



SOCIETY OF PETROLEUM ENGINEERS

# SPE NEWS

COPENHAGEN SECTION

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## Welcome to a new season in

# THE SPE COPENHAGEN SECTION

The 2010-2011 program is taking form, and we have a series of interesting topics lined up. I am really looking forward to the coming season, and I hope that we can maintain the high number of attendees we have had the last years.

In fact, we already started this season in August, when DTU hosted the SPE EOR Seminar for more than 80 people. I found the event very successful and interesting. First, Anne Høier Simonsen, Deputy General Director from DEA, gave DEA's view on EOR in the Danish North Sea, and she was preceded by 3 operating company representatives: Maersk Oil, DONG E&P and ConocoPhillips, Norway BU.

All three speakers recognised a significant EOR potential with CO<sub>2</sub> injection, but a number of technical challenges still need to be solved. It also appeared from the presentations that the largest obstacle for a CO<sub>2</sub>EOR adventure in the North Sea is the financial side. It appears that the cost of capturing, transporting, and injecting the CO<sub>2</sub> is too high to make a positive business case for a full scale field development.

The afternoon was split into 2 sessions. First, the researchers from GEUS, DTU and GEO, representing the Research Partners in the Danish National Advanced Technology Foundation project, gave technical presentations on their work on

CO<sub>2</sub>EOR. Apart from indicating a significant potential of CO<sub>2</sub>EOR in chalk, the session really highlighted the importance of maintaining and building a strong E&P related research community. Second, Omer Gupinar, Schlumberger, gave an overview of EOR around the globe, and he ended by asking for more innovation on the EOR scene. The seminar ended with a panel discussion, where the audience had a chance to ask questions to the speakers of the day.

Our meeting in October is kindly sponsored by Chevron. We will welcome our first SPE Distinguished Lecturer of the season, Steve Begg, who will talk about Reliability of Expert Judgements and Uncertainty Assessments. The after dinner speaker, Jørgen Hallundbæk from Wellttec, will take the Step from IOR to EOR.

In November, SHELL is our sponsor for the meeting. Mike Kramer will give a presentation on Maturing E&P portfolio and preparing us for new challenges. As an after dinner talk, Tim Erdmann will discuss Geothermal Energy.

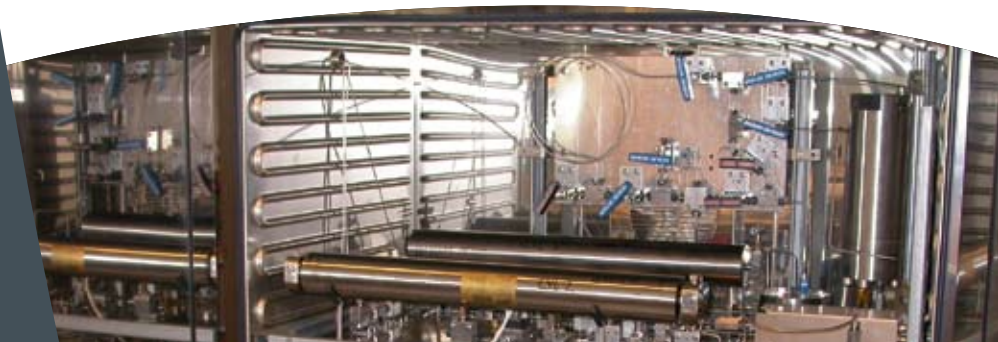
Please join us on the 25 October and the 16 November.

Finally I will take the opportunity to thank both Felicity Boyd and Gerwyn Williams. Felicity for kindly taking over the Chairman role when David Walsh was relocated to Aberdeen, and Gerwyn, who is leaving the country in the closest future, for his appreciated role as secretary for the Board.

**Morten G. Stage, Section Chairman** ◀

## FUTURE MEETINGS

FOR MORE INFORMATION  
REGARDING THE PROGRAMME  
SEE PAGE 6



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# MOVING IN THE



The maximisation of ultimate recovery from existing North Sea fields is of ever increasing importance in the mature operating environment of the United Kingdom Continental Shelf (UKCS). Over the last few years, technological developments in reservoir management, drilling and completions and production practices have been focussed towards these efforts.

