

True Drilling Efficiency: Lead, Follow or Get Out of the Way

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PetroSkills®

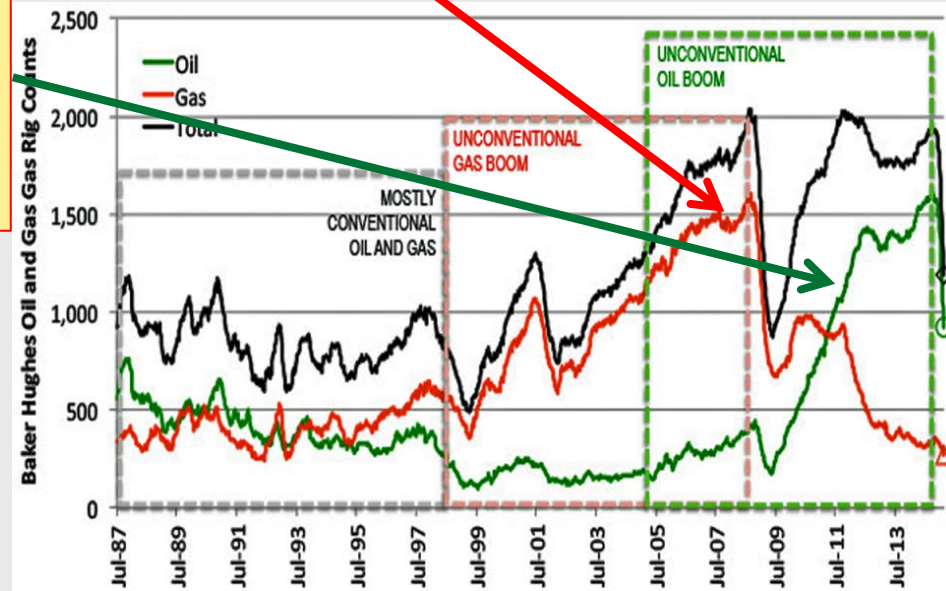
Heading into low rig count high oil production

