



SOCIETY OF PETROLEUM ENGINEERS
SPE NEWS
COPENHAGEN SECTION

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A FRESH START OF A NEW SEASON

Now that everyone has returned safe and well from their vacations I welcome all members back to the SPE this season and attend a great line-up of lectures, starting with a kick-off presentation on decommissioning of Shell's giant Brent field, in Charlottehaven.

Fall usually marks a new beginning and a fresh start, but this year there is considerable uncertainty on where our industry is heading. Oil price volatility is driving decisions affecting our industry's future and there is palpable nervousness among young and old professionals regarding the employment situation.

Despite this insecurity there is a silver lining to the current low oil price as its impact is beneficial to society on balance. What we are doing for others is quite extraordinary: our professional efforts help keep energy costs down, which is particularly relevant to the poor whose well being depends on affordable energy. After all worldwide oil demand is still growing as a result of people becoming more prosperous.

Only two hundred and fifty years ago most people in Europe lived in what is now regarded as extreme poverty. Life was harsh, short (35 years on average) and characterised by scarcity. But several industrial revolutions powered by coal, oil and gas have lifted the majority of people in the industrialised world out of poverty and ensured they are now living longer and healthier lives than at

any time before. Forty years ago almost nine in ten Chinese lived in extreme poverty; now just one in ten do. Then, just half of the world's population had access to safe water. Now, 90 per cent do, much of it thanks to affordable energy.

Concerns that the environment is being destroyed by our activities are waning. As developed nations became richer, they have become cleaner and greener. The quantity of oil spilled in our oceans has decreased by 99 percent since 1970. Forests are reappearing, even in emerging countries like India and China. And technology is helping to mitigate the effects of global warming.

So, on that optimistic note I would like to thank you and our Board members for supporting the SPE and wider society. Special thanks go to Anders Norman who has kindly passed the baton as chairman of the SPE Copenhagen Board after a very successful 2 years with record membership numbers. We have the pleasure of welcoming four new members to the Board: Duncan Healey (Chevron), Jacob Odgaard (Maersk Drilling), student rep Leonardo Meireles (DTU) and our new treasurer Miroslav Slapal (Schlumberger) and we also express thanks to departing Board members Jennifer McBeath (Chevron), Gregers Kudsk (Maersk Drilling), student rep Farhad Varzandeh and treasurer David Harrison (Schlumberger).

Looking forward to meet you all on the 22nd of September in Charlottehaven.

Hans Horikx

FUTURE MEETINGS

FOR MORE INFORMATION REGARDING THE PROGRAMME SEE PAGE 6

SPE

COPENHAGEN SECTION
THE BOARD · 2016-2017 SEASON

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Efficiency in of reduces opex:

(courtesy of NAM)

One year ago the award-winning 'Walk to Work' vessel **Kroonborg** began operations for the unmanned platforms in the southern North Sea.

The vessel supports the **Nederlandse Aardolie Maatschappij (NAM)** and **Shell UK** in their offshore operations in an efficient, safe and comfortable way. A look back at the first year of working with the **Kroonborg** follows.

Efficient deployment of personnel

With a length of almost 80 meters, the **Kroonborg** is not only a workshop and warehouse but also a hotel and a means of transport. It provides accommodation for 60 people, including 40 technicians that can 'walk to work' via a stable gangway connected to an advanced system able to compensate for the motion of waves of up to 3.5 meters high. Before the **Kroonborg** was brought into service, employees were transported by helicopter daily to work on the platforms, with the result that the average travel time per person per day was about 4 hours. And with adverse weather conditions like fog, high winds or frost, delays were commonplace. In the past year some 12,500 transfers of an employee offshore have been carried out using the **Kroonborg**. Working with the **Kroonborg** has thus increased the number of effective worked hours by approximately 30%.

Safe lifting of equipment

The motion-compensated crane on the **Kroonborg** has proved that equipment can be lifted safely when waves are up to 3 metres high. With its lifting capacity of 5 tonnes and reach of 32 metres, the replacement of wind tur-



offshore operations the Kroonborg story



biners and solar panels on 6 platforms has been possible, making it unnecessary to use the much more expensive jack-up vessels for these operations. In the past year nearly 1,000 lifting operations were performed safely.

