Issue 31 \ May 2018

SPE International
London Section

SPEREVIEW LONDON

- Petroleum Unitisation: How to Do Better
- Maximizing the Value of a Mature Asset using Data-Centric Workflows
- What has SPE London Done for Me?
- PLUS: Events, Jobs

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ABOUT US
The Society of Petroleum Engineers (SPE) is a not-for-profit professional association whose members are engaged in energy resources, development and production. SPE serves more than 143,000 members in 141 countries worldwide. SPE is a key resource for technical knowledge related to the oil and gas exploration and production industry and provides services through its global events, publications, events, training courses and online resources at www.spe.org, as well as local chapters such as the SPE London section.
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Information

At SPE Review London, we strive to provide knowledge and information to navigate our changing, and challenging, industry. We trust the April 2018 issue of SPE Review London will be useful, actionable and informative.

In the first of this issue's two technical features, '**Petroleum Unitisation: How to Do Better**', **Professor Paul F. Worthington** discusses (*page 4*) key requirements for effective unitisation.

The second of this issue's technical features **'Maximizing the Value of a Mature Asset using Data-Centric Workflows'** starts on *page 9*, with an overview of Anne Valentine's (SPE Distinguished Lecturer 2017-2018) presentation an the SPE London evening event in April**.**

We continue to get some great responses for our new feature where we ask: **'What has SPE Done for Me?** Read the insighful responses on *page 7*.

Our regular features include: Meet the people **'Behind the Scenes'**, The SPE Review Editorial Board (*page 3*) and the **SPE London Board** (*page 13*).

Don't forget to get tickets for the **Women in Energy Annual Seminar** in June - see *page 8* for details. And join us for the **London Section Tuesday evening meeting** on 27 May (see *page 12* for booking information).

Make sure to keep up to date with **industry events and networking opportunities,** and the **Job Board** (thanks to Jared Hammond, Reservoir Engineer - Consultant, for providing the monthly job statistics)**,** all on *page 14*.

Get noticed in 2018 – write an article for SPE Review London, or **volunteer to speak at future events**. For more information, or to volunteer **contact Patrick Davies**, SPE London BD Chair (patrick.davies@gmail.com).

And don't forget to check out our social media pages: Facebook, Twitter, and Linkedin.

As always, this issue of SPE Review London offers the opportunity to be educated, entertained and informed.

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SPE International London Section

Behind the Scenes: SPE Review Editorial Board

Jonathan Ovens
Chief Editor

- Ph.D in Physics at Cambridge University.
- Joined Shell in 1986. Reservoir Engineer – hydraulic fracturing, pressure transient analysis and reservoir simulation.
- 1997 - 2012: independent consultant covering the North Sea, North Africa and the Middle East.
- Experience ranges from Exploration and Development planning through to Reserves Evaluation.
- 2013: Senior Reservoir Engineer at JX Nippon E&P (UK) Ltd.
- 2009 and 2015 served with SPE Europec Technical Committee.
- Member of the SPE London Board.

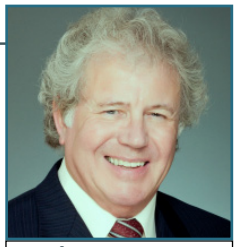
Josh Beinke
Editor

- Graduated from University of Adelaide with degree in Petroleum Engineering.
- 10 years prior experience with Chevron Corporation, Origin Energy and Santos, including as Production Engineer on the Gorgon Field during First Gas.
- Following move to Europe in 2016, consulted on European and African assets (specialising in data room and field development advisory).
- Now working out of Amsterdam as a Production/ Exploitation Engineer with Vermilion Energy.

Ffion Llwyd-Jones
Designer

- Editor and business writer, with 15+ years experience in North America and the UK.
- Editor for several trade and consumer magazines (print and/online).
- Provides industry-related case studies, and detailed, research-driven B2B reports and technical white papers.
- Accomplished photographer, and videographer.
- Educated in Canada, and in the UK.
- Fluent in Welsh and English.
- BA (Hons) from The Open University.

Petroleum Unitisation: How to do Better



Paul F. Worthington

This is a transcript of Professor Paul F. Worthington's presentation to the SPE London Section on 24 April 2018

Principles

Petroleum unitisation brings together commercial, legal, strategic and technical practitioners within a domestic or international setting. It takes place once in the life of an oil or gas field. It arises where a petroleum accumulation with geological and/or hydraulic closure has been confirmed by drilling to straddle at least one tract boundary across which there is reservoir connectivity, pressure communication and similar hydrocarbon composition.[1] It is risky to presume that a petroleum accumulation extends into an adjoining tract on the basis of seismic data alone, especially as direct hydrocarbon indicators have been misleading.[2]

The objective is to operate and develop a straddling accumulation as a single Unit, rather than in a partitioned or competing manner, as though the tract boundary was not there, with each tract group having an undivided share regardless of where the unitised petroleum is produced. In this way, development of the resource is more efficient with greater recovery of petroleum so that no coventurer is worse off and most if not all benefit from greater net revenue. The same principle applies to a grouping of small fields in different tracts that can only be developed economically as a Unit cluster.

