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SOCIETY OF PETROLEUM ENGINEERS

# SPE NEWS

COPENHAGEN SECTION

## CONTENT



*Enhanced Oil Recovery*

## ENHANCED OIL RECOVERY

At our last meeting, we had an excellent presentation on the massive scale of LNG projects and some of the technical challenges that have to be overcome in these projects. After the dinner, Morten Norderud-Poulsen from Maersk Drilling showed us how big and advanced the new generation jack-up drilling rigs are. I want to thank Shell for sponsoring the meeting and the excellent dinner for 75 people.

The topic at our next meeting is a case story from a mature field in Papua New Guinea. Dr. Neil Williams will tells us how a review of production performance and well data led to a revised structural interpretation. This led to identification of drilling targets in regions which where thought to have been swept by water. We also have an after dinner speaker from TecWell who will tell us about the Ultrasound Well Scanner.

Let me also bring your attention to two extra events. At our next meeting, we have a pre-session from 16.00 - 17.00, where Dr. Neil Williams will present a case story on how incorrect core measurement techniques led to an overestimation of the enhanced oil recovery potential. We have also organized a special event on April 23rd, where Niels Springer will give a one day course on core analysis techniques. For both events, please read more inside the Newsletter. Inside the Newsletter, you will also see who won this years student scholarship on DKK 12,000.

Lastly, let me remind you that we will be electing a new board at our annual meeting in May. We will, amongst others, need a new chairman and a new Newsletter chairman. Please let us know if you or any of your colleagues are interested.

I hope to see many of you at our next meeting on March 10th at Moltkes Palæ at 16.00, if you attend the pre-session, otherwise for drinks at 17.00. Please sign up.

**Per Bak, Section Chairman**

## FUTURE MEETINGS

FOR MORE INFORMATION REGARDING THE PROGRAMME SEE PAGES 4-5

SPE

COPENHAGEN SECTION

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**2008-2009 SEASON**


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# SHORT COURSE IN CORE ANALYSIS

*Short course*

23 APRIL 2009

## Biography

Niels Springer is senior geological adviser and head of the core laboratory at the Geological Survey of Denmark and Greenland (GEUS). Since joining GEUS in 1984 he has worked in experimental petrophysics with focus on the North Sea chalk and sandstone fields, disposal of CO2 in aquifers and oilfields and the integrety of caprocks in relation to disposal of CO2 . He has participated in many research programmes and been involved in a large number of service projects for the industry. NS is a 25 year member of SPE and lifetime member of Society of Core Analysts. NS holds a cand. scient. (MSc) degree in geology from U. of Copenhagen.

## The topics covered in this short course are as follows:

*CCAL methods (Conventional Core AnaLysis) will include:*

- Coring and preservation
- Planning a plugging and testing programme
- Core gamma and density scanning
- Poro-perm measurements
- Fluid saturation and core photo
- Quality assurance of data and what can go wrong, how to use hot-shot data.
- What is CCAL data used for with examples from the North Sea chalk and sandstone fields

*SCAL methods (Special Core AnaLysis) will include:*

- Screening of samples for SCAL using different imaging techniques (X-ray CT, NMR, SEM, AFM)
- Overburden measurements of porosity
- Permeability
- Electrical parameters (FRF, RI, m and n)
- Capillary pressure (mercury injection, porous plate, centrifuge and NMR), wettability and caprock testing
- What can go wrong and how to check the quality
- Petrophysical models with examples form the North Sea chalk and sandstone fields

**Who should attend?**

The short course is directed towards the young professional that would like to know about the fundamentals of core analysis, but even the more experienced petrophysicist will benefit from participating.

**23 April 2009**
GeoCenter Denmark
Øster Voldgade 10
1350 København K
08:45 – 16:30
Price: Free

Register to: Susanne.Poulsen@maerskoil.com
The participants should bring a pocket calculator (or PC) for worked examples – coffee and lunch is included.
*We can only accomodate 50 participants. First come, first served.*

A STORY FROM THIS MONTH'S SPONSOR

# SOUTH ARNE TEAM SOLVES COSTLY PROBLEM WITH INGENUITY AND IMAGINATION

**If the water inlet in a washing machine leaks into the water outlet, you call a plumber who patches the leak. When the same thing happens 3,000 meters under the Danish North Sea, the job is more complicated.**