Chevron's Captain Field in the UKCS presents a typical challenge where remaining hydrocarbon target opportunities are becoming smaller and more technologically demanding. Production from Captain started in 1997 and the current development comprises of two fixed platforms with platform and subsea wells and a Floating, Production, Storage and Offloading (FPSO) vessel for oil export. Captain comprises of Lower Cretaceous turbidite sands where development requires extended reach horizontal production and injection wells. One of the main uncertainties in the field is the topography of the top reservoir (Upper Captain Sand) surface which dictates that wells need to be drilled to maximise 'attic oil'.

The challenge to drill close to the 'roof' has required technology developments to aid in well positioning. In 2009, during a development drilling campaign, reservoir navigation using deep azimuthal resistivity and geo-steering techniques was key to unlocking the potential of Captain's 'attic oil'. This was achieved by minimising the distance between the wellbore and top reservoir surface.

The recent developments in azimuthal resistivity tools provided a step change in reservoir navigation capabilities with respect to wellbore placement. The rugose topography of the top Upper Captain Sand required a fully interactive approach to wellbore placement to successfully reach drilling targets. Previous geo-steered wells required depth corrections to avoid the risk of reservoir exit which could lead to sub-optimal well placement. The ability to detect approaching reservoir boundaries and to understand their

# RIGHT DIRECTION



Chevron's Captain field  
in the UKCS



3D spatial relationship led to increased confidence in azimuthal steering decisions.

This directional drilling challenge required new technology to provide accurate azimuthal distance-to-bed readings to support real-time modelling and multi-disciplinary decision making. The ability to represent these complex 3D environments with intuitive interactive 2D distance-to-bed displays simplified the decision making processes, improved operational efficiencies and above all maximised hydrocarbon recovery.

This example of productive collaboration between operator and vendor has delivered superior value over traditional methods. Previous SPE publications have commented that the easiest 'new oil' is to be found in old fields. Technological improvements fostered by collaborative partnerships, as highlighted by the Captain example, is a proven method to help in unlocking the remaining resources of mature hydrocarbon regions such as the UKCS. ◀

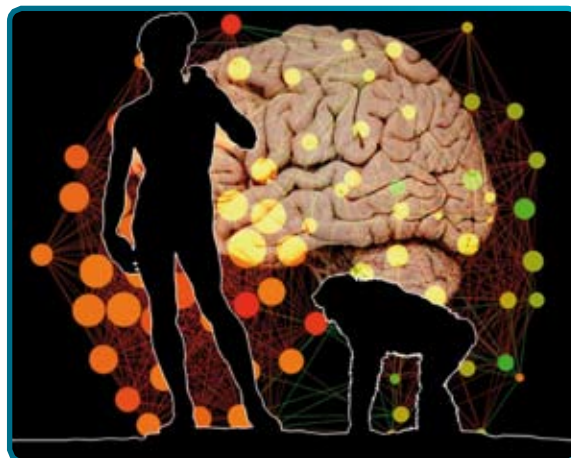


# RELIABILITY OF EXPERT JUDGMENTS AND UNCERTAINTY ASSESSMENTS

One idea I would like members to take away: human factors are big contributors to poor uncertainty assessments, and thus decisions - perhaps more than technical issues.

Formal decision-making tools (e.g. probability theory, EMV, Monte Carlo simulation, decision trees, etc) require the elicitation of expert opinions and uncertainty assessments. But our heads are just not wired for uncertainty. Years of behavioral research on how people deal with

uncertainty and its consequences reveal a variety of cognitive biases leading to error-prone heuristics. Inappropriate attitudes towards risk are major value destroyers and the way most organizations assess people's performance tends to exacerbate these undesirable effects!



The lecture will start by exposing a common misunderstanding about the true nature of uncertainty – the fact that it is in our heads, not in the systems we deal with. This has profound implications for uncertainty assessment. Clarification of this mis-conception, combined with a decision-driven focus, can free experts to express their knowledge with greater integrity and lead to more of a value-creation mind-set.

Outcomes of recent research on the presence and impact of heuristics & biases, specifically within oil and gas industry, will be reviewed. This research was motivated by criticism that the general research results would not apply to experts dealing with their own subject matter. The results suggest otherwise.

A cognitive-science perspective can offer practical suggestions on how to avoid them and thus lead to improved outcomes for individuals and corporations.