A wide range of operations

Besides standard maintenance work, the Kroonborg is also being used for other operations. For a period of two weeks per year the vessel visits some 10 platforms for highly specialised maintenance, for example of radio equipment and weather stations. And last year, seven wells were successfully started up by injecting chemicals at high pressure. Using the mobile cold start-up equipment, the Kroonborg can now safely start up a well in a matter of hours, dispensing with the need to rig up a large unit on the platform. The high costs of the latter would make such operations uneconomic in some cases.

No incidents and few cases of seasickness

The unique design of Kroonborg's thrusters, which compensate for the ship's roll, results in very smooth sailing at sea and means that after their working day the 60 people on board can enjoy relaxing time off, which contributes to working safely at sea. The first year of operation has been incident-free on the Kroonborg itself and the platforms maintained by the vessel. And only one case of seasickness was registered.

More gas produced at reduced opex

Thanks to the effective maintenance that has been possible by deploying the Kroonborg, production from wells has increased and the availability of the installations has been safeguarded and in some cases improved. The deployment of the Kroonborg has led to considerable opex savings, including a reduction in personnel costs of some 40%.

The cleanest fuel: Shell GTL

People are the most important asset and make the difference, as we see on the Maintenance Support Vessel the Kroonborg every day. On the Kroonborg every element has been optimized, with specific attention to the welfare, to ensure that people can work efficient, safe and comfortable. And naturally you look at the fuel that powers the vessel.

In its first marine application the Kroonborg uses Shell GTL Fuel a natural gas derived liquid fuel, a much cleaner burning fuel than conventional diesel. Apart from the fact that is suitable for any diesel engine, it is much cleaner in the reduced emission of particulate matter (PM10) and nitrogen oxides (NOx) and reduced smell and engine noise. But the most important element is that GTL ensures that the people on board and on the platform are less exposed to emissions and smell and noise nuisances.



ABSTRACT

BRENT DECOMMISSIONING – NEXT STEPS

The Brent oil and gas field, lying north-east of the Shetland Islands, has been a cornerstone of the UK's hugely successful oil and gas industry for almost 40 years. It has created and sustained thousands of jobs, contributed billions of pounds in tax revenues, and provided the UK with a substantial amount of its oil and gas.

Now, after many years of service to the UK, the Brent field is reaching the stage where almost all the available reserves of oil and gas have been retrieved. The next step in the lifecycle is to retire or 'decommission' the Brent field's

four platforms and their related infrastructure. This will be a complex, major engineering project and will take over ten years to complete. It follows the decommissioning of other operators' platforms in the North Sea with some 40 programmes submitted to the government's Department of Energy and Climate Change (DECC) so far. This is the body that regulates the decommissioning of offshore oil and gas installations and pipelines in the UK.

Shell's Business Opportunity Manager Duncan Manning will share proposals for how the team plan to carry out this significant engineering operation.



COPENHAGEN MEETING

THURSDAY 22 SEPTEMBER 2016

SEPTEMBER

PROGRAMME

17:30 - 18:30

DRINKS

18:30 - 19:30

PRESENTATION AND SPE NEWS

19:30 - 21:00

DINNER

LOCATION

Charlottehaven
Hjørringgade 12C
2100 Copenhagen

SPEAKER

Duncan Manning
Shell

TOPIC

Brent Decommissioning
- Next steps

ENTRANCE FEE

None

REGISTRATION

Please indicate your attendance by
Monday 19 September
by signing up on the internet
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BIOGRAPHY



**Duncan Manning, Brent Decommissioning
Business Opportunity Manager, Shell**

Duncan Manning joined Shell Upstream International in 2013 after 19 years of service in the Royal Marine, retiring as a Lieutenant Colonel. A varied and successful career saw him fulfill a number of desk and leadership appointments as well as selection and attendance at the United States Marine Corps University for a year of study.

He completed three operational tours in Afghanistan and was responsible for planning and delivering a National level specialist response during the 2012 Olympic Games. In addition to a degree from the University of Aberdeen in Geography and International Relations, Duncan also holds a Master's degree (Distinguished Graduate) from the USMC University. He is a Fellow of the Chartered Management Institute where he is also qualified in Strategic Direction and Leadership.