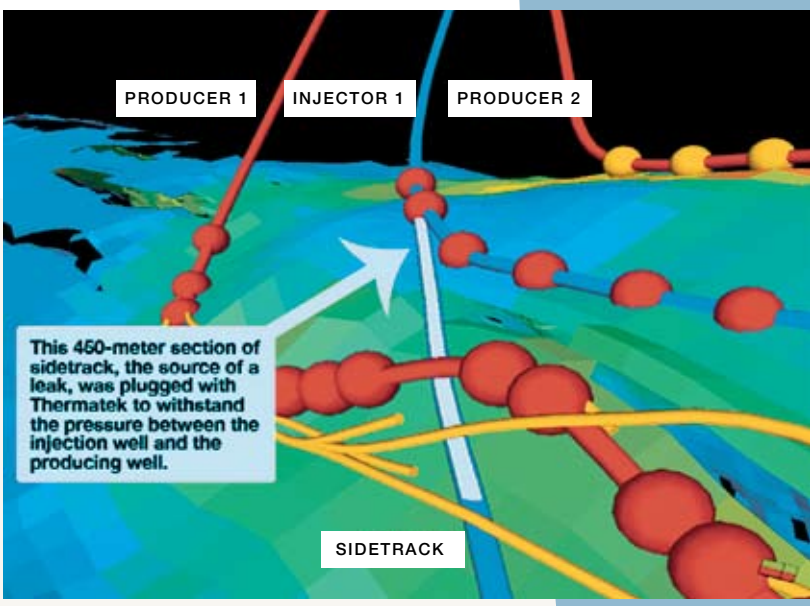
In the complex and challenging chalk reservoir of the Hess-operated South Arne field, two of the long horizontal wells drilled into the reservoir, one a producer 1 and the other a water injector 1, short-circuited, showing signs of leakage as early as 2002. High pressure water from the injector 1 flowed directly into the producer 1 well, killing oil production.

The solution would require new technology, a collaborative effort and some intelligent risk to return the wells to full operation. If the team could solve the problem without re-drilling, it could save a lot of money.

The story began back in 2000 when the injector 1 well was drilled and included a redundant sidetrack section that was shut-off with a traditional cement/concrete plug. Two years later, the producer 1 was drilled along a parallel track converging to within 300 meters of the injector. Early pressure data indicated that a problem was brewing.

There was some temporary relief from the use of advanced isolation systems that had been built into the producer 1. These doors that can be opened and closed to expose or shut off sections of the reservoir worked briefly, but water under pressure broke through the concrete surrounding the steel lining of the production well and oil production ceased.

In 2004, the reservoir team at Hess looked to see which products were on the market to provide a permanent fix. The team homed in on Thermatek, a Halliburton filler material, which can be mixed to set at a particular temperature. The product was relatively new and carried 25 case histories in the North Sea. Nevertheless, it had only been used to deal with small problems, such as casing leaks, and never in the volume or circumstances needed to isolate a full sidetrack well.




Tracer tests established that the water was following a single path between the wells. Logging tools in the well provided information about pressure, and more importantly, the temperature gradient along the sidetrack.

The Thermatek set within a minute, leaving a solid plug that stretches 450 meters back along the sidetrack section. "It was like an accelerating train hitting the brakes and coming to a halt exactly in the right place". It is holding up well and withstanding the pressure between the injector 1 and the producer 1.

As the well cleans up, production is being increased slowly and is expected to peak at 2,000 barrels of oil per day.