In jurisdictions where natural resources are owned by the State, legislation usually requires that a Unitisation and Unit Operating Agreement (UUOA) be agreed by coventurers before production start-up. Where private ownership of natural resources is permitted, e.g. in the continental USA, unitisation often takes place at the onset of secondary recovery. Until then, the subsurface capture of hydrocarbons from neighbouring tracts is allowed to prevail, a practice that has led to competitive drilling of production wells and thence lower recovery factors overall. Capture can be partially mitigated, but not fully eradicated, by well-spacing regulations in conjunction with pooling of tracts to create a larger area that can claim entitlement to a production well.

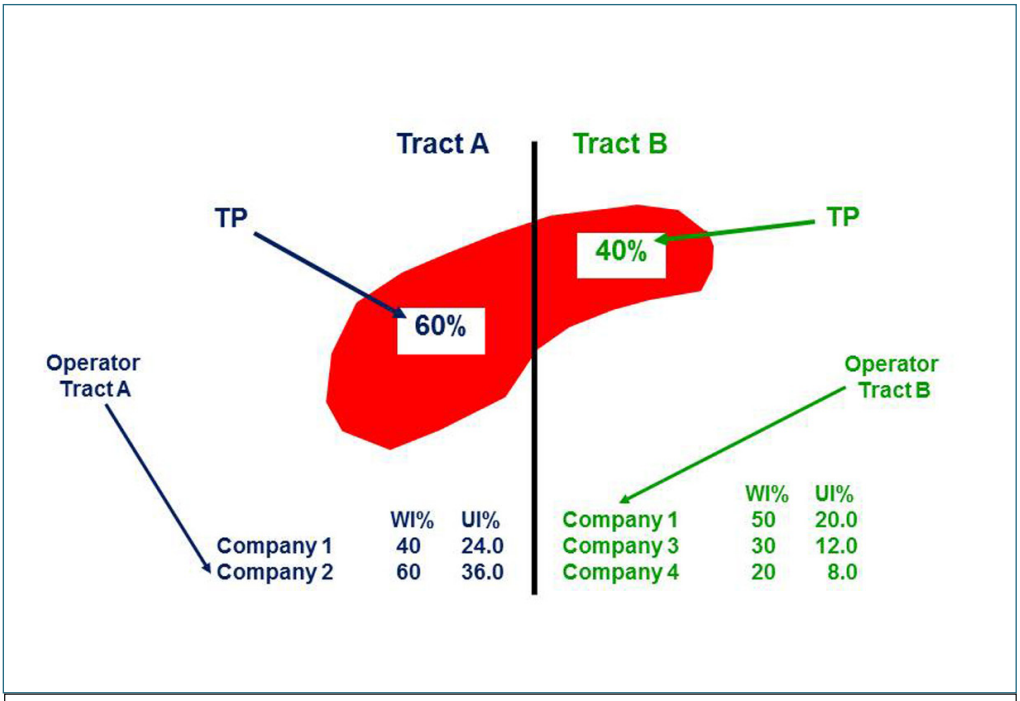


Figure 1: Working Interest (WI), Tract Participation (TP) and Unit Interest (UI).

Tract Participation

In many unitisation situations, the most contentious part of the process is the determination of Tract Participation (TP), which quantifies the proportional investment obligations and production entitlements of the straddled tract groups. The product of a coventurer's Working Interest in a tract and the corresponding TP is the coventurer's Unit Interest by virtue of participation in that tract group (*Fig. 1*). If a coventurer is present in more than one tract group, its total Unit Interest is the aggregate of the several.

TP is determined or negotiated at the point of unitisation when the

Continued on page 5

Petroleum Unitisation: How to do Better continued

coventurers become Unit Owners. It is often redetermined subsequently when a more comprehensive reservoir database has been acquired. This is done to render the unitisation process as fair and equitable as possible. TP is then reset and retroactive adjustments of capital expenditure and uplift are made to the effective date of unitisation with the capex adjustment possibly extending into the pre-unitisation appraisal stage, too. Larger fields tend to have more redeterminations while small fields might have none at all, the so-called fixed-equity agreements. Whatever the coventurers might agree, it has to be prescribed at the unitisation stage when comparatively little is known about the straddling accumulation. There is always the risk that an agreed prescription might later turn out to be inappropriate or unworkable when more is known about the field, so a functional balance has to be achieved between under- and over-prescription in the UUOA, whose content can only be changed subsequently by unanimous agreement of the Unit Owners.

Note that TP is determined as a single numerical outcome. It is not estimated using probability and statistics. It is usually reported as a percentage to several decimal places that are commercially significant but technically trivial. This underscores the fact that unitisation is a commercial exercise that is undertaken technically. The UUOA should make provision for technical disputes to be resolved by an independent Expert.[3]

Basis for Tract Participation

One of the principal requirements for a Pareto-efficient unitisation is the choice of an appropriate basis for TP.[4] This is usually a subsurface petroleum volume that is determined for the accumulation as a whole and for each straddled tract so that the percentage obligation and entitlement of each tract group can be calculated based on the relative volumes. The most common bases are initial hydrocarbon pore volume (IHPV, at reservoir temperature and pressure) and hydrocarbons initially in place (HIIP, at surface conditions). Together these static bases account for about 85% of unitisations outside North America. Minority options are estimated recovery (ER) and estimated economic recovery (EER) of hydrocarbons during field life. Dynamic bases such as ER and EER are not appropriate for use at the unitisation stage because several years of production are required before a reservoir simulator can be calibrated. They can be used later in field life, but with greater uncertainty than static bases. However, most UUOAs prescribe a basis for TP for all time. Note that hybrid bases with static and dynamic components have also been used to mitigate the uncertainty associated with uncalibrated dynamic models (*Fig. 2*).

