

CCOP-DANIDA
Institutional Capacity Building Project ICB-CCOP1
Seminar on Fractured Reservoir Exploration & Production
16-18 May 2007, Hanoi, Vietnam

Report on proceedings and discussions of the Seminar

Date and Venue:

The seminar was held on 16-18 May, 2007, at Melia Hanoi Hotel, 44B Ly Thuong Kiet, Hanoi, Vietnam. Tel: (84-4) 9 343 343 Fax: (84-4) 9 343 344

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Website: <http://www.solmelia.es>

Local Organizer: PetroVietnam

Participants:

Forty-Three (43) geoscientists from nine (9) CCOP Member Countries: Cambodia, China, Indonesia, Korea, Malaysia, Papua New Guinea, The Philippines, Thailand and Vietnam attended the meeting.

The represented agencies/institutes were:

- ❖ Cambodian National Petroleum Authority (CNPA), Cambodia
- ❖ China Geological Survey (CGS), China
- ❖ China National Offshore Corporation (CNOOC), China
- ❖ China Petroleum & Chemical Corporation (SINOPEC), China
- ❖ Lemigas, Indonesia
- ❖ PERTAMINA, Indonesia (ASCOPE Members)
- ❖ Korea Institute of Geoscience and Mineral Resources (KIGAM), Indonesia
- ❖ Petronas, Malaysia
- ❖ Department of Petroleum and Energy, Petroleum Division, Papua New Guinea
- ❖ Department of Energy (DOE), the Philippines
- ❖ Philippine National Oil Corporation Exploration Corporation (PNOC), the Philippines
- ❖ Department of Mineral Fuels (DMF), Ministry of Energy, Thailand
- ❖ PetroVietnam, Vietnam
- ❖ VietsovPetro, Vietnam
- ❖ Vietnam Petroleum Institute (VPI), Vietnam

Detailed name list of participants is attached as Annex 1.

Program:

The detailed program of the seminar is provided as Annex 2.

Background and Purpose of the Seminar:

For oil industry, the fractured reservoir exploration and production issue is one of the challenging frontiers in the new century. This issue was raised during the previous ICB-CCOP1 Project activities by the CCOP Member Countries. Hence, the experts from our CCOP Member Countries and ASCOPE Members have been invited to discuss on this issue together for the purpose of preparing to meet the emerging challenges, sharing the information and experience, transferring the existing technology, building the capacities and enhancing future cooperation. This seminar is in cooperation with PetroVietnam and ASCOPE.

Speakers from PetroVietnam, VietsovPetro, VPI, CNOOC, SINOPEC, PETRONAS, PERTAMINA (ASCOPE Members) made the presentation on the issue of fractured reservoir exploration and production from different case studies, including the following aspects:

- A broad introduction to geological characteristics, forming mechanism, geological scenario of the fractured reservoir
- The methodology of the fractured reservoir description, including the integrated analysis of seismic data, well log data, core, rock cutting, and outcrop observation, and utilization of different tools, like arithmetic, software, etc.
- IOR/EOR of fractured reservoir

Record of the Proceedings and Discussions at the Seminar:

On behalf of PetroVietnam, Mr. Nguyen Dang Lieu, Vice Permanent Representative of Vietnam to CCOP, Senior Vice President, Vietnam Oil and Gas Group, delivered his welcome speech to all the participants. In his speech, he mentioned that fractured reservoir in oil and gas exploration and production, which this seminar addresses, was a subject of great interest of geo-scientific community and oil producers. In Vietnam since 1988, when hydrocarbon was discovered in the basement of Bach Ho field, more than 100 million ton of crude oil has been extracted from the fractured basement, which give a typical example on fractured reservoir. Thus, in follow-up of the last year international conference on this topic, today we are very fortunate to have such a distinguished of experts from Vietsovpetro, Petrovietnam, CNOOC, SINOPEC, PETRONAS, PERTAMINA, and others to further discuss on this challenging but interesting issue. It is our hope that in sharing the view and experience, exploring the initiatives, the participants will find in this seminar both scientifically and practically informative for the future research and development

activities in the industry. He also conveyed the sincere gratitude to Royal Danish Government through DANIDA to support the project (Annex3 Mr. Nguyen Dang Lieu's speech).

In the following, Mr. Chen Shick Pei, Director of CCOP Technical Secretariat, gave his comprehensive welcome remarks. He said the organization of this seminar is made possible of the flexibility allowed by the donor agency, DANIDA and CCOP in the implementation of the ICB-CCOP 1 project to meet the needs of the Member Countries. This seminar topic on Fractured Reservoir Exploration and Production has not originally been included as an activity in the project plan. However, during the implementation, Member Countries realized that the fractured reservoir is a very important new petroleum exploration target for the region. Additionally, the participants also learnt of the advances and progress that have been made by Vietnam Oil and Gas Group and its associated agencies in this new target type and they have generously offered to share their experiences. The Member Countries therefore requested for this seminar to be organized. In this seminar, besides the Vietnamese experts, we also have opportunities to hear from resources persons of other Member Countries sharing their knowledge and experiences on the subject gained in their own countries with the other participants at the seminar. This seminar again underscores the desire of Member Countries to come together to exchange and share knowledge that can contribute to the sustainable development of the petroleum resources of the region. At the end, on behalf of CCOP, he deeply appreciated the Royal Danish Government through the Royal Danish Embassy in Bangkok for the generous support for this Project and strong support from PetroVietnam to this seminar (Annex4 Mr Chen Shick Pei's speech).

