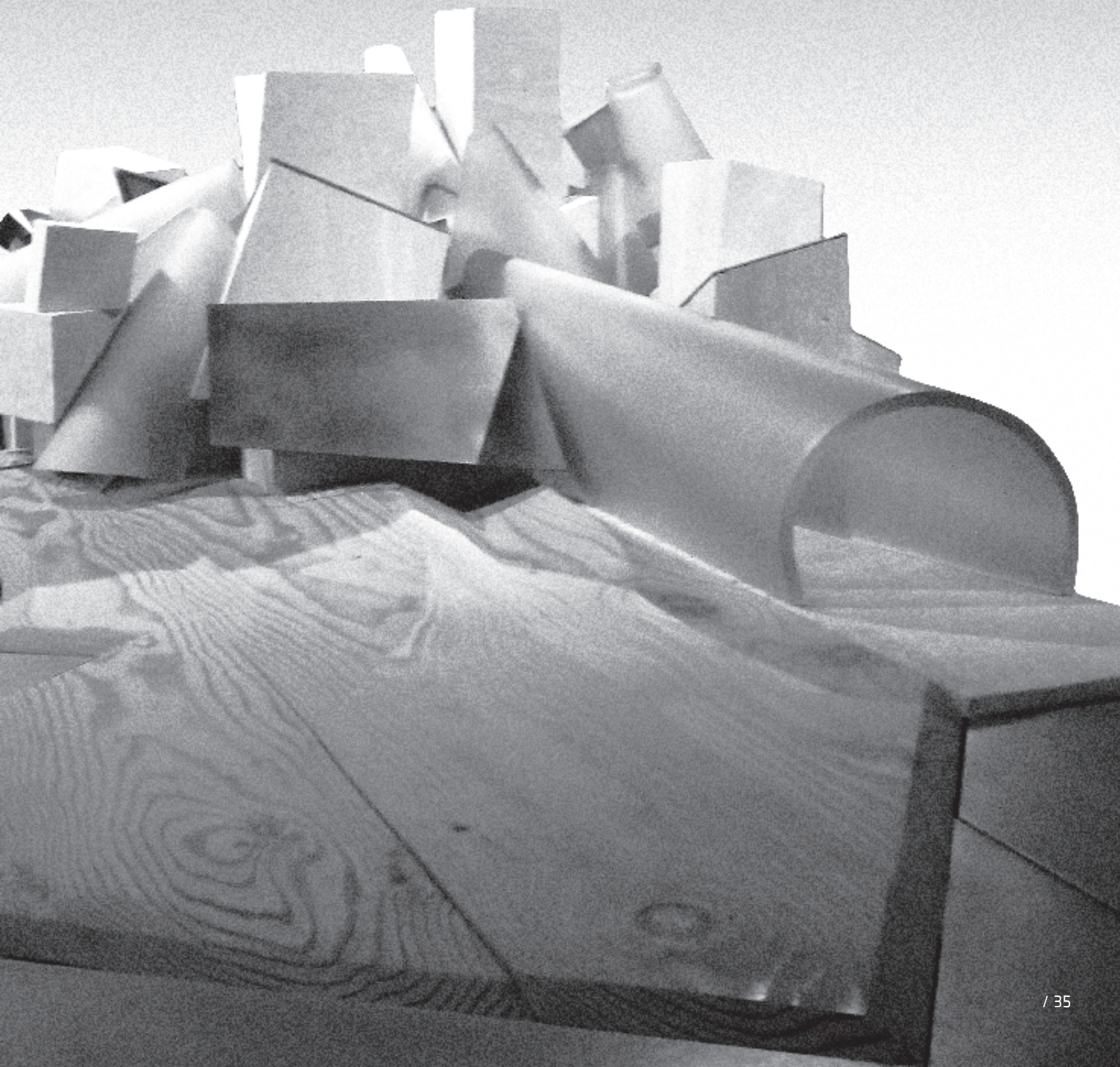
Major expansion projects were initialized in GASCO.

Agreement reached for ADCO to undertake the first CO₂ enhanced oil recovery (EOR) pilot in the Gulf region.