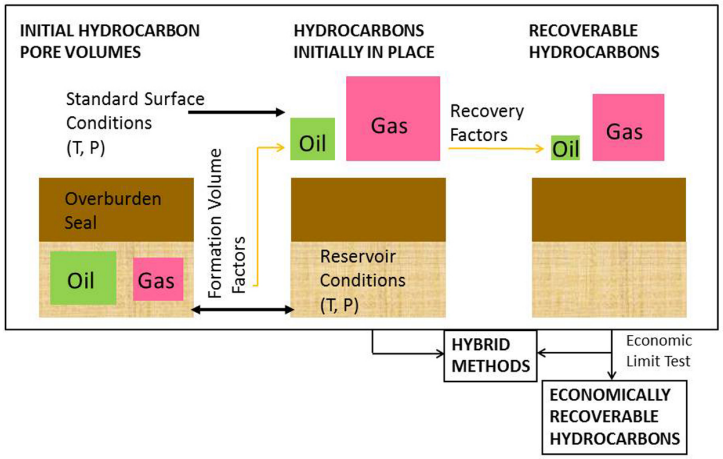


Figure 2: Bases for Tract Participation.

Reserves cannot be used as the basis for redetermined TP because remaining recoverable volumes change during production. However, reserves at a fixed point in time has been used as a basis, usually at the onset of post-production unitisation, which is not encouraged.

An impediment to adopting an appropriate basis for TP is the misuse of terminology, which is sometimes culpable. In several jurisdictions there is legislation permitting or requiring the adoption of an inappropriately-worded basis. Some examples within petroleum statutes or implementing regulations are: in situ hydrocarbons; recoverable reserves; estimated total reserves; remaining hydrocarbons initially in place; and reserves in place. None of these terms is in accord with industry standards.[5] The transnational Murchison and Statfjord field exploitation agreements between the UK and Norway stated: "Reserves" means the volume of oil present in the ... Reservoir before the start of production, ... and described ... as "Stock Tank Oil Originally in Place".[6] Such confusion still exists today. It can arise where a static basis for TP is used to determine the "apportionment of reserves" at unitisation.[7]

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Petroleum Unitisation: How to do Better continued

Problematic Situations

Unitisation requires special care where there are pronounced systematic differences between straddled tracts in terms of geological structure and reservoir quality. The former leads to greater cross-boundary migration from the flanks to the crest of a field and this increases hydrocarbon capture, especially for gas fields. This heightened migration does not lead to a greater recovery factor from the crest of the reservoir because a proportion of the gas produced therefrom is actually from the flank. In other words, hydrocarbon capture is more pronounced and the case for using IHPV or HIIP as a basis for TP is even stronger. This has been known for over 80 years,[8] but some continue to ignore the issue in pursuit of commercial gain.

Monotonic differences in reservoir quality between tracts cause the proportionality between static and recovered volumes to break down. Here, the basis should have some dynamic component. Because of the large uncertainty associated with uncalibrated simulators, a hybrid basis has sometimes been used instead, e.g. as in the transnational Markham field between the UK and the Netherlands.[9] In such situations, any weighting factors introduced to take account of differences in intrinsic recovery factor should not be fixed for field life but rather should be reset as part of a redetermination of TP.

Way Forward

In addition to points made above, key requirements for effective unitisation include: a diligent regulator; confirmation of straddle through a discovery well in each pertinent tract; a balanced appraisal drilling programme avoiding the distortions arising from asymmetrical data between tracts; a static basis for TP unless there is a good geological or reservoir-engineering reason to do otherwise; and avoidance of company managements forcing a deficient unitisation agreement upon their negotiators in order to accelerate a project and thence access revenues at an earlier date.

Despite the mitigation of wastage and the assurance of greater fairness and equitability, unitisation and equity redetermination are time-consuming and costly exercises that should be avoided wherever possible. Alternatives to unitisation include buy-outs and royalty arrangements, especially where one straddled tract has a small TP. Alternatives to redetermination of TP include fixed equity agreements, usually for small fields, and asset swaps. However, where the prize is sufficiently large, unitisation and equity redetermination of a straddling petroleum accumulation will always prevail.

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Prof. Paul F. Worthington is the Principal of Park Royd P&P (England) Limited where his main interests are integrated technical and strategic studies for unitisation and equity redetermination, reserves estimation, and the identification of hidden pay, as well as the petrophysics of problematic reservoirs. Previously, he spent many years as a Technical Director with Gaffney, Cline & Associates in UK and Singapore and also with BP, mostly as Head of Formation Evaluation at the BP Research Centre in Sunbury-on-Thames, England. His degrees include a PhD and a higher doctorate (DEng), both from the University of Birmingham, UK, and he has published some 90 peer-reviewed papers in the field of engineering geoscience.
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WHAT HAS SPE LONDON DONE FOR ME?