Finally, H.E. Mr. Peter Lysholt Hansen, the Ambassador of Denmark to Vietnam made opening address for this seminar. He said it was his great pleasure for him to address everybody this morning at the opening of the seminar on Fractured Basement Reservoir Exploration & Production. As you know the seminar is part of the Danida funded ICB-CCOP 1 Institutional Capacity Building project. He found the project seminar to be most important and a very good example of how regional scientific cooperation can contribute to enhancing regional stability and joint efforts to increase economic growth and prosperity. Therefore, Denmark is most happy to support the project and to work with CCOP and our Asian friends to encourage and strengthen the geoscientific cooperation in East and South East Asia (Annex4 Mr. Peter Lysholt Hansen's speech)..

Afterward, 5 sets GIS digital mapping software ArcView 9.2 which were purchased under the ICB-CCOP1 Project were granted to the five case study host countries, China, Indonesia, Malaysia, Philippines and Vietnam for applying it to joint case studies by H.E. Danish Ambassador.

According to the technical program of the seminar, speakers from PetroVietnam, VietsovPetro, VPI, CNOOC, SINOPEC, PETRONAS, PERTAMINA (ASCOPE Members) made high standard presentations on the issue of fractured reservoir exploration and production from different case studies. (Annex 6 Speakers' CV and Abstracts)

The interests from participants were so great that they were continuing discussions even during the coffee breaks. According to their opinions, the seminar was very informative, advanced and there

were a vast knowledge and experiences from invited speakers on the fractured reservoir. The presented concepts and techniques were very useful and help participants to broaden their knowledge about the basement play. (Annex 7 Comments from CCOP Member Countries)

In this two-day seminar, participants were informed of the current situation of technology and engineering on fractured reservoir exploration and production in China, Indonesia, Malaysia and Vietnam. Especially, the technology of E&P of the fractured basement reservoir in Vietnam is amongst the most advanced technology leaders in the world oil industry. Participants learnt a lot and felt that it was urgently needed and necessary to import and share such technologies, analyze the key points, strengthen basic technology system to support fractured reservoir exploration and production. At the seminar wrap up, the participants expressed sincere thanks for the excellent seminar. This was an opportunity for participants to get an overview of fractured reservoir exploration and production, and get the networking in the future development. Participants would like to thank Royal Danish Government sponsored CCOP-ICB1 Project, PetroVietnam, VietsovPetro, VPI to host this seminar as well as the Guest Speakers for their great efforts for this high level seminar. (Annex 8 Evaluation of the Seminar)

In addition, the ICB-CCOP1 Project Chinese and Vietnamese case study team members also took this opportunity to hold a side meeting to have a good discuss on outputs merging from basin modeling results of the joint case study of the Yinggehai-Song Hong basin.

This seminar is in cooperation with PetroVietnam and ASCOPE. The cooperation between CCOP and ASCOPE Members in the petroleum sector is continuously improving, and the door is further opened through this seminar.

After two-day seminar, the participants had visited Ha Long Bay, the World Natural Heritage, located 160 km northeast Hanoi. Geoscientists from CCOP Member Countries have a chance to observe the beauty of the landscapes of limestone islands all around the Ha Long Bay, which is also an known fractured reservoir for oil and gas in Song Hong basin, northern Vietnam.



**INSTITUTIONAL CAPACITY BUILDING IN CCOP COUNTRIES,
PHASE 1 (ICB-CCOP1)**



Group photo of all the ICB-CCOP1 Hanoi Seminar



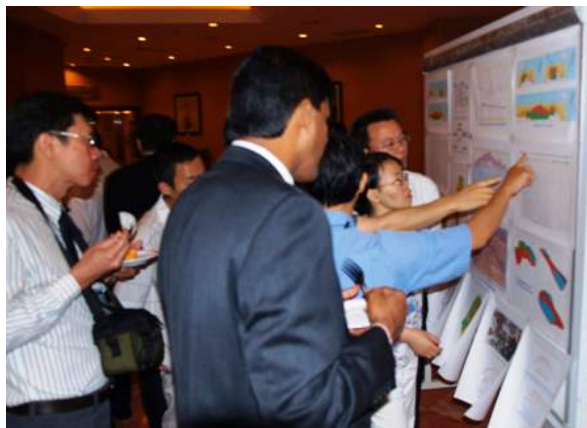
H.E. Mr. Peter Lysholt Hansen, the Ambassador of Denmark to Vietnam delivered opening address



ArcView 9.2 Software Granted



Presentation during the seminar



Continual discussion during the coffee break in front of the poster

Presentation



Focusing on the presentations



Question



Side-meeting on the Yinggehai-Song Hong case study between Chinese and Vietnamese Partners



Certification



Visited the World Natural Heritage Ha Long Bay

Annex 1 List of Participants

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GUEST SPEAKERS

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Annex 2

SEMINAR PROGRAM

Day 1: 15 May 2007 (Tuesday)

Traveling to Hanoi, Vietnam. Arrival of Participants / Check-in at Melia Hanoi Hotel

Day 2: 16 May 2007 (Wednesday)