# MEETING SCHEDULE 2008-2009

| September 18 | MAIN SPEAKER | AFTER DINNER |
|---|---|---|
| TOPIC | **Intervention Strategies for Production Enhancement** | |
| SPEAKER | John Haukvik | |
| LOCATION | Welltec, Gydevang 25, 3450 Allerød | |
| SPONSOR | Welltec | |
| **October 23** | **MAIN SPEAKER** | **AFTER DINNER** |
| TOPIC | **The Growing Demand for Oil and Natural Gas and the Related Global Warming Issues** | |
| SPEAKER | SPE-DL George J Stosur | |
| LOCATION | Hotel Adina, Amerika Plads 7, 2100 København Ø | |
| SPONSOR | Chevron | |
| **December 4** | **MAIN SPEAKER** | **DINNER SPEAKER** |
| TOPIC | **Hydrocarbon potential in East Greenland** | |
| SPEAKER | Jørgen Bojesen-Koefoed, Flemming Getreuer Christiansen | |
| LOCATION | GEUS, Øster Voldgade 10, 1350 København K | |
| SPONSOR | GEUS | |
| **January 13** | **MAIN SPEAKER** | **DINNER SPEAKER** |
| TOPIC | **Hejre development – Uncertainty analysis using experimental design techniques** | Wind energy in DONG Energy |
| SPEAKER | Jesper Werner Christensen | |
| LOCATION | DONG Energy, Nesa Allé 1, 2820 Gentofte | |
| SPONSOR | DONG Energy | |
| **February 11** | **MAIN SPEAKER** | **DINNER SPEAKER** |
| TOPIC | **LNG – Roaring Ahead – Where Will it End?** | Maersk Drilling: Maersk High Efficiency Rigs |
| SPEAKER | SPE-DL John Morgan, John M. Campbell & Company | |
| LOCATION | Moltkes Palæ, Dronningens Tværgade 2 , 1302 København K | |
| SPONSOR | Shell E & P | |
| **March 10** | **MAIN SPEAKER** | **DINNER SPEAKER** |
| TOPIC | **Mature Fields: Keep Revisiting the Fundamentals New Technology** | TecWel: The ultrasound Well Scanner |
| SPEAKER | SPE-DL Dr. Neil Williams, Oil Search Limited - Tecwel, Chris Nussbaum | |
| LOCATION | Moltkes Palæ, Dronningens Tværgade 2 , 1302 København K | |
| SPONSOR | HESS | |
| **April 16** | **MAIN SPEAKER** | **DINNER SPEAKER** |
| TOPIC | **Gas hydrates in flow assurance: Controlling hydrates at arctic conditions and evaluation of new green inhibitors** | "Opal not only for fun" by Ida L. Fabricius |
| SPEAKER | Nicolas von Solms & Lars Jensen | |
| LOCATION | | |
| SPONSOR | DTU | |
| **May 19** | **MAIN SPEAKER** | **ANNUAL MEETING** |
| TOPIC | **Halfdan Northeast: Development of tight gas with dual lateral wells** | |
| SPEAKER | | |
| LOCATION | Mærsk Olie og Gas AS, Esplanaden 50, 1263 København K | |
| SPONSOR | Mærsk Olie og Gas AS | |
| **June 19** | **MAIN SPEAKER** | **DINNER SPEAKER** |
| TOPIC | **Summer party** | |
| SPEAKER | | |
| LOCATION | | |
| SPONSOR | Schlumberger | |

# Scholarship

The 2008 SPE student scholarship has been awarded to Gulraiz Khan who graduates from Aalborg University in Esbjerg in April 2009 with a Master degree in oil and gas technology.

The main interest of Gulraiz is EOR. Before the Master thesis work, Gulraiz worked with microbial EOR trying to find the cheapest and most suitable microbes to maximize hydrocarbon recovery. The current Master thesis work is on $CO_2$ injection.

The SPE board hereby congratulates Gulraiz on his fine academic achievements and wishes him all the best in his future career.

## Do you want to be part of the SPE board?

On the annual general meeting in May 2009 we will as always elect new board members.

If you are interested in joining the board, do not hesitate to contact one of the present board members.

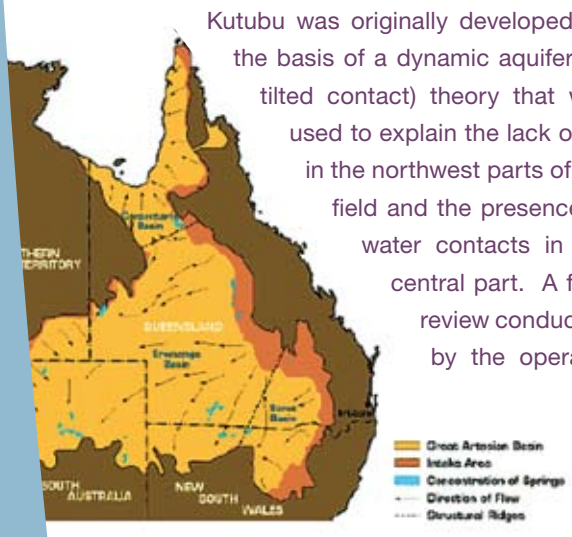
*Abstract*

MATURE FIELDS:

# KEEP REVISITING THE FUNDAMENTALS

Kutubu is Papua New Guinea's largest oil field. It came on line in 1992 and achieved peak rates of over 130,000 stb/d in 1993 before decline commenced in 1994. Capacity was still 45,000 stb/d at the beginning of 1998 but Kutubu production rates declined rapidly and half the field capacity was lost during 1998 to 2000. It was beginning to look in 2001 as if the field would be completely shut in within a few more years.

