



DEVEX 2022

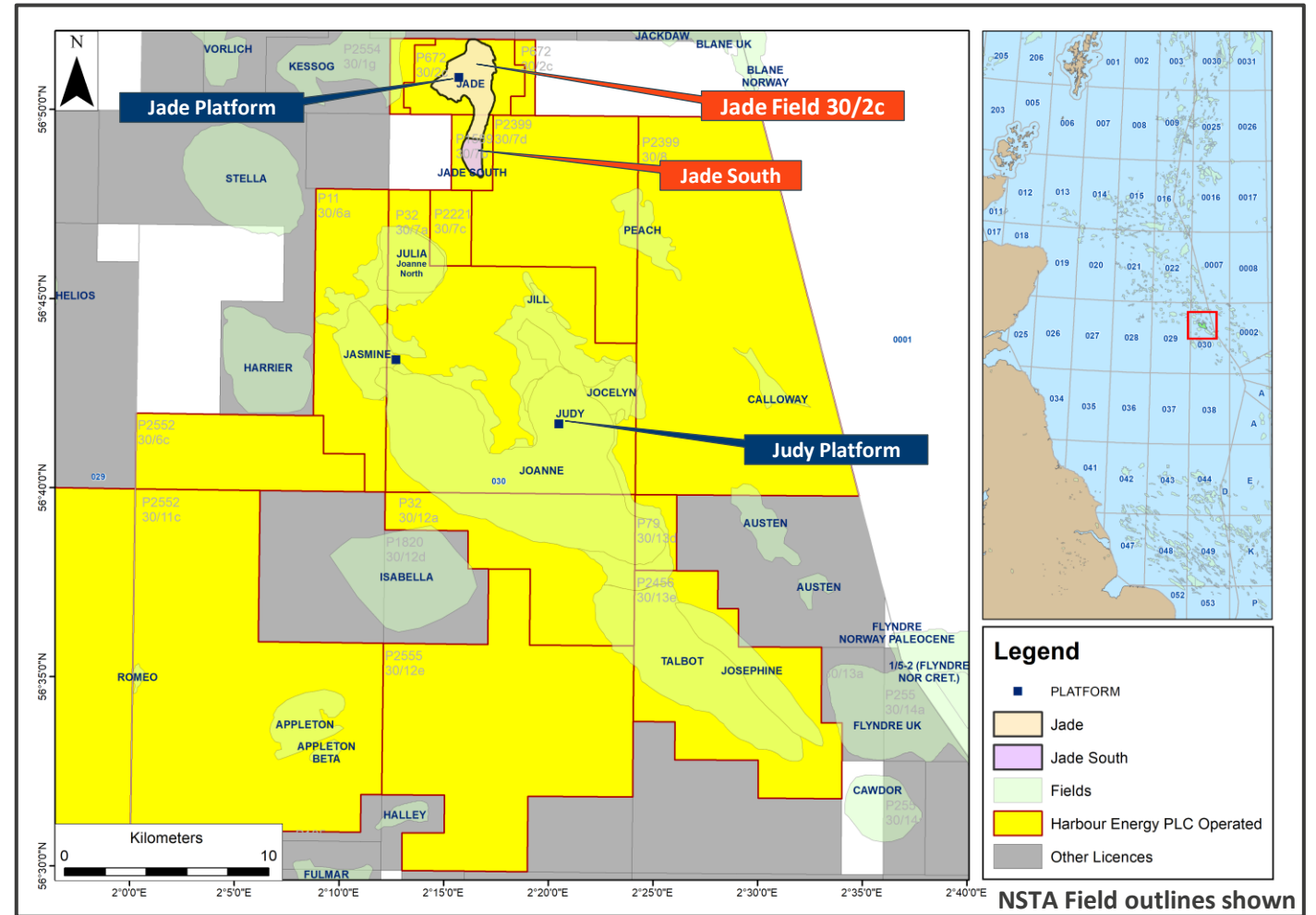
Jade south: extending the reach of the field

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DEVEX 2022 - 10 – 11 May 2022

Outline

- 1 Jade Field Overview
- 2 Opportunity Characterisation
- 3 Well Planning & Execution
- 4 Results
- 5 Conclusion