- 08:30 Registration CCOPTS
- 09:00 Opening Ceremony:
Welcome Remark by Mr. Nguyen Dang Lieu, Vice Permanent Representative of Vietnam to CCOP, Senior Vice President, Vietnam Oil and Gas Group
Welcome Speech by Mr. Chen Shick Pei, Director of CCOP Technical Secretariat
Opening Address by H.E. Mr. Peter Lysholt Hansen, Ambassador of Denmark to Vietnam and Laos, Embassy of Denmark
- 09:30 Group Photo
- 09:45 Coffee/tea break
- 10:00 Introduction
- 10:10 Presentation “**Bach Ho Fractured Basement Reservoir**” by Mr. Trinh Xuan Cuong, Deputy Exploration Manager, Exploration Division, PetroVietnam, Vietnam
- 11:00 Presentation “**Hydrocarbon Exploration in Fractured Basement in Southern Malay Basin-Peninsula Malaysia**” by Mr. Wan Mohd Sharif Wan Ali, (PCSB), Petronas, Malaysia
- 12:00 Lunch Break
- 13:00 Presentation “**Reservoir Characteristics and Predicting Method of Neogene Buried Hill of JZS Oil Pool in Liaoxi Uplift of Bohai Sea**” by Dr. Zhou Xinhui, Senior staff geologist of Technology Department, CNOOC Ltd.-Tianjin, China
- 13:50 Presentation “**Method and Application of Fractured Carbonate Reservoir Detection**” by Ms. Liu Guoping, Geophysicist, Natural Gas Division, Exploration & Production Research Institute, Sinopec, China
- 14:40 Coffee/tea break
- 15:00 Presentation “**Reservoir Geology of Fractured Basement: Suban Barat-1 well – South Sumatra, Indonesia**” by Mr. Arief Budiman, Operation Geology Coordinator -Sumatra Area, Pertamina EP, Indonesia
- 15:30 End of Day 2
- 15:45 Departure from Hotel for cultural event (Water Puppet Show)
- 18:30 Welcome Dinner

Day 3: 17 May 2007 (Thursday)

- 08:30 Presentation “**BASROC 3.0 – A Special Software for Processing of Wireline Logs in Fractured Basement**” by Mr. Luong Duc Phong, Joint Venture Vietsovpetro, Vietnam
- 09:20 Presentation “**Integration of Well and Seismic Data in 3D Geological Model**”

Building for Fractured basement reservoir- Case study: Fractured reservoir of White Tiger Oil Field by Dr. Hoang Phuoc Son, Deputy Manager of Exploration Department, Vietsovpetro J/V Company, Vietnam

- 10:10 Coffee/tea break
- 10:40 Presentation “**The Results for Permeability Determination from Well Log Data in Vuggy-Fractured Basement Reservoir of White Tiger Field Using Artificial Neural Network**” by Mr. Tran Duc Lan, Manager of E&P Data management group - R&E Institute, Joint venture Vietsovpetro, Vietnam
- 11:30 Presentation “**The Oil Reservoir in Vuggy-fractured Basement of White Tiger and Solution for Enhancing oil recovery**” by Dr. Hoang Van Quy, Director of R&E Institute, Joint venture Vietsovpetro, Vietnam
- 12:20 Lunch Break
- 13:10 Outputs Merging of the Song Hong – Yinggehai Basin Joint Case Study
- 13:30 Presentation “**Production Technology of Oil Pool in Fractured Basement Reservoir**” by Mr. Nguyen Hai An, Deputy Manager of Petroleum Production Department, E&P Research Center, Vietnam Petroleum Institute, Vietnam
- 14:20 Presentation “**Research for Predicting the Lost Zones and for Fighting Lost Circulation in the Fractured Basement of White Tiger field**” by Dr. Hoang Hong Linh, Head of Drilling Fluid, Department, Workover & Offshore Drilling Division – Joint venture Vietsovpetro, Vietnam
- 15:00 Certification
- 15:20 Seminar wrap up
- 15:45 End of day 3 / Coffee and tea break

Day 4: 18 May 2007 (Friday)

07:00 – 21:00 Excursion to Halong bay, a Natural World Heritage site by UNESCO and Farewell dinner

Day 5: 19 May 2007 (Saturday)

Check out from Melia Hanoi Hotel, Back Home Trip

Annex 3

WELCOME SPEECH VICE PRESIDENT OF PETROVIETNAM, VICE PERMANENT REPRESENTATIVE OF VIETNAM TO CCOP

MR. NGUYEN DANG LIEU

**At the Opening Ceremony CCOP-DANIDA Institutional Capacity Building
Project ICB-CCOP1
Seminar on Fractured Reservoir Exploration & Production
16-18 May 2007, Hanoi, Vietnam**

H.E. Peter Lysholt Hansen, Ambassador of Denmark to Vietnam

Mr. Chen Shick Pei, Director of CCOP Technical Secretariat

Mr. Ioannis Abatzis, Representative of Denmark to CCOP

Ladies and Gentlemen,

It is a great pleasure for me to be here and join you in this seminar today. First of all, let me, on behalf of CCOP Vietnam and Petrovietnam, extend our warm welcome to all the distinguished guests and participants to this event organized within the frame of cooperation in ICB-CCOP1 project.

Fractured reservoir in oil and gas exploration and production, which this seminar addresses, is a subject of great interest of geo-scientific community and oil producers. In Vietnam since 1988, when hydrocarbon was discovered in the basement of Bach Ho field, more than 100 million ton of crude oil has been extracted from the fractured basement, which give a typical example on fractured reservoir. Thus, in follow-up of the last year international conference on this topic, today we are very fortunate to have such a distinguished of experts from Vietsovpetro, Petrovietnam, CNOOC, SINOPEC, PETRONAS, PERTAMINA, and others to further discuss on this challenging but interesting issue. It is our hope that in sharing the view and experience, exploring the initiatives, the participants will find in this seminar both scientifically and practically informative for the future research and development activities in the industry.