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SPE MEETING SCHEDULE 2016-2017

September 22	MAIN SPEAKER	AFTER DINNER
TOPIC	Brent Decommissioning - Next steps	
SPEAKER	Duncan Manning, Shell	
LOCATION	Charlottehaven	
SPONSOR	Shell	
October 26	MAIN SPEAKER	AFTER DINNER
TOPIC	Human Factors in Barrier Thinking	Optimized well design for shallow reservoirs. <i>Speaker: Johnny Bårdsen, Welltec</i>
SPEAKER	Ronald McLeod (SPE DL)	
LOCATION	Welltec	
SPONSOR	Welltec	
November 23/24	MAIN SPEAKER	AFTER DINNER
TOPIC		
SPEAKER		
LOCATION	DTU	
SPONSOR	DTU	
January 25	MAIN SPEAKER	AFTER DINNER
TOPIC	How can Microfracturing Improve Reservoir Management?	
SPEAKER	Mayank Malk (SPE DL)	
LOCATION		
SPONSOR	Hess	
February	MAIN SPEAKER	AFTER DINNER
TOPIC		
SPEAKER		
LOCATION	Maersk	
SPONSOR	Maersk	
March	MAIN SPEAKER	AFTER DINNER
TOPIC		OPTION <i>Speaker: Stefan Glimberg, Lloyd's Register</i>
SPEAKER		
LOCATION	DONG	
SPONSOR	DONG	
April	MAIN SPEAKER	AFTER DINNER
TOPIC		
SPEAKER		
LOCATION	GEUS	
SPONSOR	GEUS	
May 23	MAIN SPEAKER	AFTER DINNER
TOPIC	Creating Value from Uncertainty and Flexibility	AGM
SPEAKER	Reidar B. Bratvold (SPE DL)	
LOCATION		
SPONSOR	Chevron	
June	MAIN SPEAKER	AFTER DINNER
TOPIC	SPE Summer party	
SPEAKER		
LOCATION		
SPONSOR	Schlumberger	

Later start,
see page 5



This is our backyard

Read more about DONG Energy Oil & Gas at dongenergy.com

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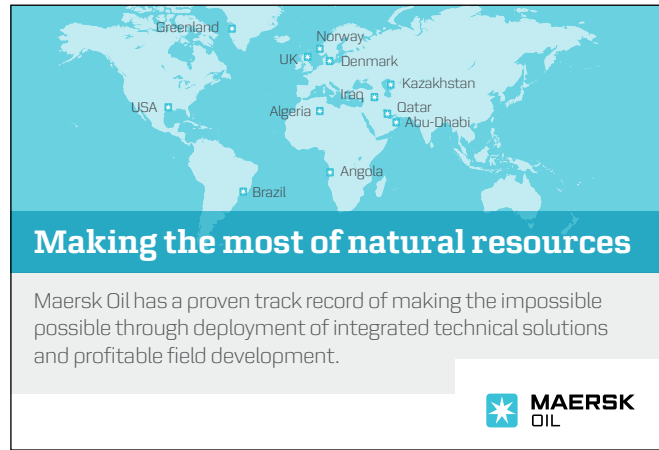
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SPE Esbjerg Section

SPE Esbjerg Section was established in November 2015. In the harsh economic situation in which we currently sit, we believe that it is of utmost importance that we as an industry come together and share ideas on how we can do things better. The SPE meetings are a fantastic forum in which to do this, where people do not only attend a technical discussion, but also socialize and meet other colleagues during the meeting itself, the pre-meeting mixer and the post meeting dinner. In the current cost climate, when the possibilities of attending training courses and/or conferences are limited, having the option of attending locally a few events every year can be extremely useful.

SPE Esbjerg Chapter collaborates with Copenhagen Section. Engineers from Copenhagen will be invited to Esbjerg for the events.

For more information please contact us:
EsbjergSection@spemail.org

You can visit our webpage:
<http://connect.spe.org/esbjergsection/home>

October 4	Performance Drilling Expectations, Perceptions, and Path Forward – Turning Challenges Into Opportunities	Graham Mensa-Wilmot
November 16	The Digital Oilfield – Collaborative Working at Global Scale	Frans VandenBerg
May 15	Your Field is Getting Older: Is your Process Engineering Still Cost Effective?	Wally Georgie



NO CEMENT? NO PROBLEM!

Maintaining well integrity is often perceived as being relatively simple. Unfortunately this belief could not be further from the truth. Many studies and reports have covered the extent to which operators suffer from issues on a global basis with an average of 38% of wells historically being impacted, a considerable challenge for the industry to overcome.