The SPE is a global organisation of 88,000+ E&P industry professionals.

The SPE London board oversees the SPE London activities including our evening programme and other events. Our various committees have specific focus for the members including Young Professionals, Women in Energy and associated student chapters. As well as engineers who make up our core, we also welcome those with qualifications in geology, geophysics, earth science, environment, health and safety, mathematics, information technology, as well as management and economics.

Adam Borushek
Principal Consultant, Reservoir Engineer

After spending time in Australia, on my return to London I re-engaged with the SPE section here. This helped me to reconnect with old colleagues and refresh my wider network of London-based contacts.

I like how the SPE is a truly international organisation. With volunteers from all over the world sharing ideas, local SPE sections can copy the best practices, ideas for seminars, and sponsorship initiatives.

As a volunteer with SPE London, I have appreciated the opportunities to organise functions, and to present to our members. Presenting to less technical audiences like lawyers, bankers and economists has been good practice for me as a consultant!

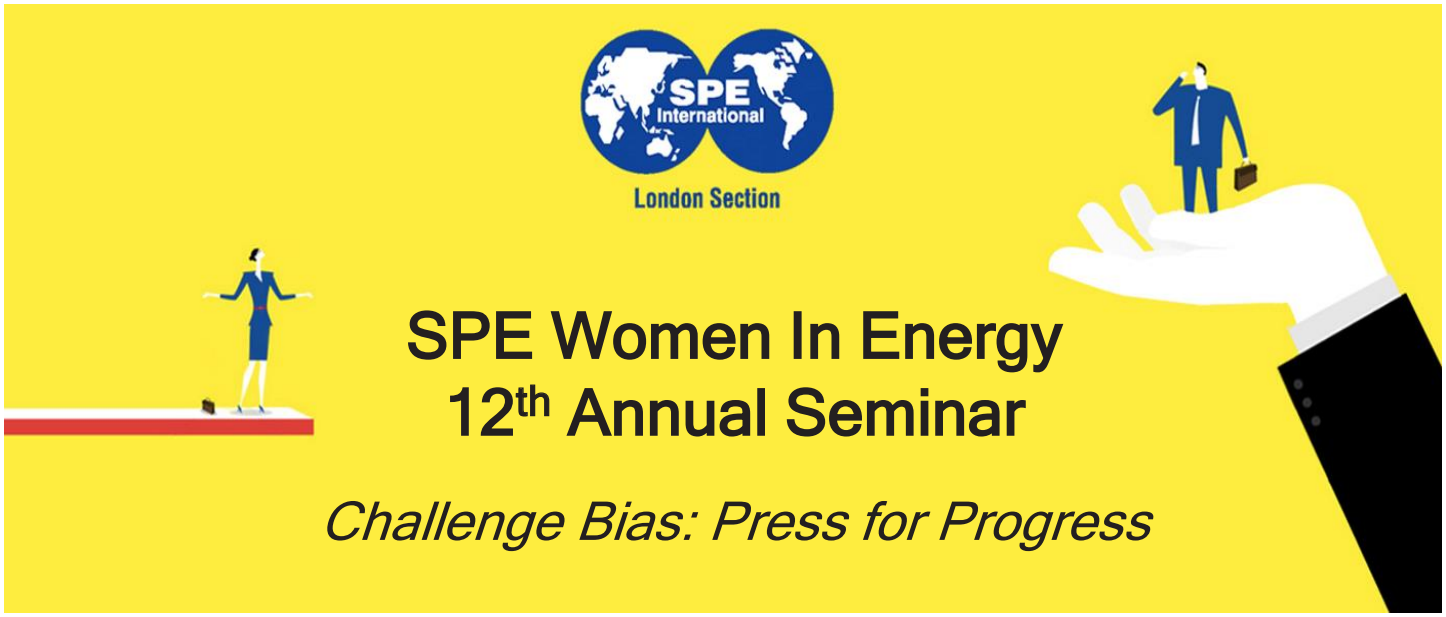
After a number of years in Perth (Australia) it was good on returning to London to catch up with friends and ex-colleagues at the new (for me at least) SPE meetings venue in the Imperial School of Mines.

Having stopped full time work but still being interested to pick up interesting projects I was pleasantly surprise to leave the last meeting with two promising business leads, the first of which has already matured.

The mix of presentations and debate works well and the speaker line up is impressive. I was also encouraged by the number of students present and as a follow on signed up for e-mentoring which has proved both enlightening (for me and hopefully my mentee) as well as rewarding.

My thanks to the SPE volunteer officers without whom the meetings program would not be what it is today.

Mark Graham



Time & Date: 9am-5pm, Friday 15th June

Location: The Keyworth Centre, London South Bank University

Tickets: £35 for general admission, £25 for students / unemployed
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Morning Session (9am-1pm): Keynote speakers & panel discussion

- Sinead Lynch - Chair of Shell UK
- Beverley Smith - Director, POWERful Women (formerly VP Exploration & Growth, BG)
- Dr Nic Hammarling - Head of Diversity, Pearn Kandola
- Leigh-Ann Russell - VP of Global Wells Org, BP
- Tania Gandamihardja - Diversity Manager, Schlumberger

Plus representatives from Total & other

Afternoon session (2pm-5pm): Workshops, Coaching Sessions & Networking
Including unconscious bias workshops led by Pearn Kandola & Shell, as well as fireside chats with senior professionals from the energy industry.