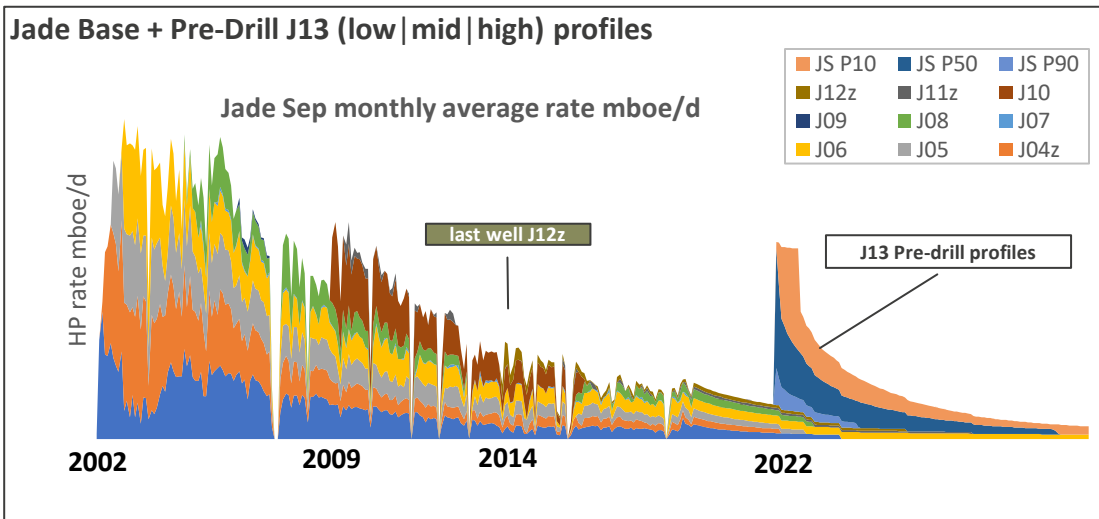
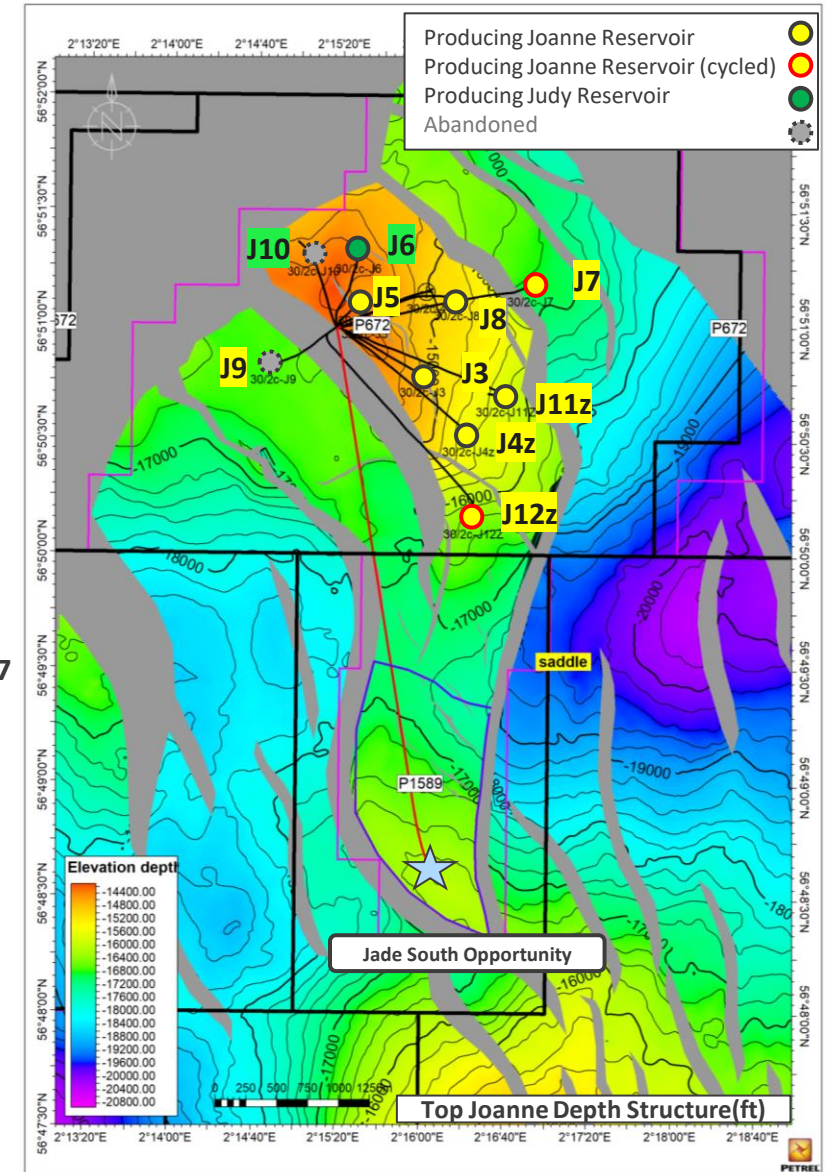