Ladies and Gentlemen,

Taking this opportunity, on behalf of CCOP Vietnam and Petrovietnam, I would like to convey our sincere gratitude to Danish Embassy and DANIDA for effective cooperation and assistance granted to Vietnam and Petrovietnam so far. We really must to express our special appreciation to Mr.Chen Shick Pei for his excellent stewardship as Director of CCOP Technical Secretariat; and to Mr. Ioannis Abatzis for his attention, closed guidance and enthusiasm reserved for ICB-CCOP1 Project as well as for many other cooperation activities with Vietnam. I would also like to extend our thanks to the organizing committee for their best effort in every preparations for this seminar.

Finally, wish every success for the seminar, wish you all very good health and happiness. And enjoy your stays in Hanoi.

Thank you.

Annex 4

WELCOME REMARKS OF DIRECTOR OF CCOP TECHNICAL SECRETARIAT

MR. CHEN SHICK PEI

**At the Opening Ceremony CCOP-DANIDA Institutional Capacity Building
Project ICB-CCOP1
Seminar on Fractured Reservoir Exploration & Production
16-18 May 2007, Hanoi, Vietnam**

HE Mr Peter Lysholt Hansen, Ambassador of Denmark to Vietnam and Laos

**Dr Nguyen Dang Lieu, Permanent Representative of Vietnam to CCOP, Senior Vice President,
Vietnam Oil and Gas Group**

Mr. Zainal A. Matassan, Secretary In-Charge, ASCOPE

Dr. Phan Tien Vien, Deputy Director of Vietnam Petroleum Institute

Mr. Ioannis Abatzis, Representative of Denmark to CCOP

Mr. Liu Liqun, ICB-CCOP 1 Coordinator

Distinguished speakers and participants

Ladies and Gentlemen

Cin Cao (Chao) and Good Morning

On behalf of CCOP, I would like to extend a very warm welcome to everybody to this Seminar on Fractured Reservoir Exploration and Production under the ICB-CCOP 1 Project. In this august opening ceremony this morning, we would like to express our deep appreciation to HE Mr Peter Lysholt Hansen, Ambassador of Denmark to Vietnam, and Dr Nguyen Dang Lieu, Vice President, Vietnam Oil and Gas Group for giving us their valuable time to be with us to grace this opening ceremony and to deliver the opening speeches despite their busy schedule and heavy commitments.

The organization of this seminar is made possible of the flexibility allowed by the donor agency, DANIDA and CCOP in the implementation of the ICB-CCOP 1 project to meet the needs of the Member Countries. This seminar topic on Fractured Reservoir Exploration and Production has not originally been included as an activity in the project plan. However, during the implementation, Member Countries realized that the fractured reservoir is a very important new petroleum target for the region. Additionally, the participants also learnt of the advances and progress that have been made by Vietnam Oil and Gas Group and its associated agencies in this new target type and they have generously offered to share their experiences. The Member Countries therefore requested for this seminar to be organized. In this seminar, besides the Vietnamese experts, we also have opportunities to hear from resources persons of other Member Countries sharing their knowledge and experiences on the subject gained in their own countries with the other participants at the seminar. This seminar again underscores the desire of Member Countries to come together to exchange and share knowledge that can contribute to the sustainable development of the petroleum resources of the region.

Besides this seminar, other ICB-CCOP 1 activities have also brought the petroleum practitioners from countries in the region together to collaboratively discuss, exchange and share their experiences and knowledge we have organized joint field studies both in Member Countries, and cross-border areas, in workshops, training sessions as well as activities of sharing and integration of data and information for the joint assessment of petroleum resource in the cross border case studies, Yinggehai Song Hong Basin and the Sulu Sea-East Sabah Basin.

This is unprecedented especially in the Petroleum Sector where data and information are considered to be commercial strategic assets, and we are proud that CCOP has facilitated this under the Danish Government supported ICB-CCOP 1 project: this is in fact one of the key objectives of the ICB-CCOP 1 project. This could well serve as the model of implementation for future CCOP projects.

As you are probably aware, the ICB-CCOP 1 project is now at the final 7 months of its 36-month project duration. We anticipate that the final report will be completed by the end of August and the dissemination seminars to inform the stake-holders of the countries hosting the case studies will be held in the 4th Quarter of 2007. We expect that the whole project will be completed by end of December, 2007 according to plan. Based on the Member Countries' strong request for continuation with Phase 2 of this very useful and high positive impact project, we will in the course of the next couple of months gather Member Countries' specific needs to enable us to prepare the Phase 2 Project Concept for consideration of the funding agency.

To conclude, we would like to say a big thank you to Vietnam Oil and Gas Group for hosting this Seminar. We would especially like to thank the resource persons from Vietnam Oil and Gas Group, Vietnam Petroleum Institute, VietsovPetro, and from other Member Countries, China, Indonesia, Malaysia, for their generosity in sharing their knowledge and experience in fractured reservoir exploration and production. We once again like to thank HE Mr Peter Lysholt Hansen, Danish Ambassador to Vietnam, and Dr Nguyen Dang Lieu, Vice President Vietnam Oil and Gas Group for gracing this morning's opening session. We thank Mr. Liu Liqun, the ICB-CCOP 1 Project Coordinator for the efficient coordination of the project, and the staff of the CCOP Technical Secretariat for their hard work in the overall arrangement for this event. Our special appreciation goes to Mr. Ioannis Abatzis, Representative of Denmark to CCOP, Senior Advisor of the Geological Survey of Denmark and Greenland (GEUS) for rendering his useful advice and guidance for the project, and his untiring effort to find opportunities to assist CCOP. We thank Mr. Liu Liqun, the ICB-CCOP 1 Project Coordinator for the efficient coordinator of the project, and the staff of the CCOP Technical Secretariat for their hard work in overall arrangement for this event.