Proper well integrity is a process, one that begins with the design phase and does not end until the well is permanently abandoned in accordance with the appropriate regulations of the governing bodies. Without complete attention to the entire design, leak paths may occur, sometimes leading to catastrophic harm to individuals, assets and the environment. These in turn can result in loss of profitability, reputation and even a company's license to operate.

No cement, no problem

Well construction relies heavily upon cement to provide the primary barrier for well integrity. But more and more frequently cement is being demonstrated to have challenges; both in the short term when trying to overcome geological aspects such as depleted zones, water zones, extended reach wells, etc. and also in consideration of more enduring aspects, such as being a permanent barrier over the 20 - 30 year life of the well. It can fail, resulting in fluid paths occurring, which is not necessarily a catastrophic event. Proper planning should incorporate either the installation of redundant barriers to the cement or a design providing sufficient well integrity without it.

One way to easily overcome these challenges is with technology referred to as well annular barriers (WABs). The latest WAB is a metal expandable barrier which can be run on the outside of the pipe. Once on depth, it is expanded using hydraulic pressure from surface. As it expands, it conforms to the open hole or the inside of the next casing string around it, creating an annular barrier which prevents the flow of fluids past it.

Multiple WABs can be installed on the same string of pipe and inflated simultaneously at various depths, each forming an annular barrier for improved well integrity.

Because of its rugged design, it can be rotated during installation. This feature, integrated with its full bore design and high tolerance to temperature and corrosion, combines to create a technology that has many applications for improving well integrity. Several of these examples are described hereafter in different applications performed around the globe.

Ensuring well integrity

Operators continue to explore new approaches to an old problem; ensuring well integrity during well construction. New technology in the form of the well annular barrier (WAB) has been gaining momentum as a solution over the past few years, offering a way to overcome the challenges of SCP/SAP, provide barriers in open hole, even replace cement in well completions. The advantages of not having to rely solely upon cement as the primary barrier for well construction includes increased safety as well as reduced costs for the operator.