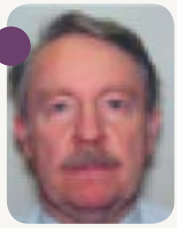
Kutubu was originally developed on the basis of a dynamic aquifer (or tilted contact) theory that was used to explain the lack of oil in the northwest parts of the field and the presence of water contacts in the central part. A field review conducted by the operator identified an alternate theory of compartmentalisation to explain the non-uniform oil column. As the alternate hypothesis was as good at explaining the early data and better at explaining some of the more recent performance, it was decided to abandon the original concept and test the new theory by drilling in areas the original concept would have predicted to be water swept. Drilling results were conclusive - there was oil and little or no water in the centre of the field. Consequently, the compartmentalisation theory opened up a series of opportunities in areas that were previously considered un-prospective due to the tilted contact concept. A follow up development campaign, along with other projects, has for four straight years completely halted the production decline. The field now appears to have a considerable remaining life of up to 2 decades.




The main conclusion is that we regularly need to go back to basics and establish whether or not our fundamental assumptions are supported by solid evidence.

*Speaker*

## BIOGRAPHY



### DR. NEIL WILLIAMS

*Oil Search Limited, Sydney, Australia*

Dr. Neil Williams is presently in charge of the reservoir engineering, geoscience, planning and development of New Guinea's largest oil field, the Kutubu Field, for Oil Search Limited.

Neil graduated with a BSc from Sydney University in 1969 with 1st Class Honours honours and the University Medal in Applied Mathematics. He then completed 3 post-graduate courses simultaneously including a PhD in fluid mechanics at the University of New South Wales. Neil joined Shell in Melbourne then transferred to their international staff with assignments in The Hague, the North Sea and London before returning to Australia with Exxon and later moving to Santos, Helix and Oil Search in various technical, supervisory and management roles. Neil has done or supervised the reservoir engineering for Australia's largest offshore oilfield Kingfish, Australia's largest onshore oilfield Jackson, and New Guinea's largest oilfield Kutubu. Neil's main interest is in mature field development and he has published on this subject as well as on EOR, petrophysics, SCAL and, prior to joining the oil industry, in physics and mathematics.

# EOR EVALUATION OF THIN OIL COLUMNS

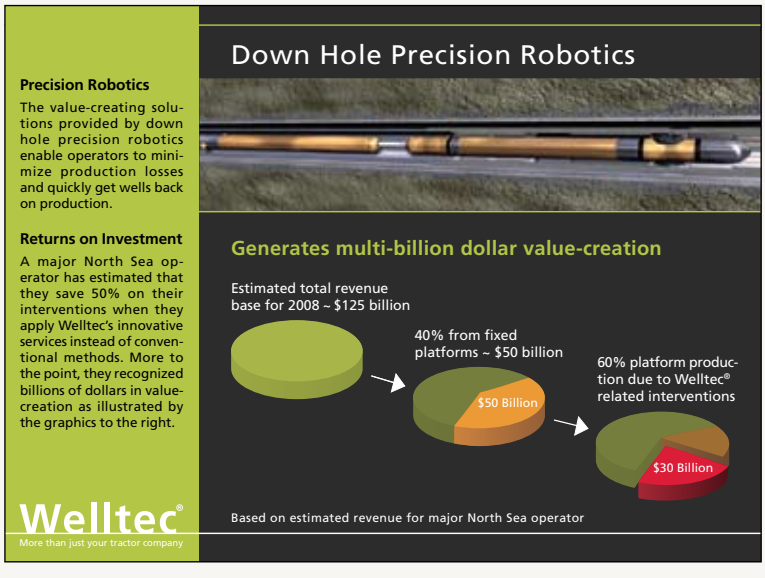
The Eromanga Basin in central Australia is Australia's main onshore oil province, consisting of a large number of thin good permeability reservoirs. This basin overlies the Cooper Basin, Australia's main onshore gas province, consisting of many thicker but low permeability gas reservoirs. Both basins often contain stacked reservoirs.

In the early 1990's a review of all the available special core analysis indicated that there was a lot of undrained oil in the Eromanga and so a team was established to evaluate the EOR potential of the entire basin. A multi-million dollar field trial was planned. Alas the target was an illusion created by incorrect (but used worldwide) laboratory procedures. The talk discusses how the mess was unravelled over a period of years and should enable the listener to see whether his reservoirs and SCAL may suffer from similar problems. The message is that EOR involves a huge amount of laboratory work and it is up to the customer to ensure that all that work is tailored to the needs of his reservoir.