On behalf of CCOP, we would like to say a big thank you to the Royal Danish Government through the Danish Embassies in Hanoi and Bangkok, for the generous support for this Project. I thank our CCOP Member Countries, the national project coordinators and their colleagues for their cooperation, support and participation in the project activities and the case studies.

I wish you all a successful seminar.

Cam Mon and Thank you.

Annex 5

OPENING SPEECH OF the Ambassador of Denmark to Vietnam

Mr. Peter Lysholt Hansen

**At the Opening Ceremony CCOP-DANIDA Institutional Capacity Building
Project ICB-CCOP1**

**Seminar on Fractured Reservoir Exploration & Production
16-18 May 2007, Hanoi, Vietnam**

**Dr. Lieu, Vice President of Petrovietnam and good friend,
Director Chen Shick Pei,
Ladies & Gentlemen, dear friends.**

It is a great pleasure for me to address you this morning at the opening of the seminar on Fractured Basement Reservoir Exploration & Production. As you know the seminar is part of the Danida funded ICB CCOP 1 Institutional Capacity Building project.

To a layman the seminar and project name might seem incomprehensible and it might scare away most people, not least many in the diplomatic community. Should an ambassador really spend his time on an event like this? It also seems to scare women away if one looks at the gender balance of today's participants.

However, in all honesty I find the project seminar to be most important and a very good example of how regional scientific cooperation can contribute to enhancing regional stability and joint efforts to increase economic growth and prosperity. Therefore, Denmark is most happy to support the project and to work with CCOP and our Asian friends to encourage and strengthen the geoscientific cooperation in East and South East Asia.

I understand that the purpose of today's seminar is to transfer Vietnamese experience and expertise in exploring and producing oil from granite basement. The story behind the seminar demonstrates the need and benefits of cooperating across borders within geology.

The story starts with Vietsovpetro and Petrovietnam discovering oil reserves in the granite basement of Vietnam. To exploit these reserves, the companies have established a new and unique exploration and production concept. This has greatly contributed to increasing and optimising oil and gas production in Vietnam.

As part of the process, Denmark has through Danida funds supported the development of human resources and supplied appropriate tools in the form of interactive interpretation work stations and powerful software to facilitate the interpretation of the complicated data.

I am very happy to see that our Vietnamese friends at Vietnam Petroleum Institute and in Petrovietnam together with Vietsovpetro will share expertise harvested over the past and share knowledge and methodologies applied for optimising the oil and gas production from such

reservoir type.

Neighbouring countries facing similar oil sources and challenges have asked CCOP for knowledge transfer and expertise on these issues. As it turned out that Vietnam possesses a unique experience and expertise in this field, it was natural to ask Vietnam to share these with countries in the region. And Vietnam has shown an admirable will to share with its neighbours.

Moreover, the seminar today is a spin-off of the regional cooperation through CCOP on capacity building. It was not a planned activity but came into being due to demand from some CCOP members and the willingness of other members to share. It illustrates that CCOP has a unique role in creating cross border cooperation in Asia. Denmark highly appreciates the spirit of regional cooperation and understanding that CCOP works towards constantly increasing.

Furthermore, we are most satisfied that expertise from Denmark, e.g. from GEUS, can benefit the development of regional cooperation and capacity building. And actually, it is a two way street, as Danish researchers also benefit and learn from working with colleagues in Vietnam and elsewhere in Asia.

Finally, I am most happy to learn that cross border cooperation projects like the ICB CCOP 1 Institutional Capacity Building project are now becoming very popular. The project in this sense constitutes a role model for how to create regional cooperation in Asia. This is a reflection of CCOP's ambition to create real and substantial cooperation across borders. And it is very much in line with Danida's goals for providing regional assistance to Asia.

To me the project in general and today's seminar in particular demonstrate in a very explicit manner that knowledge and geology does not know and respect geographic boundaries. It is my belief and hope that sharing knowledge and expertise will be the building blocks of further strengthening cooperation and friendship across borders in Asia.

Before I end my speech there is one more thing left to do:

On the occasion of your coming retirement, Mr Chen Shick Pei, I would like to take this opportunity to congratulate you for your efforts and achievements during your directorship of CCOP's technical secretariat. We hope that CCOP under the new director will continue its important role in encouraging and facilitating regional cooperation to the benefit of the member countries.

I wish you all a good and fruitful seminar carried out in the true spirit of regional cooperation and friendship. Thank you!

Annex 6

ABSTRACT and SPEAKERS' CV

1-Bach Ho Fractured Basement Reservoir

Mr. Trinh Xuan Cuong

Deputy Exploration Manager,
Exploration Division, PetroVietnam, Vietnam

Short CV:

Mr. Trinh Xuan Cuong graduated a Bachelor Degree at Hanoi University of Mining and Geology in Petroleum Geology and Master Degree in Petroleum Geoscience from the University in Brunei. He is doing the Ph.D. Degree now in Hanoi University. He has been worked with Petrovietnam since 1994 in the E&P division and he is now a Deputy Exploration Manager of Exploration Division.

2-Hydrocarbon Exploration in Fractured Basement in Southern Malay Basin-Peninsula Malaysia

Mr. Wan Mohd Sharif Wan Ali

Manager, PM6/12 Peninsular Malaysia Operation, XMAS
Petronas Carigali Sdn. Bhd., PETRONAS, Malaysia

Abstract

PCSB for nearly 30 years has explored mostly structural traps, focusing on clastic reservoirs in exploration areas in Malaysia. Despite recent discoveries in stratigraphic play types, exploration focus remains mainly on structural clastic reservoirs. Discovery of oil in basement of neighboring countries, encouraged PCSB to explore for basement plays in Malaysia.