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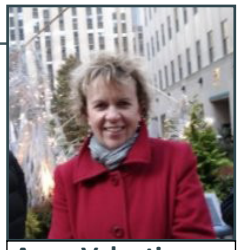
Maximizing the Value of a Mature Asset using Data-Centric Workflows



Anne Valentine

At the March SPE London meeting, SPE Distinguished Lecturer Anne Valentine presented a lecture on the way field production data can be used to understand and improve field performance using quick and easily implemented methods.

Industry studies show that mature fields currently account for over 70% of the world's oil and gas production. Increasing production rates and ultimate recovery in these fields, without increasing costs, is a common challenge.
Quick workflows are possible that extract maximum value from historical production data. Monthly production and injection volumes, pressures and well event data are required, along with petrophysical data and PVT properties.

Approach

The approach is based on a fundamental assumption: performance should be a function of reservoir quality. We can use key performance indicators to compare well performance and reservoir quality to identify under- and over-performing wells. For reservoir quality, the indicator could be flow capacity (kh) or hydrocarbon column. The latter is calculated on a per well basis as Net pay x Porosity x (1 – Initial water saturation). For well performance, there are more possibilities. For a field with a wide range of well ages, we can smooth the oil (or gas) rate using a moving average, then select the best value of the smoothed rate as the indicator.

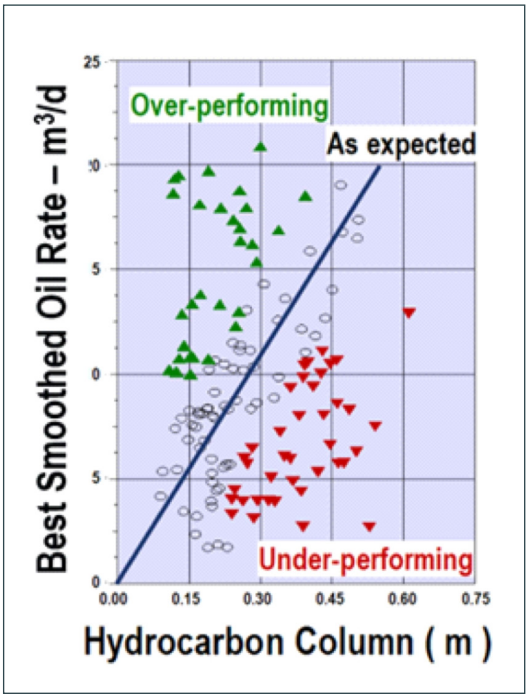


Figure 1: Performance indicator plot showing oil rate plotted against reservoir quality indicator.

We then plot the performance indicator against the reservoir quality indicator to identify under- and over-performing wells. The example shown (*Figure 1*) is based on a Canadian case study of a well published, low perm eability brown oil field.

The black line represents the expected trend, while the wells marked in green towards the top left have above average performance with below average reservoir quality. The wells marked in red towards the bottom right have poorer performance with better than average reservoir quality, therefore they appear to be under-performing.

Having identified the under-performing wells, we need to consider the likely reasons for under-performance.
These could include water production, formation damage, well completion or surface problems or poor waterflood management, since the case study is a large waterflood.

Water production problems

We can identify the wells producing above average amounts of water by carrying out a heterogeneity index (HI) analysis.[1,2] Calculate the HI for oil production and water production as well value/group average value - 1.

The result is positive for an above average well and negative for a below average well. We then take a running sum of the two HI values and plot them against each other.
The case study example is shown in *Figure 2*.

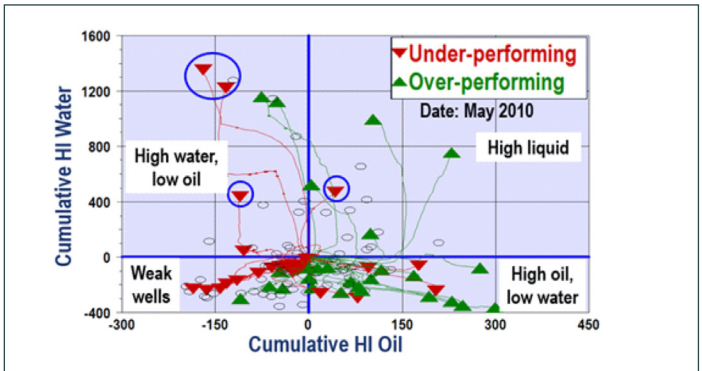


Figure 2: Crossplot of cumulative heterogeneity indices for oil and water.

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Maximizing the Value of a Mature Asset using Data-Centric Workflows cont.