Although the topic is serious, the talk will be interactive, light-hearted and accessible to a broad audience. ◀

## BIOGRAPHY

Steve Begg, SPE DL



Steve Begg is a Professor in the Australian School of Petroleum where his teaching and research focus is on asset and portfolio investment decision-making under uncertainty. He spent 19 years in the oil and gas industry before joining academia in 2002. First as a reservoir characterization researcher with BP Research, then in a variety of senior engineering and geo-science roles with BP in Alaska. He spent 5 years with Landmark where his last role was Director of Strategic Planning and Decision Science. Steve frequently speaks at industry conferences and has published many papers on evaluation and decision-making. In 2002 he was an SPE Distinguished Lecturer on the topic "A new approach to investment decision-making" and in 2000 chaired an SPE Forum on related topics. He has chaired the SPE Forum Series, was instrumental in starting the new Economics and Management journal and has been a Technical Editor and Review Chairman. Steve holds a Ph.D. in Geophysics and a B.Sc. in Geological Geophysics from Reading University. ◀

# The Step from IOR to EOR

Why should prevailing drainage philosophies be challenged? There is an increasing awareness of the necessity to view hydrocarbon recovery in a more long term perspective, and in this context also to challenge the traditional drainage philosophies. Reservoir modeling is complex and includes so many parameters and assumptions that drainage optimization predictions become inherently uncertain. Data from the wells on the other hand provide reliable snap-shots of the conditions and used over time provide the perfect information for planning purposes. The recovery costs increase as production shifts to the tertiary phase. Postponing the need for this can be done by keeping the wells up to shape by removing scale, reducing water intrusion and other performance maintaining measures. Observing and operating with an adaptive approach is instrumental in capitalizing the value and realizing the actual potential. ◀



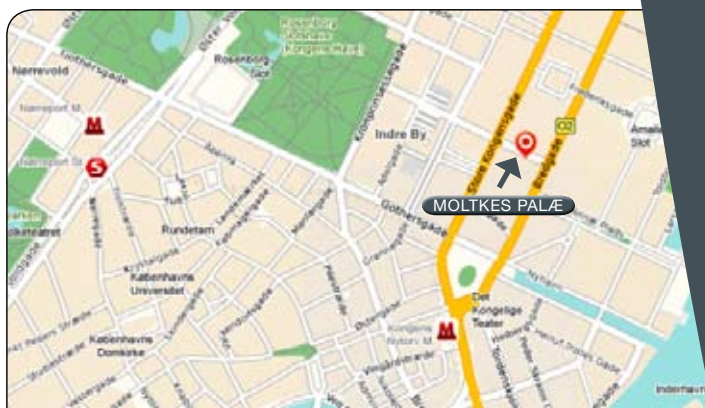
## BIOGRAPHY

### Jørgen Hallundbæk, Welltec



Jørgen Hallundbæk, founder and CEO, overall responsible for the management of Welltec. Spurred by work on 3D wave simulations for platform construction, slim hole drilling and geotechnical surveys, Mr. Hallundbæk founded Welltec in 1994 – materializing a vision that has transformed the way energy is produced. With great success, Mr. Hallundbæk has developed the business from a minor sub contractor into a direct contractor to the world's leading oil and gas companies. Mr. Hallundbæk still plays an active role in the development of new technology and has authored many SPE papers. The environment is prioritized highly by Mr. Hallundbæk, which is why he from the start has designed all Welltec's technologies around principles that safeguard the environment.

Mr. Hallundbæk holds an MSc in Engineering, Naval Architecture (1987) from the Technical University of Denmark. ◀



C O P E N H A G E N  
O C T O B E R  
M E E T I N G  
MONDAY 25 OCTOBER 2010

### PROGRAMME

17:00 - 18:00

Drinks

18:00 - 19:00

Presentation and SPE News

19:00 - 21:00

Dinner

### LOCATION

Moltkes Palæ

Dronningens Tværgade 2 A  
1302 København K

### SPEAKER

Steve Begg

SPE DL

### TOPIC

Reliability of Expert Judgments  
and Uncertainty Assessments

### DINNER SPEAKER

Jørgen Hallundbæk

Welltec

### TOPIC

The Step from IOR to EOR

### ENTRANCE FEE

None

### REGISTRATION

Please indicate your attendance  
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# MEETING SCHEDULE :2009-2010