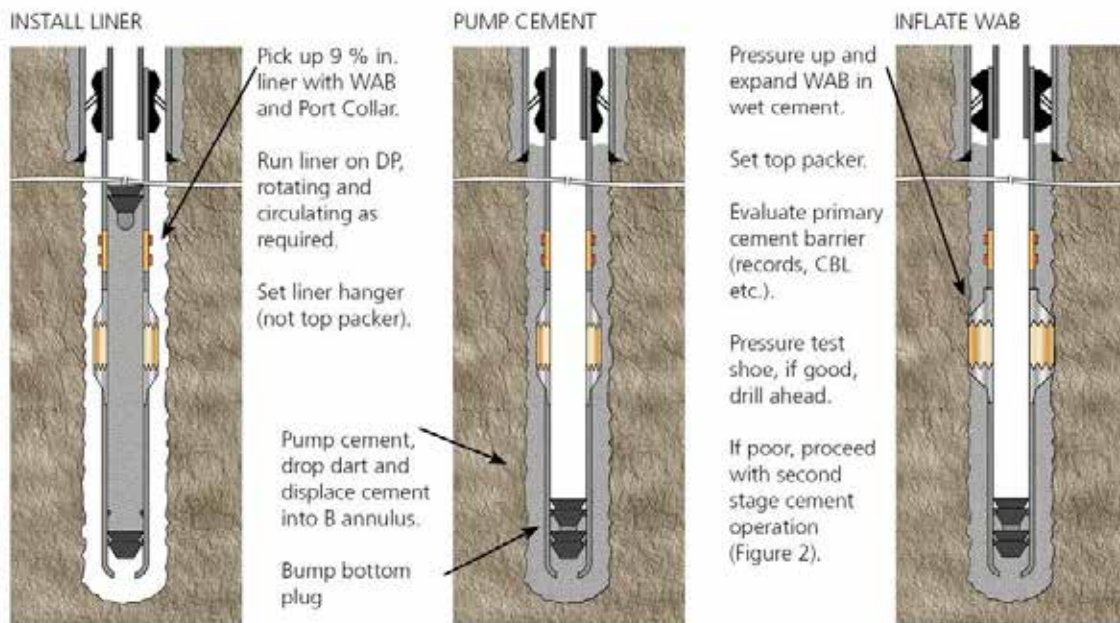


Figure 1: Cement assurance with the WAB, good cement example

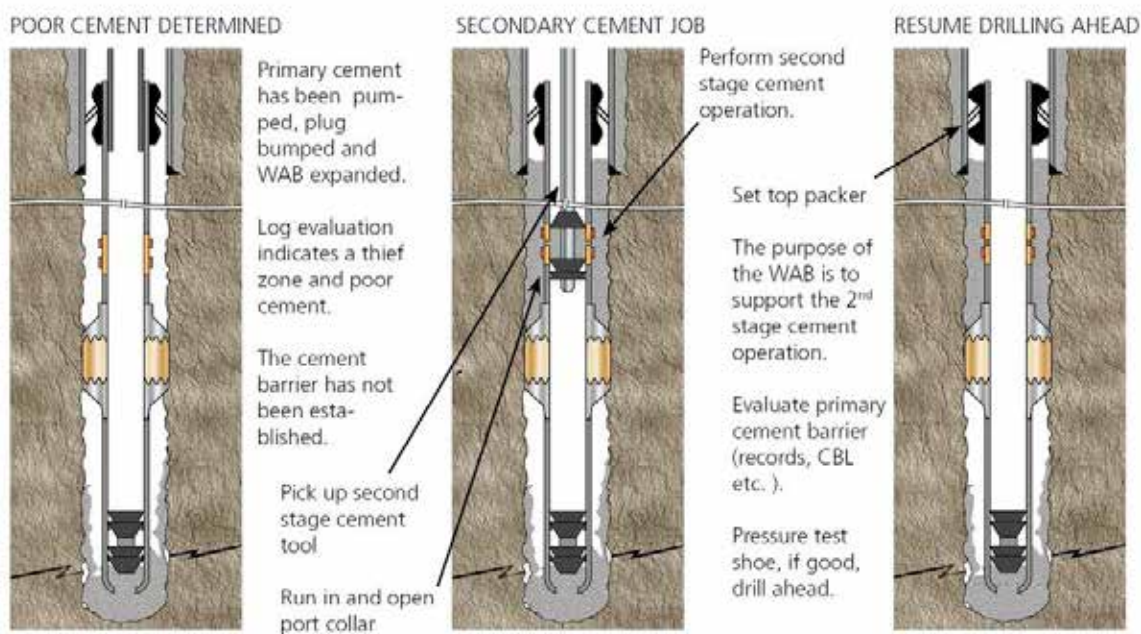


Figure 2: Cement assurance with the WAB, poor cement example

For more information about well integrity go to welltec.com/solutions/well-integrity/



ABSTRACT

HUMAN FACTORS IN BARRIER THINKING

The oil and gas industry places great reliance on layers of defenses, or barrier thinking, to protect against process safety incidents. Human performance continues to be the single most widely relied on barrier, whether as a defense in its own right, or in implementing, inspecting, maintaining, and supporting engineered defenses. Human error, in its many forms, also continues to be a significant threat to the reliability of engineered and organizational defenses. While approaches to developing and assuring layers-of-defenses strategies have become increasingly formalized and rigorous in recent years,

many organizations struggle to know how to ensure that the human defenses they rely on are as robust as they reasonably can be when those strategies are developed and implemented. Drawing on the 2005 explosion and fire at the Buncefield (UK) fuel storage site as a case study, the presentation considers issues associated with the independence and effectiveness of human defenses. The key idea SPE members should take away from the lecture is that organizations can improve the strength of their human defenses by being clearer about exactly what it is they expect and intend of human performance to protect against threats.

BIOGRAPHY



Ron McLeod, professor of engineering psychology at Heriot-Watt University

Ron McLeod is honorary professor of engineering psychology at Heriot-Watt University. He has more than 30 years' experience as a human factors specialist and was Shell's global discipline lead for human factors until March 2014. McLeod has been active in organizations including the UK National Advisory Committee on Human Factors, the Process Safety Lead-

ership Group, the International Association of Oil and Gas Producers, SPE, and the Chartered Institute of Ergonomics and Human Factors. He has published in scientific journals and has authored or contributed to numerous technical standards and best-practice guides. McLeod's first book, *Designing for Human Reliability: Human Factors Engineering in the Oil, Gas, and Process Industries*, was published by Elsevier in 2015. He holds a BSc degree in psychology, an MSc degree in ergonomics, and a PhD in engineering and applied science.