Results of re-evaluation of the G&G data, prompted the drilling of deeper wells into the basement in Block PM12, offshore Peninsular Malaysia.

The exploration well in Block PM12, namely AU-1 targeted Early Miocene clastic reservoirs (structural) and Middle Miocene stratigraphic reservoirs. The well drilled 35m of the basement as rat hole for the overlying sedimentary objective. AU-1 exhibited good shows of up to 16% total gas, on Chromatograph log and deepening of the well 150m further into basement. This section was later tested and flowed oil without any water production.

The well was sidetracked to test another basement culmination about 1000m away (at basement objective). In AU1 SDTR-1, 250m of metamorphic basement was drilled. Basement was tested and flowed oil.

Another exploration well, AUB-1 was drilled some 200m down dip of AU-1 well, penetrated 1000m MD of basement. At this location the well established that weathered basement is more oil prolific than fresh basement.

Although 2 exploration wells have proven discoveries in the basement, geological uncertainties such as porosity and permeability remained, in addition to high well cost, sidetrack requirement and complicated subsurface pressure. New technology that have real time impact during exploration was suggested by our Technology Management Unit for the subsequent exploration well, AT-1. The new technologies include:-

- Advanced Gas Chromatography Technology
 - to enable accurate and fast gas chromatographic analysis
- Specialized Wireline Logging Technology
 - to enable wire line logging of formation behind casing
 - to enable detection of fracture geometry
 - to enable imaging of basement using while using OBM/SBM

AT-1 well results continued this success story in the Anding area

Currently, more prospects targeting basement will be drilled which would further enrich PSCB's knowledge of basement reservoir.

Short CV:

Mr. Wan Mohd Sharif Wan Ali graduated a Bachelor Degree in the field of Physics & Mathematics with Education from University Science of Malaysia, Penang. He has been worked with Petronas since 1979. He has conducted seismic interpretation of many interesting areas during his training with Shell (1980), SNEA(P)(1983) and EXXON(1984) and while working with Petronas – West Australian Shelf, Lake Tanganyika, Tonga, North Sea, Africa, Chad, Niger, Sudan, Nigeria, Equatorial Guinea, Mozambique, Malaysia but NOT VIETNAM. He has spent the last four years exploring for oil in the basement in southern part of Malay Basin, Malaysia and made a first basement oil discovery in 2004.

3-Reservoir Characteristics and Predicting Method of Neoproterozoic Buried Hill of JZS Oil Pool in Liaoxi Uplift of Bohai Sea

Dr. Zhou Xinhui

Senior staff geologist of Technology Department
CNOOC Ltd.-Tianjin, China

Abstract

JZS is the biggest buried hill oil pool in Bohai sea area, with OIP 31730×10³ m³ and recoverable reserves 5395×10³ m³. The oil pool is located in Liaoxi uplift, Bohai sea area of Bohai Gulf Basin. It is very important both for exploration assessment and development design plan to research the reservoir characteristics and quality controlling factors of Neoproterozoic buried hill. Thin section identification indicates that the lithologic types of JZS Neoproterozoic Buried hill are light grey gneisses and cataclasite. Cores examinations Statistical results and Geo-stress study results find that more than two-group high-dip tectonic fractures are developed in this pool.

The extensional directions of fracture are NE (paralleled to main faults, mostly effective) and NW (oblique-cut main faults, filled and half filled). Reservoir properties of JZS Neoproterozoic buried hill are reasonably good and relatively homogeneous. FMI and porosity log information indicate the quality variation of reservoir beds in this area. Correlation with other similar basement buried hill reservoirs indicates that the main controlling factors of Neoproterozoic buried hill reservoir property in JZS pool are Cenozoic palaeogeomorphology and tectonic faults of Mesozoic and Cenozoic. Tectonic force, weathering, dissolution during catagenesis and organic acid dissolution during oil and gas infilling periods are key factors to affect the evolution of Neoproterozoic metamorphic reservoir. Several new seismic technology methods are combined together to predict the complex Neoproterozoic reservoir, such as fine along the level variance body slice, based on prestack seismic data body spectral imaging analysis, tectonic stress field analysis and absorption decay attribute analysis. Drilling results are proved to be correspondent to the prediction.

Key words: Bohai sea, Neoproterozoic, Metamorphic reservoir, Reservoir characteristics controlling factors, Evolution model, Seismic technology

Short CV: Dr. Zhou Xinhui, born in Jiangxi province in south China, is the senior staff geologist of Technology Department, CNOOC Ltd.-Tianjin. He also has an experiences being an oil exploration project manager, staff geologist, as well as reservoir predicting geologist.

He graduated a Doctoral Degree from China University of Geosciences (Beijing), major in engineering geology. He had studied involved in the reservoir prediction, exploration target analysis, and hydrocarbon accumulation research, mainly in Bohai sea area of Bohai Gulf Basin. All of the studies are included in 8 large projects (area including Liaodongwan depression, Huanghekou depression, as well as Bohai area as total). Many year abroad experiences in geology and oil exploration have made him an efficiency and open-minded researcher as shown in his work

and papers published.

Professional awards: According to the studies and experiences, he has received a lot of honor such as National Technology Prize (2006), Tianjing State Labor Prize (2006), and CNOOC Company Prize (9 times from 2004 to 2006).