<b>August 18</b>			MAIN SPEAKER	AFTER DINNER
TOPIC	<b>EOR Seminar</b>			
SPEAKER				
LOCATION	DTU			
SPONSOR	SPE			
<b>October 25</b>			MAIN SPEAKER	AFTER DINNER
TOPIC	<b>Reliability of Expert Judgments and Uncertainty Assessments</b>		The step from IOR to EOR	
SPEAKER	Steve Begg, SPE DL		Jørgen Hallundbæk	
LOCATION	Moltkes Palæ			
SPONSOR	Chevron			
<b>November 16</b>			MAIN SPEAKER	DINNER SPEAKER
TOPIC	<b>Maturing E&amp;P portfolio - Preparing for new challenges</b>		Geothermal	
SPEAKER	Mike Kramer, Shell		Tim Erdmann	
LOCATION	Moltkes Palæ			
SPONSOR	Shell			
<b>January 18</b>			MAIN SPEAKER	AFTER DINNER
TOPIC	<b>DONG E&amp;P's West of Shetland activities</b>		A possible "Green"	
SPEAKER	Mike Smith DONG E&P, UK		Hydrate Inhibitor	
LOCATION	DONG Energy			
SPONSOR	DONG Energy		Lars Jensen, DTU.	
<b>February 16</b>			MAIN SPEAKER	DINNER SPEAKER / DISCUSSION
TOPIC	<b>Annular Isolation</b>			
SPEAKER	Robert L. Dillenbeck III, SPE DL			
LOCATION	Maersk			
SPONSOR	Maersk			
<b>March tba</b>			MAIN SPEAKER	DINNER SPEAKER
TOPIC				
SPEAKER				
LOCATION	Welltec			
SPONSOR	Welltec			
<b>April tba</b>			MAIN SPEAKER	DINNER SPEAKER
TOPIC				
SPEAKER				
LOCATION	GEUS			
SPONSOR	GEUS			
<b>May 17</b>			MAIN SPEAKER	ANNUAL MEETING
TOPIC	<b>Intelligent Wells</b>			
SPEAKER	Younes Jalali, SPE DL			
LOCATION	Moltkes Palæ			
SPONSOR	HESS			
<b>June tba</b>			MAIN SPEAKER	DINNER SPEAKER
TOPIC	<b>SPE Summerparty</b>			
SPEAKER				
LOCATION				
SPONSOR				



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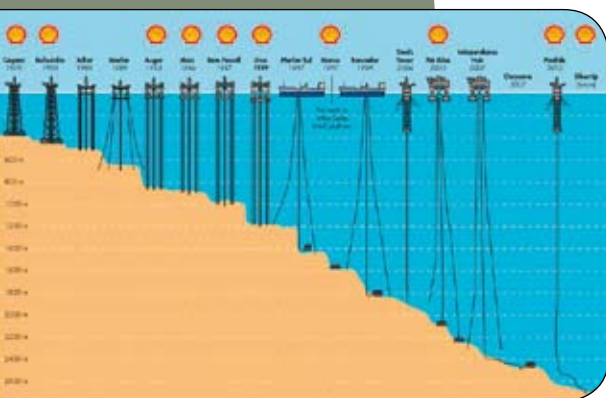


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# PARQUE DAS CONCHAS

## - A DEEP WATER SUCCESS



Shell has been a leader in deep-water exploration and production for 30 years. Parque das Conchas (BC-10) offshore Brazil is one of our most challenging deep-water projects. Shell has a 50% interest in the project and is the operator. Parque das Conchas (BC-10) lies in around 1,780 metres of water.

### Technology

Parque das Conchas (BC-10) represents a key milestone in the development and commercialisation of Brazil's offshore heavy oil. The three fields have been developed with subsea wells and manifolds, with each field tied back to a centrally located Floating Production Storage and Offloading (FPSO) vessel moored in around 1,780m of water. The development is the first of its kind based fully on subsea oil and gas separation and subsea pumping. The drilling programme uses floating-rig surface blow-out preventer well drilling and completions. The development includes the first application of steel tube hydraulic and multi-circuit high power umbilicals, which deliver power to 1,500-horsepower pumps on the sea floor. It is also the first application of lazy wave steel riser technology on a turreted FPSO. Initial

production is expected to reach ~60,000 kboe/d, with headroom in the FPSO design for additional growth from improved recovery or future discoveries.