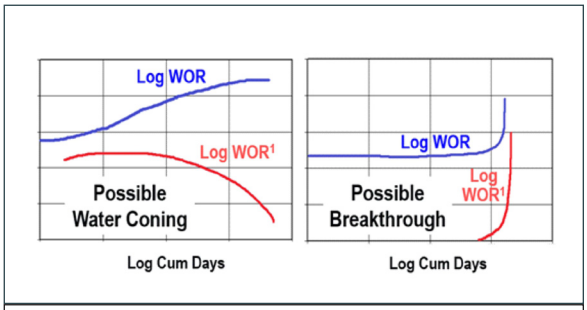

Figure 3: Chan plots of WOR against time can be used to distinguish different types of water influx.

On these plots there are always four quadrants based on the zero values. The four circled wells are under-performers with significantly above average water production. Out next step is to try to understand the mechanism of this high water production.

A "Chan plot" can be useful for this.[3] The water-oil ratio (WOR) and the first derivative of the WOR are plotted against cumulative days on production on log-log scales. The resulting shapes can indicate potential water coning or potential breakthrough, as shown on the sample plots (*Figure 3*).

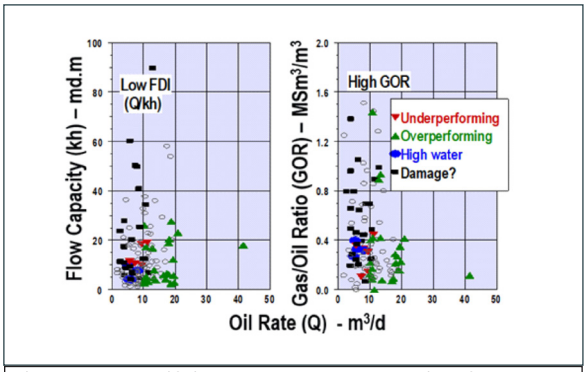

Figure 4: Identifying damaged wells using flow capacity and GOR.

Formation damage problems

To identify potentially damaged wells, we can look for high gas-oil ratio (GOR) or low Formation Damage Index (FDI), calculated as rate/flow capacity, i.e. q/kh.

The plot (*Figure 4*) for the case study field shows the potentially damaged wells marked in black. These are wells previously identified as under-performing which meet either or both criteria mentioned above.

Well completion or surface problems

Under-performance may be a result of problems with the wellbore, the perforations, the artificial lift or other equipment in the well, or even surface constraints. Well performance is not only a function of the reservoir quality, it is also a function of the well itself. In a homogeneous reservoir, we expect better performance from the better completion. The indicator for the completion quality will depend on the data available and the type of wells. A simple example would be the feet or meters open or perforated. In wells that are fractured on completion, such as unconventional gas wells, the indicator could be much more complex, based on the properties of the fracturing job. This type of data was not available for the case study.

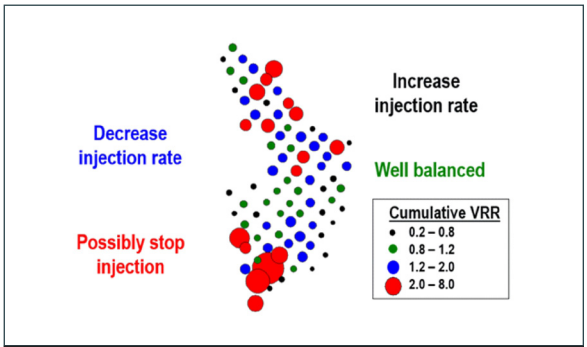

Figure 5: Geographic distribution of voidage replacement ratio over field.

Waterflood management

An improperly managed waterflood could lead to under-performance problems. The key performance indicator for a waterflood is the voidage replacement ratio (VRR), which we calculate as injected volume/produced volume. These volumes include all fluids and are calculated at reservoir volumes.

The case study had both monthly and cumulative values of VRR very close to the target of 1 at the field level. However, at a pattern level, the map (*Figure 5*) shows patterns ranging from under-injected to highly over-injected:

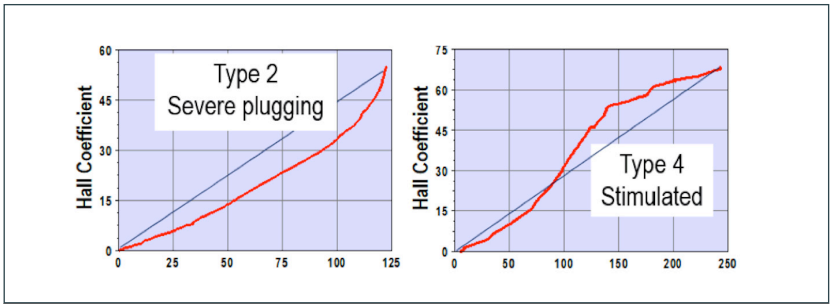

Figure 6: Illustrative examples of Hall plots.

When we want to increase injection rates, we can use a Hall plot, which is a very effective analysis of skin problems in injection wells.[4]

The Hall coefficient (simplified) is the cumulative injection pressure. We plot this against cumulative water injection and look for slope changes.

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Maximizing the Value of a Mature Asset using Data-Centric Workflows cont.