Jade Field Summary

- Top Joanne Pressure = 12,150 psi (838bar)
- Top Joanne Temperature = 330 °F (166°C)
- Gas Condensate
 - CGR = 192-66 bbl/mmscf
 - Dew point = 6100-8300psia
- **Joanne Sandstone**
 - GIIP 1.3 TCF
 - Column > 3000 ft
- **Judy Sandstone**
 - GIIP 250 BCF
 - Column > 1500 ft

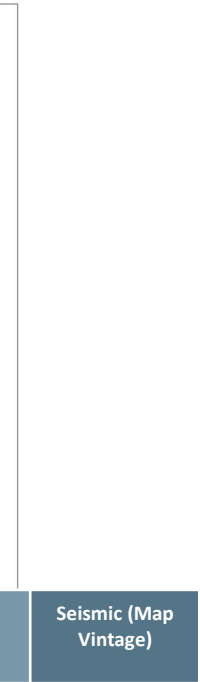
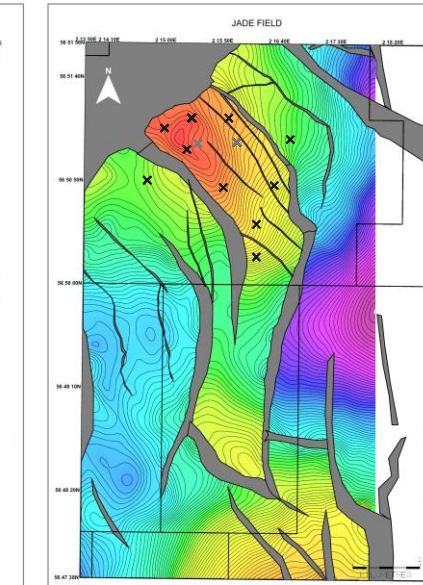
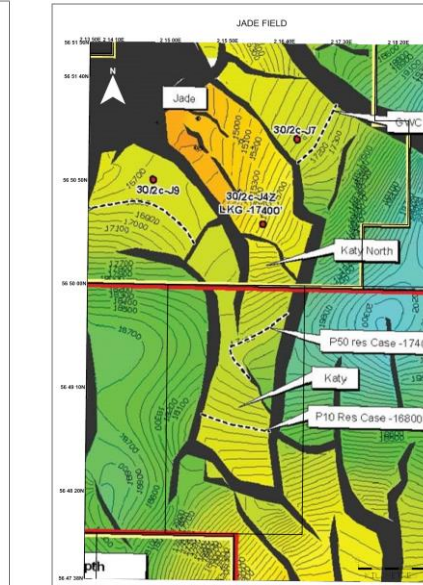
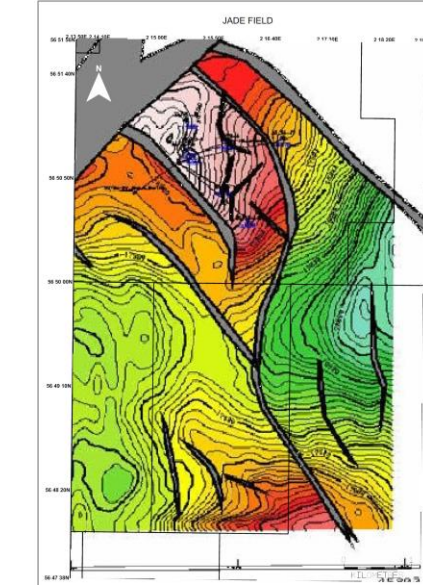
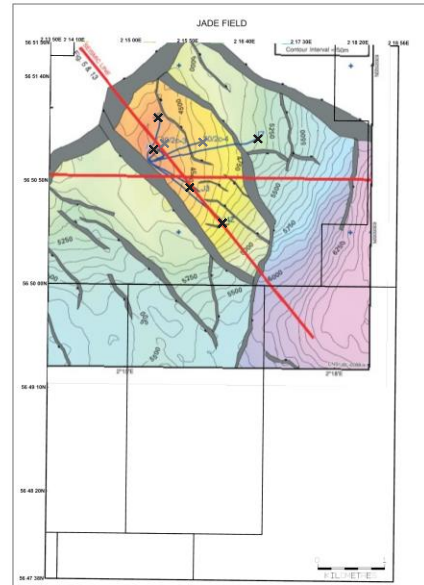