ABSTRACT

OPTIMIZED WELL DESIGN FOR SHALLOW RESERVOIRS

A horizontal appraisal well targeting a very shallow reservoir was drilled by a Barents Sea operator. The top of the reservoir is only 260 m below the sea bed and the water depth at the site is only 402 meters. It is expected that this is a low temperature, 18°C, oil reservoir. Completing the well poses a number of challenges. First, several faults exist through the reservoir interval, potentially causing issues with proper cement placement. Second, to land the well in the pay zone, the well was required to be kicked off from the vertical in the 26" section with a dog-leg severity (DLS) of up to 9 deg/30m.

Third, casing wear in the 9 5/8" section resulting from the high DLS can be a challenge, potentially compromising the sealing area of the liner hanger. And finally, the available down-weight for setting a conventional liner hanger packer is limited due to the geometry of the well.

The operator has evaluated a number of different design concepts to identify a robust solution and address the aforementioned challenges. After careful consideration, a solution based on Welltec® annular barrier (WAB®) packers mounted on 7" liner was found to provide the best result. The WAB® is utilized to provide zonal isolation in the reservoir and in addition to act as the liner ►

ABSTRACT.....

hanger inside the 9 5/8" casing. The decision was based on three primary aspects; the ability to run and seal in the >9 deg/30 m DLS, the high axial loading capabilities of the WAB® and a rugged design that allows for working the liner to TD.

The WAB® annular casing packers and WAB® liner hanger are set simultaneously by applying hydraulic pressure from surface. No down-weight is required for setting the WAB® liner hanger system.

A 9 5/8" version of the WAB® for cement assurance in the 12 1/4" hole will be run and set inside the 13 3/8" casing for well integrity purpose addressing any potential SCP challenges.

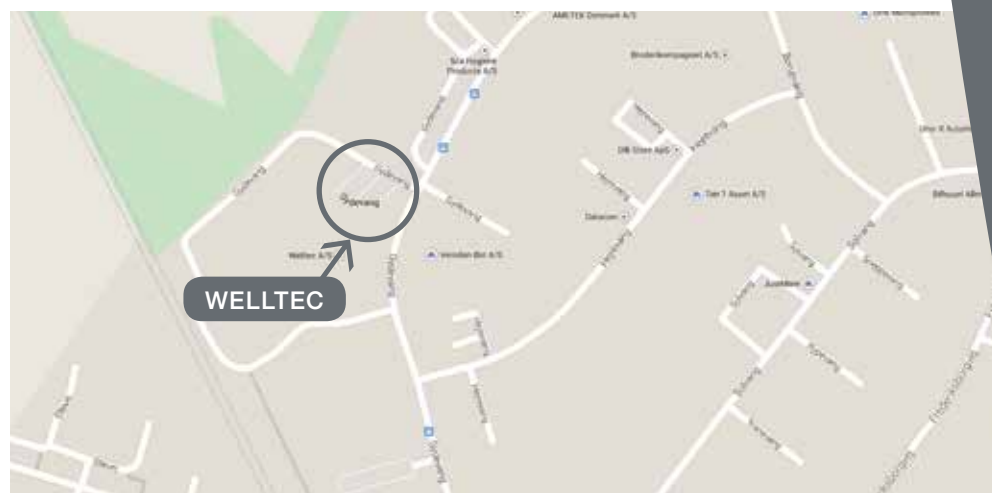


BIOGRAPHY.....



Johnny Bårdsen, Sales Director in the Well Completion group in Scandinavia at Welltec®

With an academic degree of Technical Certificate and Oil field and after that more than 20 years of Well Intervention/Completion experience in supervisor and management positions he joined Welltec in 2012 for the establishing of Well Completions as a progressive new business stream globally. Undertaken the role as Chairman of SPE Stavanger section from Aug 2015.



C O P E N H A G E N
M E E T I N G
W E D E N S D A Y 2 6 O C T O B E R 2 0 1 6

OCTOBER

PROGRAMME

17:00 - 18:00

DRINKS

18:00 - 19:00

PRESENTATION AND SPE NEWS

19:00 - 21:00

DINNER

LOCATION

Welltec

Gydevang 25, 3450 Lillerød

SPEAKER

Ronald McLeod

SPE DL

TOPIC

Human Factors in
Barrier Thinking

AFTER DINNER SPEAKER

Johnny Bårdsen

Welltec

TOPIC

Optimized well design for shallow
reservoirs

ENTRANCE FEE

None

REGISTRATION

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