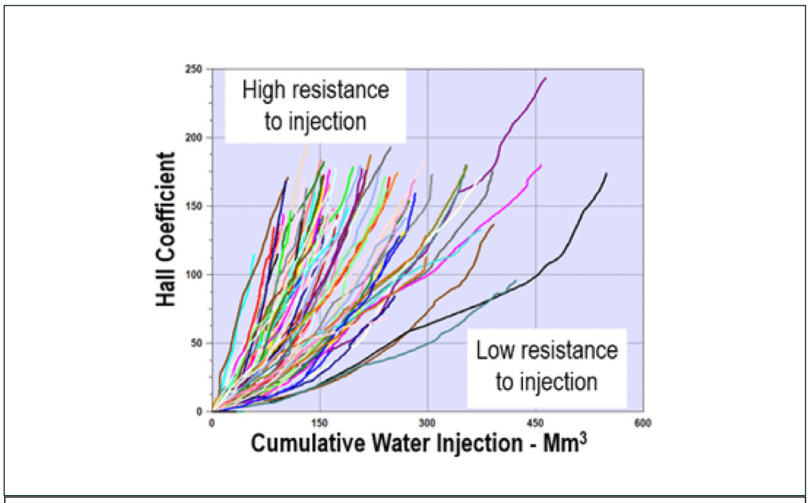

Figure 7: Hall plots for all 96 injectors in the study.

Two example wells are shown (*Figure 6, overleaf*).

The well on the right might have had an acid job or it might have broken through to a neighbouring producer.

The shapes of the plots for individual wells are informative, as are the slopes of all the injectors' plots in comparison with each other.

All 94 injectors of the case study field are shown (*Figure 7*) on a single plot.

We would want to carry out further investigation of this range of slopes, perhaps looking for correlations with permeability or flow capacity.

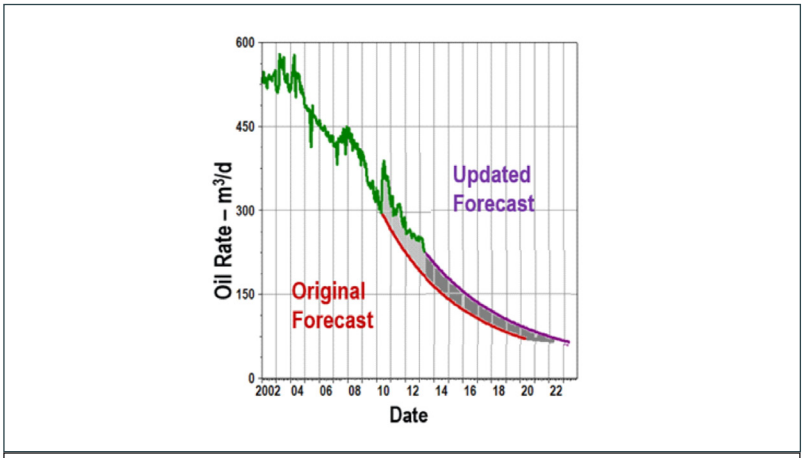

Figure 8: Historical oil rate production showing impact of reservoir management improving production.

Well intervention results

All the case study analyses to this point took about three days and were done using data as of May 2010

Later in 2010, workovers were done on 40 wells identified here as under-performing. There were also some injection rate adjustments. The effect on overall field production is shown (*Figure 8*).

The total gain in oil reserves, based on a comparison of the actual production and the updated forecast with the original forecast was about 1.4 million barrels or 220,000 m3.

Conclusion

These workflows are:

- **Simple and effective**
- **Flexible, can be adapted to multiple reservoir / field types**
- **Able to handle huge amounts of data**
- **Demonstrate value of historical data**
- **Can result in production gains**

The key to success is to determine the appropriate indicators (with built-in quality control) for reservoir quality, well performance and well completion.

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SPE Distinguished Lecturer 2017-2018
Topic: Integrated Historical Data Workflow:- Maximizing the Value of a Mature Asset
Anne Valentine, Principal Instructor (Production Engineering), Schlumberger (retired) has 35 years of experience in Canada and France in well and reservoir performance analysis, particularly related to waterflooding, unconventional reservoirs and candidate recognition for production enhancement. She built her expertise in performance analysis workflows and software through working on the Cold Lake heavy oil field as a reservoir and field engineer at Esso Resources Canada Limited, then consulting for Halliburton before joining Schlumberger in 2001. A graduate in Chemical Engineering from Queen's University in Canada, she has co-authored papers on analysis techniques for polymer floods, waterflood optimization and shale gas forecasting.

Radka Jancikova, Kate McMillan and Paul Worthington at the SPE London event.

SPE Young Professionals' Schlumberger Day.

Paul Worthington, Park Royd P&P, answers audience questions at the SPE London event.

Speaker Jeff Parkes, BP Subsurface Centre at the London Section evening event in April.

Join us for the London Section evening meeting on 29 May, 2018

SPE International
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AGENDA

4:00pm-6.30pm	**4:00 pm – 5.00 pm** **Competition: Wytch Farm Evaluation and Development,** Team A vs Team B, MSc Pet Eng, Imperial College. **Time: 5.00 pm – 6.30 pm** **Talk1: Can the UK be a world leader in Carbon Capture and Storage?** Nikki Brain, Policy Manager, Carbon Capture and Storage Association.
6.30pm-7.15pm	DRINKS AND NETWORKING BUFFET
7.15pm-8.45pm	**7.15 pm – 8.45 pm** **Talk2: Fracture Simulation Parameters: Addressing the needs of Completion Engineers: A Petrophysical Perspective.** Fred Jenson, Product Strategy Manager Petrophysics and Geomechanics, CGG.