4-Method and Application of Fractured Carbonate Reservoir Detection

Ms. Liu Guoping

Geophysicist, Natural Gas Division, Exploration
& Production Research Institute, Sinopec, China

Short CV:

Miss Liu Guoping is working with Department of Natural Gas, Exploration & Production Research Institute, Sinopec as a geophysicist. She was graduated from Jiangnan Petroleum Institute in 1995 with her bachelor's degree in the field of applied geophysics. She got her master degree in earth exploration and information technology from China Petroleum University, Beijing in 2005. She has been worked in Jiangnan Oil Field, Sinopec for seven years before she joined the Exploration & Production Research Institute, Sinopec in 2005. Being a geophysicist, she mainly undertakes the work of seismic interpretation and seismic inversion. Several research projects related to the application of 3D visualization in exploration and production have been done by herself. Recently, her paper, titled "Application and Analysis of Elastic Impedance in Time-lapse Seismology", was published in Journal of Progress in Geophysics sponsored by Institute of Geology and Geophysics of Chinese Academy of Sciences and Chinese Geophysical Society (CGS).

5-Reservoir Geology of Fractured Basement: Suban Barat-1 well – South Sumatra, Indonesia

Mr. Arief Budiman

Operation Geology Coordinator -Sumatra Area,
Pertamina EP, Indonesia

Short CV:

Mr. Arief Budiman got his degree from the Geology Department, Institut Teknologi Bandung. He has been worked with PERTAMINA since 2002 and he is now an Exploration Geology Coordinator –Exploration Region Sumatra, PERTAMINA EP. Before he joined PERTAMINA, he experiences in the filed of exploration and had worked with the GEOTRENDS CONSULTANTS and MATASAK CONSULTANTS.

6-BASROC 3.0 – A Special Software for Processing of Wireline Logs in

Fractured Basement

Mr. Luong Duc Phong
Joint Venture Vietsovpetro, Vietnam

Short CV:

Dr. Pham Xuan Son is an Engineer in geology and mineralogy fields. He has an experiences been worked in Logging & Testing Division- VSP. At present he is a Deputy Director of Logging & Testing Division- VSP.

7-Integration of Well and Seismic Data in 3D Geological Model Building for Fractured basement reservoir- Case study: Fractured reservoir of White Tiger Oil Field

Dr. Hoang Phuoc Son
Deputy Manager of Exploration Department,
Vietsovpetro J/V Company, Vietnam

Short CV:

Dr. Hoang Phuoc Son got his Master Degree of Engineer in Geological and Geophysical Engineering from University of Bucharest in Romania and Philosophy Doctor Degree in Geology from Hanoi University of Mining and Geology. He has over 29 years of experience in Geoscience study in Vietnam offshore.

8-The Results for Permeability Determination from Well Log Data in Vuggy-Fractured Basement Reservoir of White Tiger Field Using Artificial Neural Network

Mr. Tran Duc Lan
Manager of E&P Data management group
R&E Institute, Joint venture Vietsovpetro, Vietnam

Short CV:

Mr. Tran Duc Lan got the Master Degree in geology and mineralogy fields. He has worked in core laboratory of R&EI, scientific and technical information and patent Department of R&EI and nowadays is a Manager of E&P Data management group of R&E Institute.

9-The Oil Reservoir in Vuggy-fractured Basement of White Tiger and Solution for Enhancing oil recovery

Dr. Hoang Van Quy
Director of R&E Institute
Joint venture Vietsovpetro, Vietnam

Short CV:

At present Dr. Hoang Van Quy is a Director of R&E Institute, Joint venture Vietsovpetro. He got a Ph.D. Degree in geology and mineralogy fields. He has experienced and worked in the field of Petroleum for many years.

10-Production Technology of Oil Pool in Fractured Basement Reservoir

Mr. Nguyen Hai An
Deputy Manager of Petroleum Production
Department, E&P Research Center, Vietnam Petroleum Institute, Vietnam

Abstract

Fractured granitic basement is the typical oil reservoir in the CuuLong basin, offshore of Vietnam, that characterized by high oil column and large areal sizes. In addition, the fluid flow pattern in the reservoir is governed by crossed fracture system that presents a big difference from clastic integranular rock. For such uncommon reservoir, applying a suitable production technology namely well & completion type; depletion strategy; design pattern; artificial lift and etc, is one of the big challenges in oil & gas exploration and production.

This presentation will highlight the challenges and offer some experiences of production technology mainly from field history in BachHo, SuTuDen, RangDong after 20-year production of those oil pools.

Short CV:

Mr. Nguyen Hai An is presently a Deputy manager of Petroleum Production Department in Vietnam Petroleum Institute. He got his Master and Bachelor Degree at Hanoi University from the faculty of Information technology, and Petroleum Faculty (Mining and Geology, Petroleum drilling and production technology section), respectively. He has experienced in the research works on reservoir engineering and production technology for many years at VPI and had been trained the “Petroleum technology and reservoir development” course at IFP – FRANCE.

11-Research for Predicting the Lost Zones and for Fighting Lost Circulation in the Fractured Basement of White Tiger field

Dr. Hoang Hong

Linh

Head of Drilling Fluid, Department, Workover & Offshore Drilling
Division – Joint venture Vietsovpetro, Vietnam

Abstract

In the basement reservoir of White Tiger field, lost circulation often occurred while drilling wells. The researched results (about: Lost circulation, rate of penetration, thermal profile) showed the close relationship between lost circulation and fractured characteristics of the basement. Based on these results for predicting the lost zone distribution and the severity of the loss in Central Block & in North Block, that allowed to propose the suitable solutions for combatting the lost circulation at the area.

So, following the above prediction, this paper also intends to present the new research for selecting LCM pill recipes by a lot of experimental results on the combinative modern equipments and new products. The testing conditions have been modeled close to practical conditions of wells for imitating nearly correct plugging ability of the pills into the lost zones. These researched results showed the compatible LCM pills to the fractured basement. They cure effectively lost circulation, protect this reservoir and increase economical & technical effect while drilling or exploiting in the basement.