Shale drillers took
over marginal
production from
Saudi Arabia

Drilling efficiency is
a key to staying in
business

Red line – the gas story
Created lots of gas with low rig count

Green line – new
oil story
Expecting lots of
oil with low rig
count



US land drillers reacted to low gas price

A story of a tight
gas driller 15,000 ft
'S' shaped wells

Improving Operating Efficiencies



> 2000 ft (600 m) per day opposite sides of the world – land and tender platform

DJ Basin Colorado

Gas price
crash

Offshore Thailand

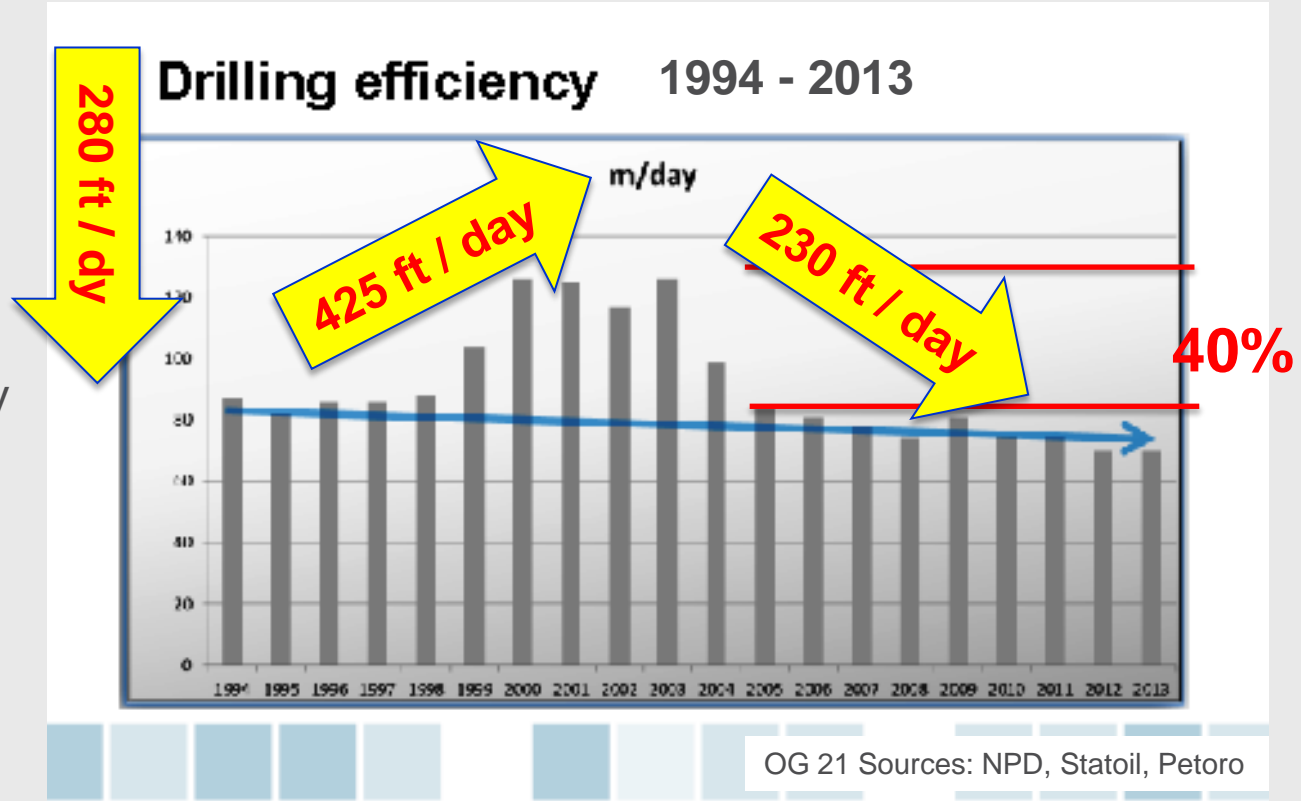
Bankruptcy

Europe struggles to perform

Now in declining trend

Averages from data:

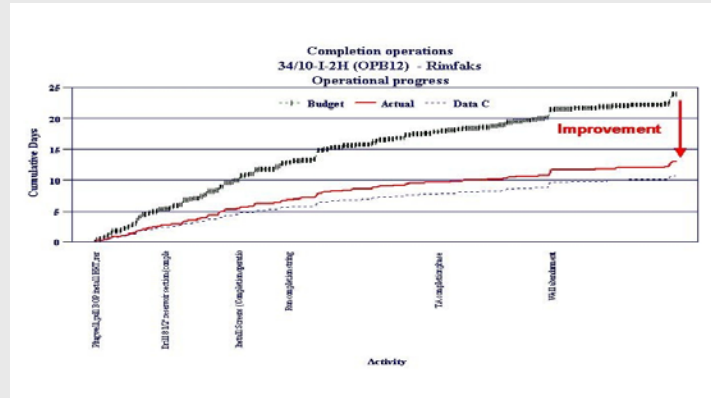
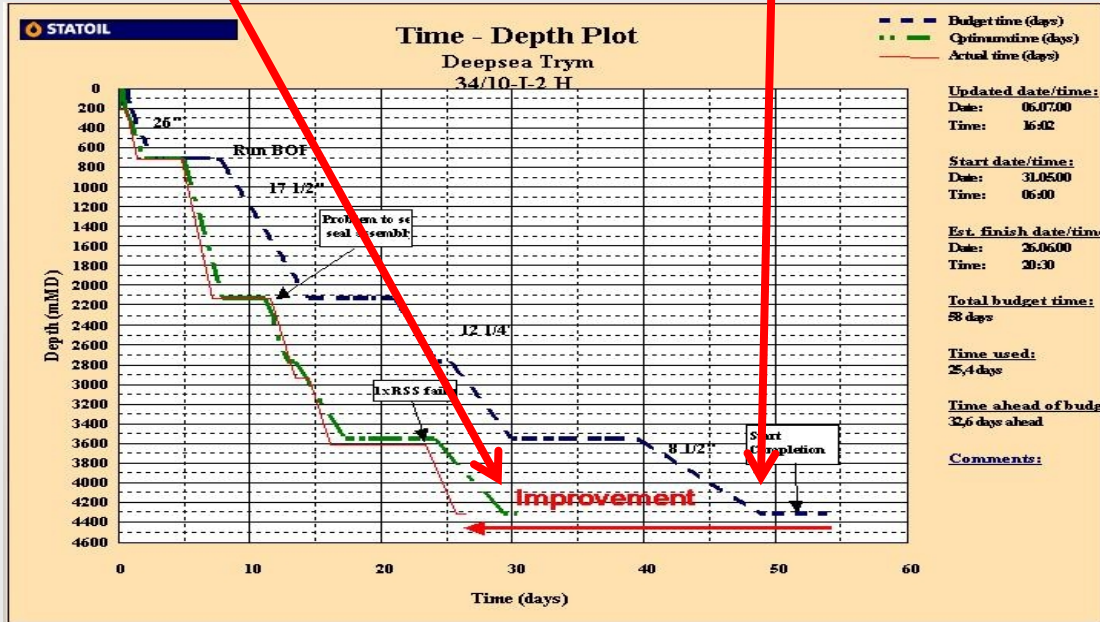
- Land Europe 300 ft / day
- Land USA 800 ft / day