- **Venue:**

The event will be held at the Department of Earth Science and Engineering, Imperial College London. ***Map available here.***

- **Directions**:

Please note the main entrance to the Department is via the Royal School of Mines Building on Prince Consort Road, between 10 and 12 on the campus map.

- **Booking:**

All booking must be paid in advance and online please.
Book via Eventbrite
Email: katespe@aol.com

- **Cost:**

£34 for SPE/PESGB/EI members, £44 non-members,
£19 unemployed members. Non refundable.
£5 for students booking by Friday 20 April (£19 after).
All tickets have an additional Eventbrite fee.

Meet the SPE London Board

SPE is a non-profit professional society with 164,000 members in 143 countries. SPE London Section, with average 2000 members and seven associated student chapters, is an active section with an aim to connect, engage and promote exchange of knowledge within London energy community of technical and commercial professionals. The SPE London Board is the policy-making and governing body consisting of volunteers who devote their time to oversee many of SPE London's administrative and operating responsibilities.

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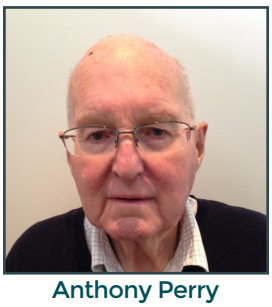


Anthony Perry
Director

Arnaud Mille
Long Term Planning

Alain Gringarten
Director

EVENTS: Upcoming global events 2018

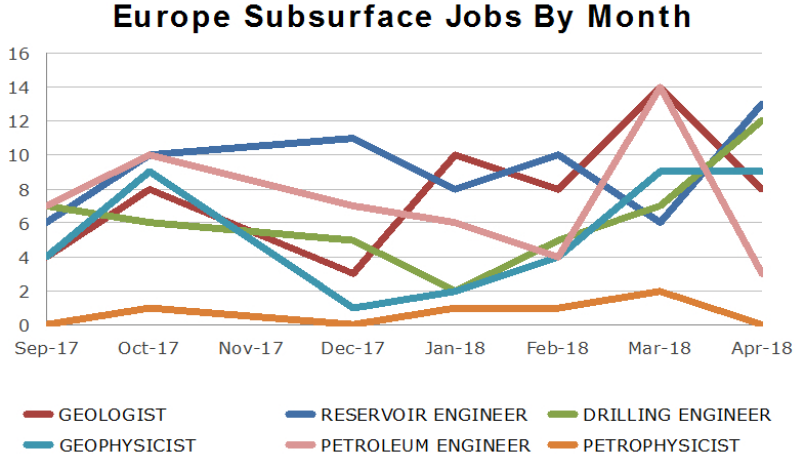
11-14 June 2018 **(Copenhagen, Denmark)**
SPE Europec featured at 80th EAGE Conference and Exhibition
The theme this year is Opportunities Presented by the Energy Transition. Attended by more than 6,000 people from almost 100 coutries annually, this three-day conference will feature 1,000 technical oral and poster presentations, training courses, and workshops. In addition, key sessions will be held for students, young professionals, and women in the geoscience and engineering industry. The exhibition will showcase the latest developments in geophysics, geology and reservoir/petroleum engineering from 350 companies, allowing attendees the opportunity to enhance their product knowledge, interact with cutting-edge technologies, and meet the people behind the products.
For more information, and to register: http://bit.ly/2G9C4DE

18-19 June 2018 **(Aberdeen, Scotland)**
The SPE International Oilfield Corrosion Conference and Exhibition
The SPE International Oilfield Corrosion Conference and Exhibition, themed Asset Integrity Management in an Age of Uncertainty, will address both familiar and new challenges that come with the wide spectrum of requirements for effective corrosion management throughout an asset's lifecycle.
For more information, and to register: http://bit.ly/2nUVyp8

20-21 June 2018 **(Aberdeen, Scotland)**
The SPE International Oilfield Scale Conference and Exhibition
The SPE International Oilfield Scale Conference and Exhibition creates opportunities for discussing and sharing new experiences in all aspects of handling oilfield scale and is designed for industry professionals involved or interested in formation, removal, inhibition, and management of oilfield scale.
For more information, and to register: http://bit.ly/2nUVyp6

23-25 July 2018 **(Houston, Texas)**
Unconventional Resources Technology Conference
Join us for the sixth edition of the Unconventional Resources Technology Conference. Stemming from the recent surge in the upstream industry, URTeC continues as the premier science-based conference and marketplace for unconventional exploration, drilling, production ideas and technologies.
For more information, and to register: http://bit.ly/2nUVyp1

PETROLEUM SUBSURFACE JOBS - EUROPE



Selected Live Jobs at Print

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Oslo, Norway

Professor in Petroleum (Drilling Engineering)
Trondheim, Norway

Reservoir Engineer
France

Staff Production Engineer
Stavanger, Norway

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www.oneoiljobsearch.com