2009

Renewal of GASCO concession until 2028, signed on 31st of March 2009.

PARTEX LONG TERM VISION FOR ABU DHABI OIL AND GAS



GASCO CONCESSION RENEWAL

The Joint Venture Agreement renewal for GASCO was signed on March 31, 2009 between ADNOC, Shell, Total and Partex, for an additional 20 years, effective from 1st October 2008.

The Agreement was signed by His Excellency Yousef Omair Bin Yousef, the Secretary General of the Supreme Petroleum Council and Chief Executive Officer of ADNOC, on behalf of ADNOC, Mr. Malcolm Brinded, Executive Director Exploration and Production, on behalf of Shell, Mr. Yves Louis Darricarrère, President of Exploration and Production, on behalf of Total, and Dr. Eduardo Marçal Grilo, Vice-Chairman of the Board of Directors, on behalf of Partex.





Present at the signing ceremony were H. E. Yousef Omair Bin Yousef, the Secretary General of the Supreme Petroleum Council and ADNOC's CEO, Mr. Abdulla Nasser al Suwaidi, the ADNOC Deputy CEO and Exploration and Production Director, the GASCO Board of Directors, and Mr. Mohamed A. Sahoo Al Suwaidi, GASCO CEO.



ADCO CONCESSION CHALLENGES A VENTURE IN UNITY

ADCO challenges are critical for the future of oil production in Abu Dhabi. It is important to emphasize that ADCO is in a solid process of expansion of its production capacity to reach 1.8 Mbd in a very near future. The basis for this ambition has been the continuous pursuit of operations excellence and reserves maximization, principles that have guided the oil development strategy, as underlined by the Joint Management Committee since its first meeting on the 25th April 1973. These expansion plans and the maturing of the existing oil fields will add enormous complexity to the operations. It is important to ensure the conditions for the future of ADCO and the materialization of this expansion plan which is essential for the country.

Above: 75th Joint Management Committee held in Abu Dhabi in December 2010.

Below: Oil terminal instalations

ABU DHABI

MINUTES OF INTERIM JOINT MANAGEMENT COMMITTEE HELD AT 33, CAVENDISH SQUARE, LONDON, W.1., at 10.30 am on WEDNESDAY, 25th APRIL, 1973.

Present:

A.D.N.O.C.

H.E. Sayid Mana Otaiba
H.E. Sayid Mohammed Nabrouh

In attendance - Dr. Mahmud Amin

A.D.P.C.

Mr. B. Bexon
Mr. C.H. Boyer
M. J. Duroc Banner
Mr. P.I. Gelpke
Mr. D.C.A. Goolden
Mr. A.J. Miller
Mr. G.G. Stockwell (Chairman)

In attendance M. J.P. Brousseau
Mr. H.C. Goff
Mr. G.Y.R. Marion

Mr. A. Turner, General Manager, A.D.P.C.
Mr. I.G. Macpherson (Acting Secretary)

OPERATIONS OF A.D.P.C. SINCE JANUARY, 1973.

1. After the discussion of the report of recent operations meeting in the report from the General Manager, A.D.P.C., which included a summary of the operations meeting, the following points were discussed:

2. After the discussion of the report of recent operations meeting in the report from the General Manager, A.D.P.C., which included a summary of the operations meeting, the following points were discussed:

LONG TERM SUSTAINABILITY OF ADCO PRODUCTION

Taking into consideration the knowledge of Partex about ADCO reservoirs and the work conducted by Partex along the years on R&D projects related to Reservoir Characterization and Simulation Modelling of Carbonate Reservoirs, it is our belief that we can play a relevant role in achieving this goal. Partex can contribute to the improvement of oil recovery and the development of accurate and reliable Field Development Plans. This is critical to formulate options focused on the maximization of reserves, the increase of production and the sustainability of the target plateau rates.