### Environment and society

Social and environmental responsibility is a central pillar of Shell operations. In Brazil, Shell is the sole sponsor of the Humpback Whales Migration project in the South Atlantic Ocean since 2002. Findings have led to a better understanding of the whales' behaviour and in 2007 Shell renewed its sponsorship for another 5 years. At a more local level, Shell has focused on education and income generation, sponsoring several projects in the areas of aquaculture, fishing and handicrafts for communities within the area of influence of BC-10. In partnership with Brazilian NGO Gaia, Shell launched a development training programme for community leaders in 2007.

### Current developments

The heart of Parque das Conchas (BC-10) is the FPSO vessel Espirito Santo with 100,000 boe/day processing capacity. Built by SBM in Singapore, the FPSO was delivered to Brazil in late 2008 and moored in around 1,780 metres of water at the Parque das Conchas (BC-10) site in the Campos basin. The first phase of the project included the development of three fields tied back to the FPSO, via subsea wells and manifolds. The double-hulled FPSO's design required significant power and heat delivery systems needed to drive the seabed lift equipment and process the heavy crudes. The development wells were drilled by Global Santa Fe's Arctic 1. The fields came on-stream in July 2009. This first phase involved nine producing wells and one gas injector well. The second phase currently in planning will focus on the Argonauta O North field.

Contact [tim.newman@shellw.com](mailto:tim.newman@shellw.com) if you wish to receive the full article. ◀

First published at [www.shell.com](http://www.shell.com)

# SPE Student section news

## PETROCHALLENGE:

### Record number of participants

The PetroChallenge internet game for Danish gymnasium students has been organized by the DTU for the sixth time. The game is organized by the Center for Energy Resources Engineering (CERE), DTU. The responsible for organization of the game this year are Professor Erling H. Stenby and Ph.D. students Sara Bülow Sandersen and Peter Herslund.

This year a record large number of participants is expected. The game is carried out in more than thirty gymnasia, with, in total, more than thousand students, who obtain an opportunity to learn about petroleum production and may become interested in choosing the technical and petroleum engineering education in the future.

The game consists in the Internet competition between the teams of the students from the different gymnasia. The teams try finding the new petroleum reservoirs, exploring them and participating in the marketing/getting profit. The winning team is awarded by a money price.



This year, as the previous years, the game is sponsored by Mærsk Oil and DONG Energy.

The game consists of three rounds: the preparatory round for the teachers, the competition for the students, and the oil education day. The first round was carried out at the

DTU 1 October 2010. The competition is planned to be 10th and 11th of November, and the education day on 2nd of December.

### Visiting the DONG carton capture facility

The SPE Student Chapter, in collaboration with the Student Organization of the Department of Chemical Engineering, DTU, has organized a trip to the DONG power plant at Esbjerg, to learn about carbon capture processes at this plant. The trip, carried out at 4th of October, was sponsored by DONG Energy and the SPE Copenhagen Section. In total 25 students participated at the event. The number was limited by the capabilities of the site, and much more student exhibited the interest to the trip.



The trip started 8 AM from the DTU. After the shuttle bus has delivered the students to the site, they were offered by an extensive program, consisting of the presentations visit to the power plant. The students were introduced to DONG Energy AS, to Carbon Capture and Storage (CCS) technologies, and were shown with the DONG pilot plant for carbon capture. They were given an opportunity to talk to the specialists and ask relevant questions. ◀



## MATURING E&P PORTFOLIO

### – Preparing for new challenges

Everyone in the industry knows there is a growth, a plateau and a decline phase in the life of an oil or gas field. Despite this companies are often ill prepared to meet the challenges of the decline phase and are at best late to react. Managing mature asset operations is different from managing a growth portfolio. During the growth phase high levels of investments are spent discovering and maturing fields, drilling wells and building facilities. The name of the game is speed and managing huge uncertainties.

When the development opportunities diminish, production and more impor-

tantly revenues decline. To maintain profitability the focus of the operations need to shift from speed to efficiency. Well and reservoir surveillance, prevention of deferment and managing operating costs are promoted from secondary objectives to the core of the business. Uncertainties are less, but so is the allowable margin of error.