Doubling performance in Europe proven by Lean Drilling™

560 ft. / day overall vs. 262 ft. / day historic best (plateau)

Halved completion time
Cut well cost 35%



Lean Drilling™ repeated step change improvement

Lessons from application

- **Organization Architecture** = alignment to objectives thro aligned delivery systems across breadth & depth of organization
- **Culture change / team building** = vision, values, equal players, common objective
- **Performance gap recognition** = team owned stretch goal (MTP beyond TL, BIC, BOB)
- **Project services systems** = professional detailed scheduling, cost est / control, risk management

Breakthrough drilling performance ingredients

Ford Brett: Study identified step change above benchmarks & analyzed causes: GRI 1997 through today

latest step change made \$35 bbl economic

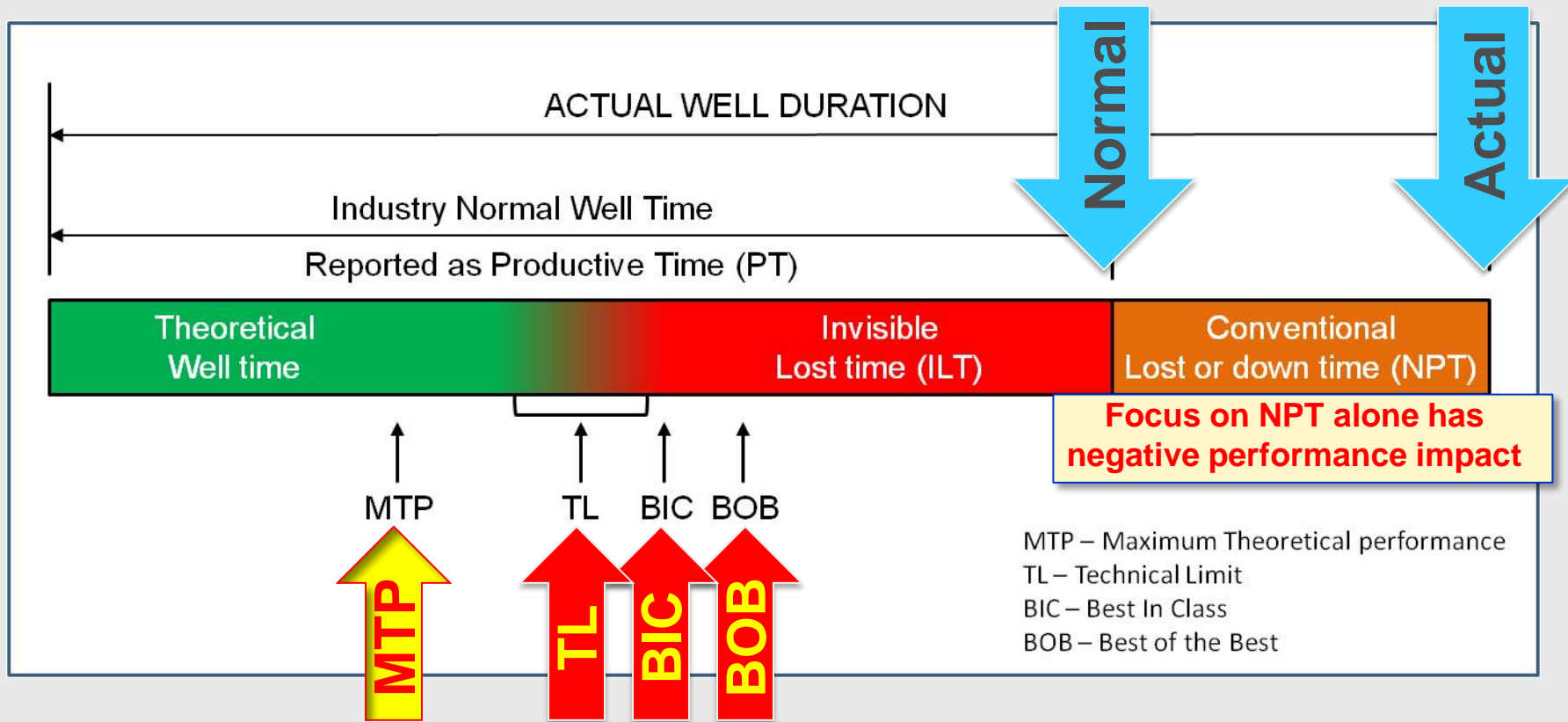
- **Commitment** = “We are going to do this no matter what”
- **Detailed process focus** = “The devil is in the details”
- **Involvement** = “Everyone (all competencies) participates
- **Financial return** = “Need to see return to make investment”