**10 March 2009**
16:00-17:00
Moltkes Palæ,
Dronningens Tværgade 2,
1302 København K
No charge
RSVP: Natalie Chadud
XNACH@dongenergy.dk

TecWel

**AFTER DINNER PRESENTATION:**
**The Ultrasound Well Scanner by TecWel**




COPENHAGEN
**MARCH MEETING**
TUESDAY 10 MARCH 2009

**PROGRAMME**
16:00 – 17:00
EOR Evaluation of Thin oil Columns

17:00 – 18:00
Drinks

18:00 – 19:00
Presentation and SPE news

19:00
Dinner

**LOCATION**
Moltkes Palæ
Dronningens Tværgade 2
1302 Copenhagen K

**SPEAKER**
Neil Williams
SPE Distinguished Lecturer

**TOPIC**
Mature Fields:
Keep Revisiting the Fundamentals

**AFTER DINNER TOPIC:**
TecWel: The Ultrasound Well Scanner

**ENTRANCE FEE**
None

**REGISTRATION**
Please indicate your attendance
by Friday 6 March
by signing up on the internet:
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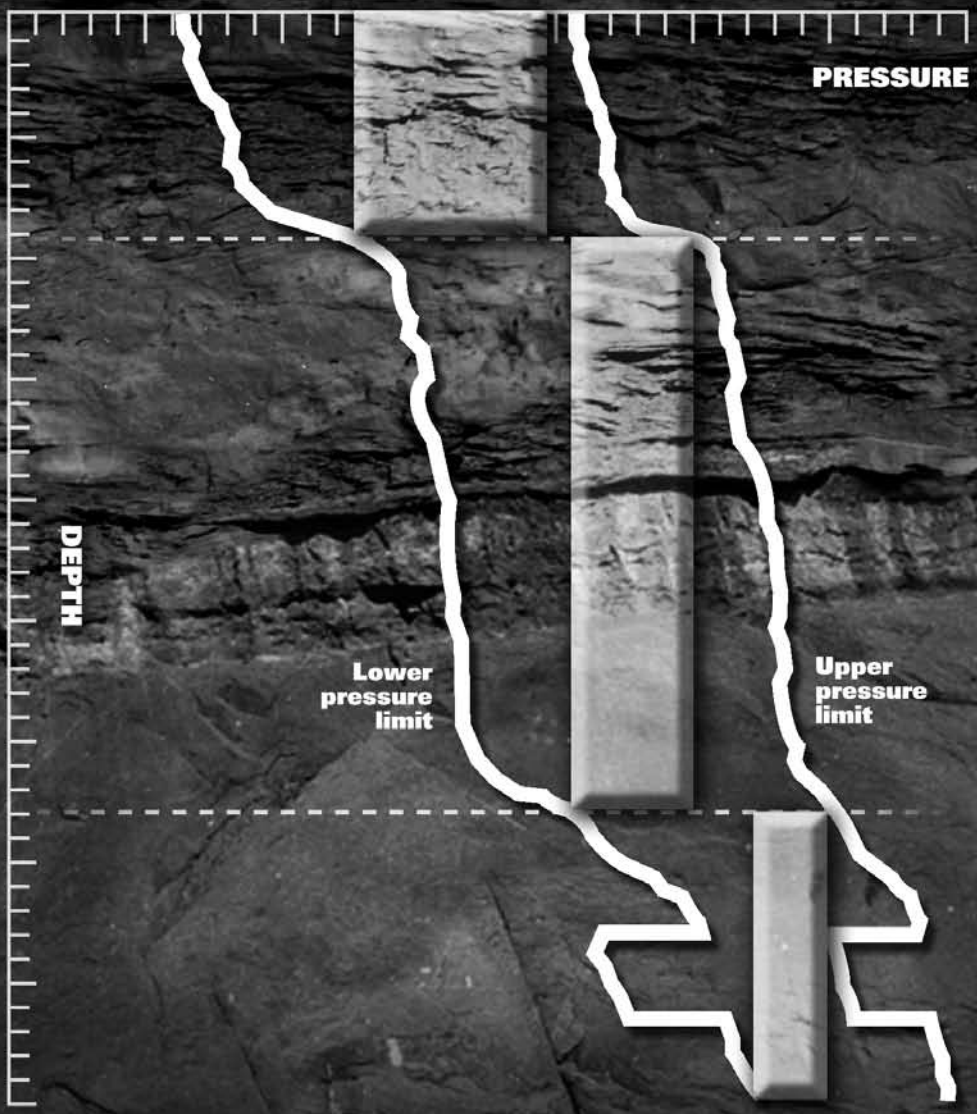


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