These efficiency objectives appear less attractive and with a natural resistance to change, companies pursue the growth model too long; “drilling yourself out of trouble”. Using examples from around the world a case will be made to show that the mature asset operations can be highly profitable and are just as exciting and stimulating as new developments. ◀

## BIOGRAPHY

### Mike Kramer, Shell



Mike Kramer holds a Petroleum Engineering degree from Delft University in Holland. He joined Shell in the late 80s as production technologist and has had assignments in Europe, the Far East, Middle East & South America.

Throughout his technical, commercial and managerial assignments he had the opportunity to participate in meeting the challenge of maturing assets. Learning is best done from mistakes and he has learnt a lot.

Mike has recently transferred to Copenhagen as Technical Manager of the Danish Shell team and is responsible for the Shell support of the DUC operations. He is accompanied by his wife and son and they have 2 daughters studying overseas. ◀

# GEO THERMAL

In today's world the field of renewable energy is expected to cover a substantial part of the future growth in energy demand, and geothermal resources currently offer the most constant and reliable form of energy supply in this arena. Specifically in Germany one of the drivers for the intense current focus on geothermal energy is driven by the CO<sub>2</sub> reduction goals set forth by the German government for 2020. The renewable energy industry is recognizing that highly sophisticated technologies the oil and gas sector has developed for exploration and production over the last 150 years can be transferred to geothermal applications.



Keeping in mind that geothermal projects often take several decades to become economically successful, the geothermal industry relies on experiences gained in the hydrocarbon industry. Cutting the costs for drilling and completion for geothermal projects is key for operators to make their projects more attractive. Although deploying today's advanced drilling systems and production assets is a major step in shaving those project costs, it is recognized that to dramatically lower the overall costs of drilling and completing geothermal wells, new technologies must be developed. The development of enhanced drilling tools in combination with superior well designs and improvements of downhole pump systems specifically designed for the geothermal market are critical to transform standard oil & gas applications to cost-efficient geothermal projects. This presentation covers the history of the oil & gas industry leading to the consequential steps to cost improvement opportunities in geothermal applications. ◀

## BIOGRAPHY

### Tim Erdmann, Baker Hughes



Tim Erdmann is the Sales Manager for Geothermal in Continental Europe for Baker Hughes, based in Celle, Germany. He started his career with Baker Hughes in 2003 as Product Reliability Engineer for Baker Hughes INTEQ followed by an assignment as Team Lead for Re-Entry Drilling Systems both in Houston, Tx and Celle before taking on his current assignment for the Geothermal segment.

Tim received a mechanical and electrical engineering MS degree from the University of Wilhelmshaven and is member of the SPE and GtV (Bundesverband Geothermie). He has published several papers and presentations at SPE and GtV events. ◀



# COPENHAGEN NOVEMBER MEETING

TUESDAY 16 NOVEMBER 2010

### PROGRAMME

17:00 - 18:00

Drinks

18:00 - 19:00

Presentation and SPE News

19:00 - 21:00

Dinner

### LOCATION

Moltkes Palæ

Dronningens Tværgade 2 A

1302 København K

### SPEAKER

Mike Kramer

SHELL

### TOPIC

Maturing E&P portfolio -  
Preparing for new challenges

### DINNER SPEAKER

Tim Erdmann

Baker Hughes

### TOPIC

GEO THERMAL

### ENTRANCE FEE

None

### REGISTRATION

Please indicate your attendance  
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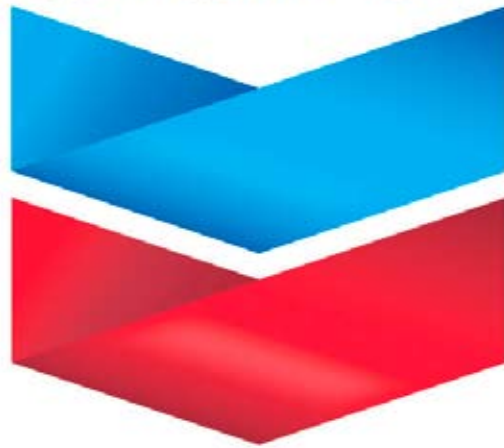
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