How NOT to have a Breakthrough

- **Keep doing things the same old way**
 - a breakthrough requires change, and change requires commitment.
- **Don't sweat the details**
 - Rarely (never?) is a breakthrough one “magic bullet.”
- **Only involve the experts**
 - A breakthrough touches everyone's job
- **Don't invest time & effort to change**
 - A breakthrough requires 5 - 10 X the normal planning, engineering, and coordination

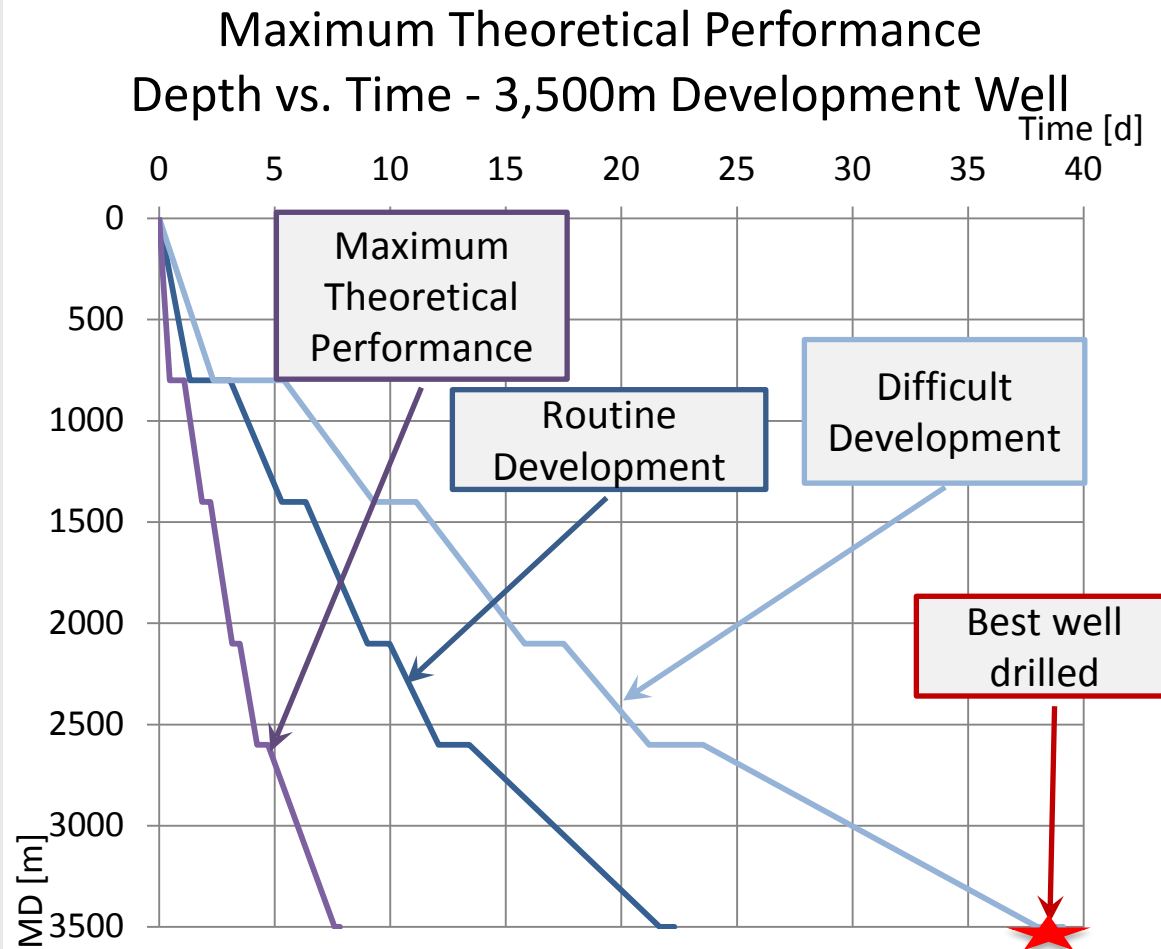


Target a true drilling efficiency ratio: Face the facts and stop the hype



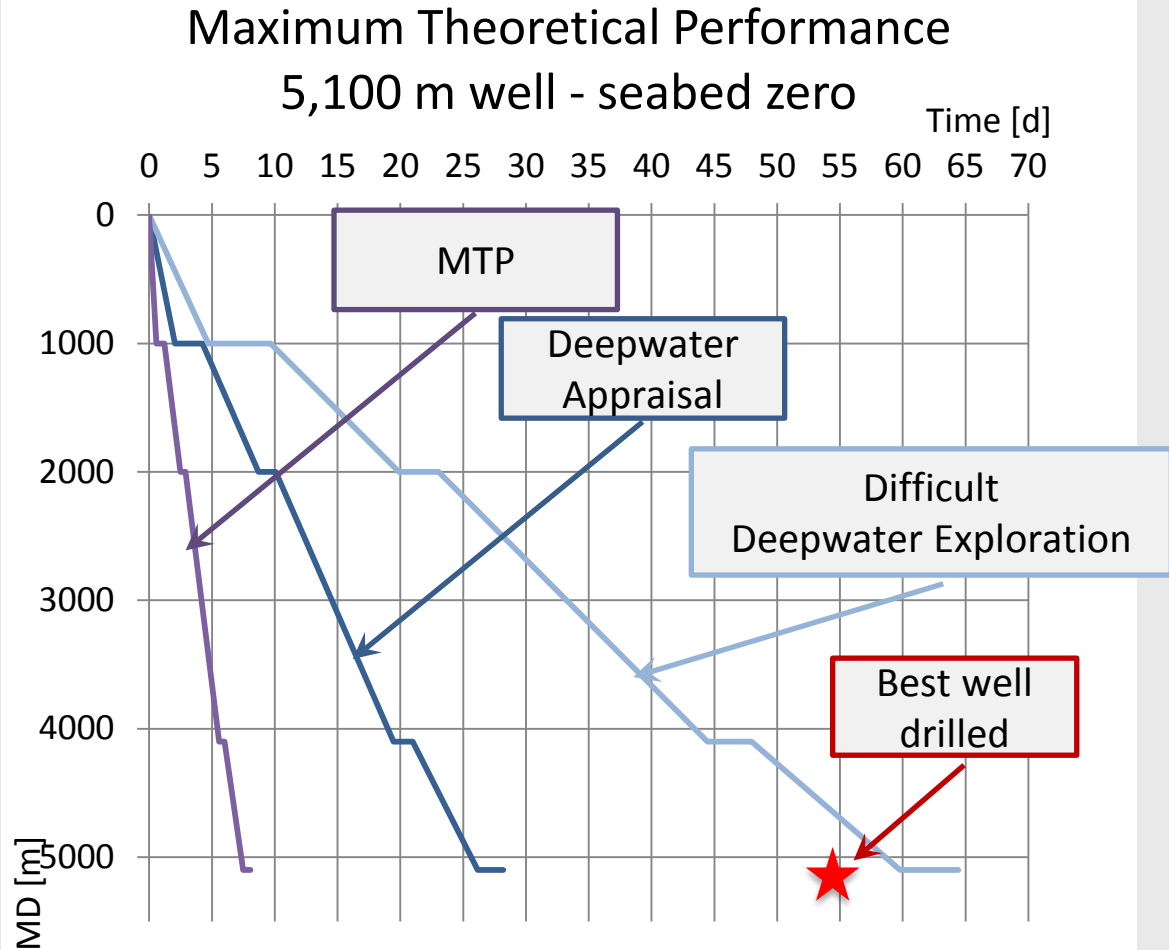
Case studies: MTP application

Mid East Land
Drilling – Dayrate,
High Complexity,
high risk area
(terrorist activity)