RESERVES ADDITIONS

The management of the reserves portfolio of ADCO has required that focus is maintained on maximizing recoverable reserves in developed and undeveloped reservoirs and fields. The need to study and tackle these assets is, of course, a critical element of ADCO's future. However, as a result of this effort, exploration has received limited attention in the last years of strong field development activities. In the view of Partex, it is now the time to start giving exploration a stronger role in the establishment of a healthy and sustainable reserves basis for ADCO. We believe that the experience and the knowledge of the exploration potential acquired by Partex throughout years of dedicated involvement in ADCO operations can provide relevant added value to such an important part of Abu Dhabi's energy wealth.

IMPROVED OIL RECOVERY IN EXISTING FIELDS

ADCO reserves, given their characteristics, are good candidates for IOR projects, such as, among others, the application of efficient infill drilling planning. However, in order to achieve success, a crucial issue is the understanding of reservoir behaviour and fluid dynamics. Partex can provide relevant insight on this area of petroleum knowledge, based on the work conducted in Reservoir Characterization and Reservoir Simulation, including studies on the understanding of the Thamama B reservoir.

In fact, Thamama B represents the major share of the Abu Dhabi oil reserves and the optimization of this reservoir's development plan will lead to the maximization of its reserves. Without a doubt, this is a fundamental challenge for the country. Partex has since long been involved in the technical work associated with the modeling of Thamama B, through the participation in ADCO projects, the contribution of Partex secondees and studies performed in-house.

One example of the involvement of Partex came in the form of the active participation in the workshop on the improvement of oil recovery from the Thamama B-Lower reservoir zone, which was organized by ADNOC in October 2002 with all the international shareholders and the ADNOC Group operating companies. The discussions focused on critical details like the identification of bypassed oil and the establishment of optimum development planning options.

OPTIMIZATION OF ADCO OPERATIONS AND DRILLING ACTIVITIES

Partex secondees in ADCO Drilling and Petroleum Development working areas have the required competences and skills and Partex is committed to bring and reinforce this presence in the future, with the aim of supporting ADCO's efforts for a continuous improvement of the management of operations.









ASSET INTEGRITY MANAGEMENT

ADCO is undergoing a major project, that started some years ago, to implement an efficient and effective Asset Integrity Management System (AIMS) and Partex has been highly involved on this issue for ADCO. This is of major importance for ADCO and ADNOC due to future challenges in EOR/ Sour projects.

Asset Integrity continues to be the main focus of interest for both ADCO and GASCO, in order to maintain the old facilities in optimum condition to last longer, as well as the implementation of Asset Integrity Management for the new plants to guaranty many years of good performance. Partex contribution has been always present and will continue in this area, through the participation of high skilled seconded professionals for special requirements (projects, audits, inspections, etc.).

HSE CHALLENGES

Partex contribution to HSE projects stands also in terms of providing Human Resources in order to support more difficult levels of operations.

THE NEB PROJECT AS AN IMAGE OF ADCO FUTURE OPERATIONS

The NEB project is a pilot for ADCO future options in terms of the operations automation, encompassing a number of intelligent field initiatives aiming at the integration of people and technologies leading to an appropriate decision-making process. The Real Time Operating Centers will be a key cornerstone of the future Model. Partex contribution to these initiatives is well reflected in the achievements of NEB team where Partex secondees were an active part of the process that led to major outcomes and opened an avenue for the future.

RESERVOIR MANAGEMENT

Partex involvement in areas of the world where ageing fields already required new approaches, can provide an useful support to ADCO in terms of how the reservoir management process can accommodate these new challenges.

WATER MANAGEMENT

Associated Water Production is increasing, its handling and treatment is becoming more complex, being vital for oil recovery optimization. Partex technology can contribute to the improvement and optimization of: (1) design philosophy and timely delivery of injection clusters; (2) water injection quality in low permeability reservoirs; (3) management of produced water, including prediction of rates and the treatment needed prior to injection and (4) evaluate the re-use of produced water for human and agricultural purposes.

ENERGY MANAGEMENT

ADNOC is undergoing a major study for Abu Dhabi on integrated energy management with special focus on optimization and introduction in a large scale of co-generation concepts to generate power from actually lost heat at power generation facilities. Partex may have an opportunity to collaborate at technical level with expertise available in Portugal. The experience from PDO, where the concept is much more advanced and widespread, may be relevant.

PARTEX
OIL AND GAS





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