



The Well Productivity Review

Rushmore Reviews: Benchmark with the Best



First proposed by BP in 2004 as the
Completions Efficiency Review (CER)

with the objective to share data on the key factors
which determine the production performance of a
completion

to enable Operators to improve and optimise their
completion design and execution practices

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In more detail - 1

To compare actual production performance achieved in
a given reservoir with what it would be if the completion
were perfectly designed and executed

To compare the performance achievable using different
technologies to enable Operators to drive improvement
in completion design and execution

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In more detail - 2

To increase understanding of the relationship between
completion practice and well performance

To develop a consistent methodology for the
measurement of completions efficiency

To improve completions design and execution practices

To improve completions productivity

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Mandatory data

Pressure Drawdown (ΔP)
Permeability Thickness (kh)
Viscosity (μ)
Production Rate (Q)
Specific Gravity (sg)
Non Darcy Flow Constant (D) for gas wells
Total Skin (S)
Rock Type

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Optional data

Non-Darcy Flow Constant (D) for oil wells
Flowing Tubing Head Pressure
Reservoir Volume Factor (B_o/B_g)

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Extracts from the rules of participation - 1

CPR participation a pre-condition

Data to be provided for minimum of 30% of qualifying wells to include all wells where a pressure transient test has been performed.

Skin value may be calculated using nodal analysis based on a multi-rate flow test

An Operator with less than 4 qualifying wells must submit data on at least 1 well

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Extracts from the rules of participation - 2

An Operator with more than 20 qualifying wells may restrict their submission to 20 wells

Not necessary to submit data for any wells with a production rate of less than 1,000 barrels per day or 10MMscf per day

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Key events

- Nov 2004: BP propose study
- Mar 2005: meeting to agree data and rules
- Jul 2005: Chevron UK contract to participate
- Jul 2005: BP withdraw
- Jul 2006: Shell commit to 05-09 global contract
- Sep 2006: Tullow commit to 06-09 global contract
- Sep 2007: Shell withdraw
- Feb 2008: Feasibility study, WPR put 'on ice'

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Cost of participation

6,000 UK pounds per country per year

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Completion Efficiency Benchmarking

Benchmarking across the industry

Richard Heddle and John Lummus

Exploration & Production Technology
delivering breakthrough solutions

Benchmarking



Obvious fact:

Completions are paid for by the saleable fluid that is produced through them

∴ to improve completion performance we should benchmark completion productivity information.

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Performance evaluation



Performance evaluation will lead to:

- Wellwork to improve productivity
- Challenge existing practices
 - E.g. encourage OHGP where CHFP are the norm
- Drive improvement in design and execution

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Benchmarking benefits



Having a large database will highlight:

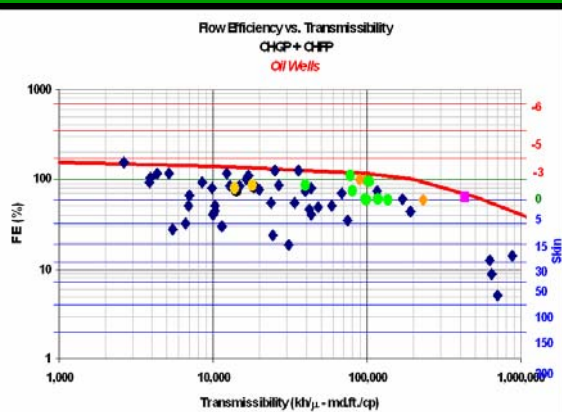
- best performance
- best practices
- and relationship between practice and performance

And identify:

- areas for improvement
- performance improvements across the industry

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Benchmarking vs. completion type



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Cross-operator Benchmarking



Hence BP come to Rushmore to ask other operators to share performance data

1. at the sandface via the skin of the completion and
2. at the surface via the production rate of the well.

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Definitions



Flow Efficiency

- An efficiency calculated at the **sandface** is

$$\text{Flow Efficiency} = \frac{7}{(7 + \text{Skin}_{\text{actual}})}$$

Benchmarking

- Compare the Flow Efficiency of the **actual** and an **ideal** completion
- *Designed to normalize for different completion designs, fluids, reservoir qualities, and flow rates*

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Current Programme within BP



Objective

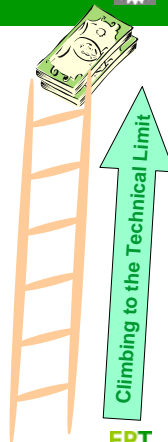
- Increase understanding of the relationship between completion practices & well performance
- Develop a consistent methodology for the measurement of completion efficiency via a simple scorecard.
- Improve completion productivity

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Benchmarking across Industry



BP is sharing these ideas with other operators in Rushmore to enable industry-wide benchmarking that will benefit all.



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