Case studies: MTP application

Deep Offshore Far East Drilling - Appraisal

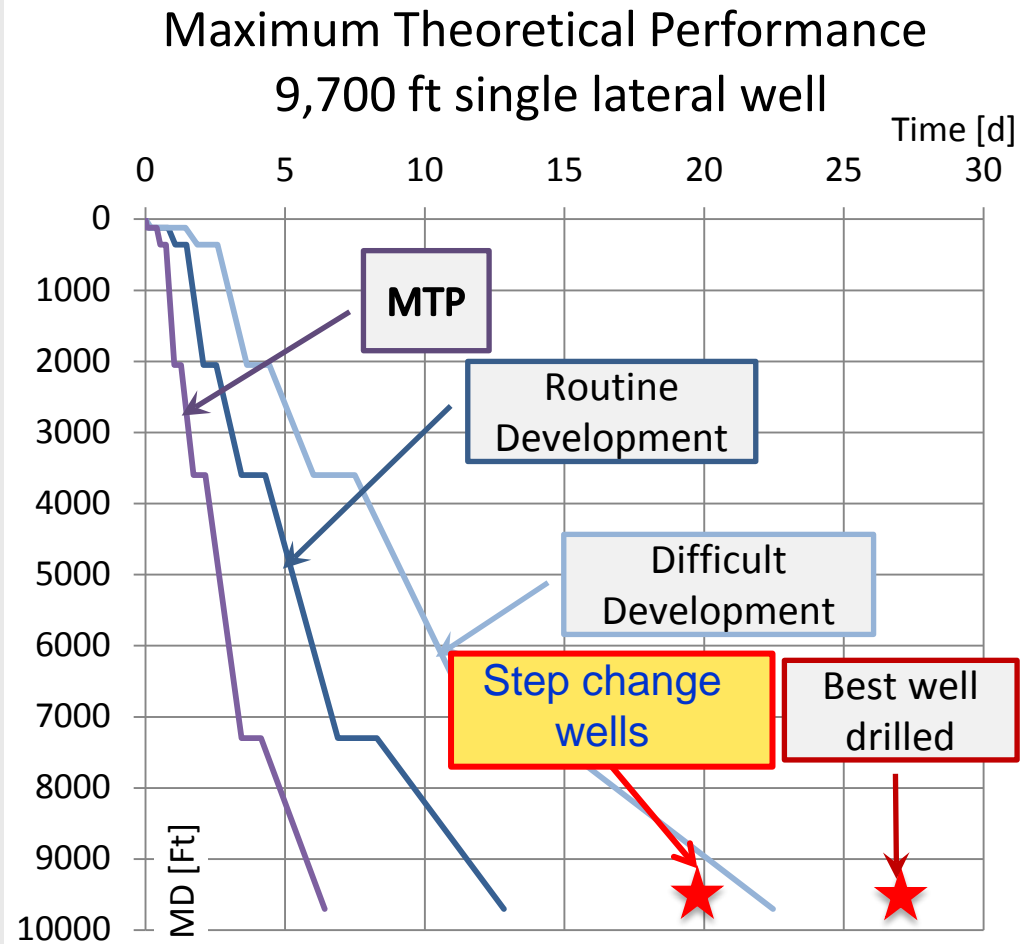


Case studies: MTP application

Mid East Land

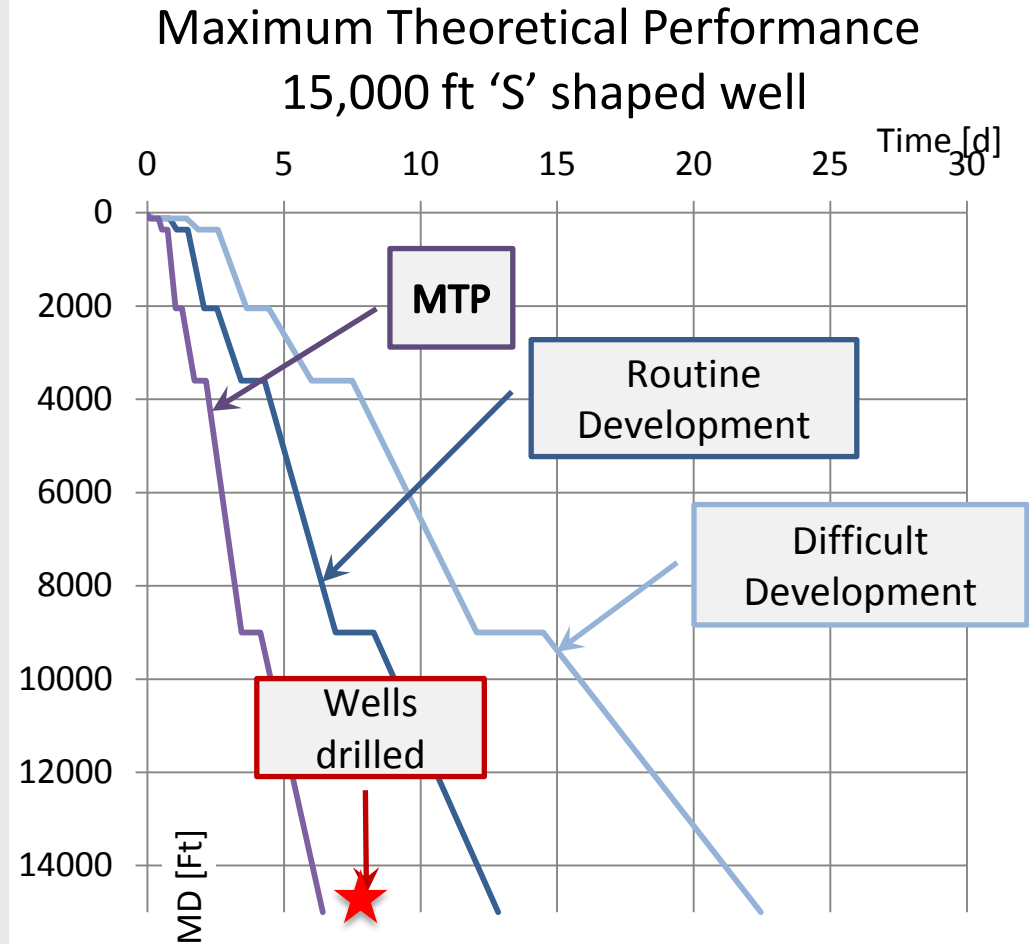
Drilling – Lump Sum

Project Managed



Case studies: MTP application

USA Land – “Super”
Performance Drillers



Drilling performance is now competitive advantage

Rig activity will be performance driven as never before

- Region to region: Europe is far behind / Mid East often wins on well production rates
- Operator to operator: drives well cost and production timing = profitability
- Project to project: drives NPV so drives well opportunities
- Contractor to contractor: winners and losers