Short CV:

Dr. Hoang Hong Linh got Ph.D. in Geology and Geography. He graduated from Hanoi Institute of Mining & Geology in 1986, Master in 1998, and Doctor in 2001. He has about 20 years of experience in Drilling Fluid. He has been an author and co-author of about 30 papers in oil & gas field presented at Vietnamese and international scientific conferences or published in the Vietnamese Oil & Gas journals.

Annex 7 Comments by ICB-CCOP1 Seminar on Fractured Reservoir E&P participants

China:

- The seminar is very useful, we have learned about techniques and technologies for fractured basement
- The presentations were very good

Malaysia:

- These issues were raised still in inception meeting and now we could have it
- The Seminar is very useful for E&P people

Vietnam:

- It is useful for everyone
- There are still many problems to discuss

Papua New Guinea:

- The Seminar is very highly informative and advanced
- We have learned a lot and will try to use these knowledge and experiences in petroleum E&P in our country

Philippines:

- Very informative.
- Although we do not have fractured basement, we do have only carbonate reservoir, but the technologies can also be applied for our targets

Thailand:

- This is vast knowledge for such kind of reservoir. We can see a lot of experts and expertise in the field like Bach Ho in this Seminar
- It is useful for us, we can apply obtained knowledge for our works in Thailand

The Coordinator:

- Thank you for contributions and sharing information, knowledge, experiences with all participant

Annex 8

CCOP-DANIDA
Institutional Capacity Building Project ICB-CCOP1
Seminar on Fractured Reservoir Exploration & Production
16-18 May 2007, Hanoi, Vietnam

EVALUATION

We would appreciate if you would complete this evaluation form and return to the Secretariat Staff.
Please mark the appropriate box, and include your comments.

Excellent	Unsatisfactory				
Description	5	4	3	2	1
1) Were the Guest speakers well prepared?	18	18	3		
2) Were the Guest speakers knowledgeable?	16	21	2		
3) Seminar presentations	19	19	1		
4) Did the Guest speakers/Seminar help you with your needs and requirements?	22	11	6		
5) Was there a good mixture of theory and practice?	19	17	2	1	
6) Were the examples good?	21	15	3		
7) Was the Seminar relevant to your job?	21	13	5		
8) Overall Seminar assessment	20	16	3		
9) Did you enjoy the Seminar?	24	12	3		
10) Did the Seminar meet your expectations?	20	16	2	1	
11) Please clarify if you missed something. <ul style="list-style-type: none"> - How to do logging and what logging suits are compatible / convenient in a basement rock. The parameters used identify reservoir sections from such logs. - Whether the seismic attributes used in white tiger could be applied in other fields in other settings. - Field trip to see outcrops of reservoir, seal, source rocks. - More examples such as seismic line. 					
12) How many people in your institution/company/organization will benefit from the seminar? (please give an estimation) <ul style="list-style-type: none"> - Around 25people - Basin studies, exploration, development and production reservoir (~ 200 people) - 35 percent of total people in my company 					
13) What changes do you think could be made to improve the Seminar? (quality of seminar handout, content , venue, facilities, etc.)? <ul style="list-style-type: none"> - Integrate the knowledge such as tectonic structure, reservoir research and production engineering 					

- It would be useful to have complete abstracts for all presentations.
- It would be convenient to have handouts of presentations to participants in advance so that participants could make notes on slides not clear (minus the confidential notes).
- Posters display is good to study some missing points.
- Please give us more examples
- Field trip could be longer
- Should be more long time.
- Very well

14) Perspectives after the Seminar. How would you put value to the knowledge learned?

- Excellent
- Good (3 answers)
- Very highly informative and advance. It gives hope to member countries like PNG to look at potential in Basement. Encouragement is achieved because it shows that Member Counties have taken the work related with fractured basement reservoir to such an advance stage and we can always rely on our Member Countries for knowledge and skills. First, we need to be bold to that extra footage, after developing the play concept.
- Know to predict reservoir character with seismic attribute and logging.
- More systematic understanding above the basement reservoir both in E&P.
- Fractured reservoir analysis project in Korea (future).
- Increase my knowledge of fractured basement reservoir, different type of reservoir that has in Thailand but knowledge obtained in the seminar is very valuable.
- Share it with technical co-workers, and try to apply with the concept to our present project.
- Share it with officemates and colleagues
- Apply to exploration works
- I will apply the interesting knowledge in my work.
- The knowledge learned can be applied to fractured limestone
- In exploration and development oil field
- It is a new high technology in our region.
- Very important and full of relevant info.
- There is always any other vision instead of conventional / conservative methods.

15) Comments on the food, accommodation and the venue for the seminar?

- Food is very good. Accommodation and venue is very good located in the middle of town. Puppet show was very good.
- Everything is good.

16) Suggestion of topics to other topics of ICB activity.

- Sequence stratigraphy
- Reserve estimation – GEOX
- Fractured limestones/carbonates
- Petroleum system analysis
- Basement exploration and challenges.
- Carbonate fractured reservoir

- Significance of fault for trapping hydrocarbon.
- Apply height technique in geology study.
- How to increase oil recovery factor.
- Gas filed production seminar
- Basin modeling or hydrocarbon entraped process modeling
- Other topics related to the fractured basement
- Marginal development
- Not normal (not common), data / phenomena / operation
- New technology applies in E&P
- Facilities applied on E&P
- CCOP should one more seminar about offshore basement
- Deep sea exploration