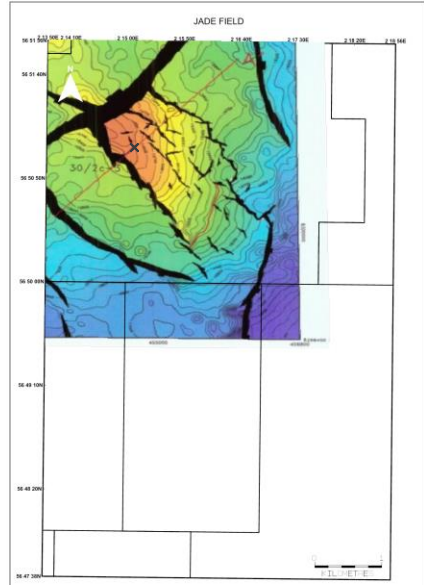
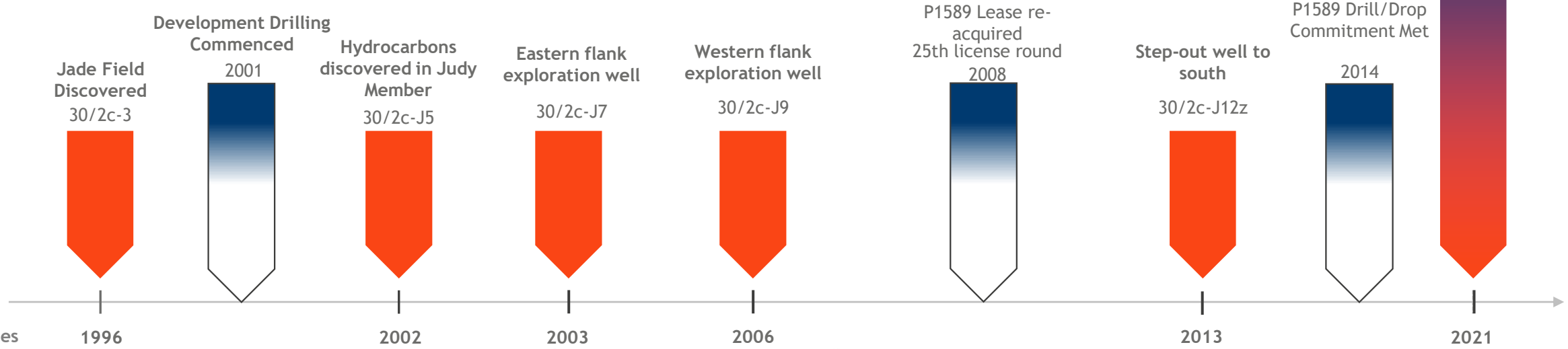


	LITHOLOGY	LITHOSTRATIGRAPHY	SOURCE/RESERVOIR
QUAT.			
SECTION NOT ILLUSTRATED			
EOC.			
PALAEOCENE	V V V V V V V V	BALDER	
		SELE / LISTA	
		FORTIES_SST	
		MAUREEN	
CRETACEOUS		EKOFISK	
		TOR	
		HOD	
JURASSIC		KIMMERIDGE CLAY	●
		HEATHER	●
		FULMAR	●
		PENTLAND	★
TRIASSIC		JOSEPHINE SST	●
		JONATHAN CLST	●
		JOANNE SANDSTONE	●
		JULIUS CLAYSTONE	●
PERMIAN		JUDY SANDSTONE	●
		SMITH BANK FM	●
PERMIAN		ZECHSTEIN	●
		ROTLEIENDES	●



Jade Field History

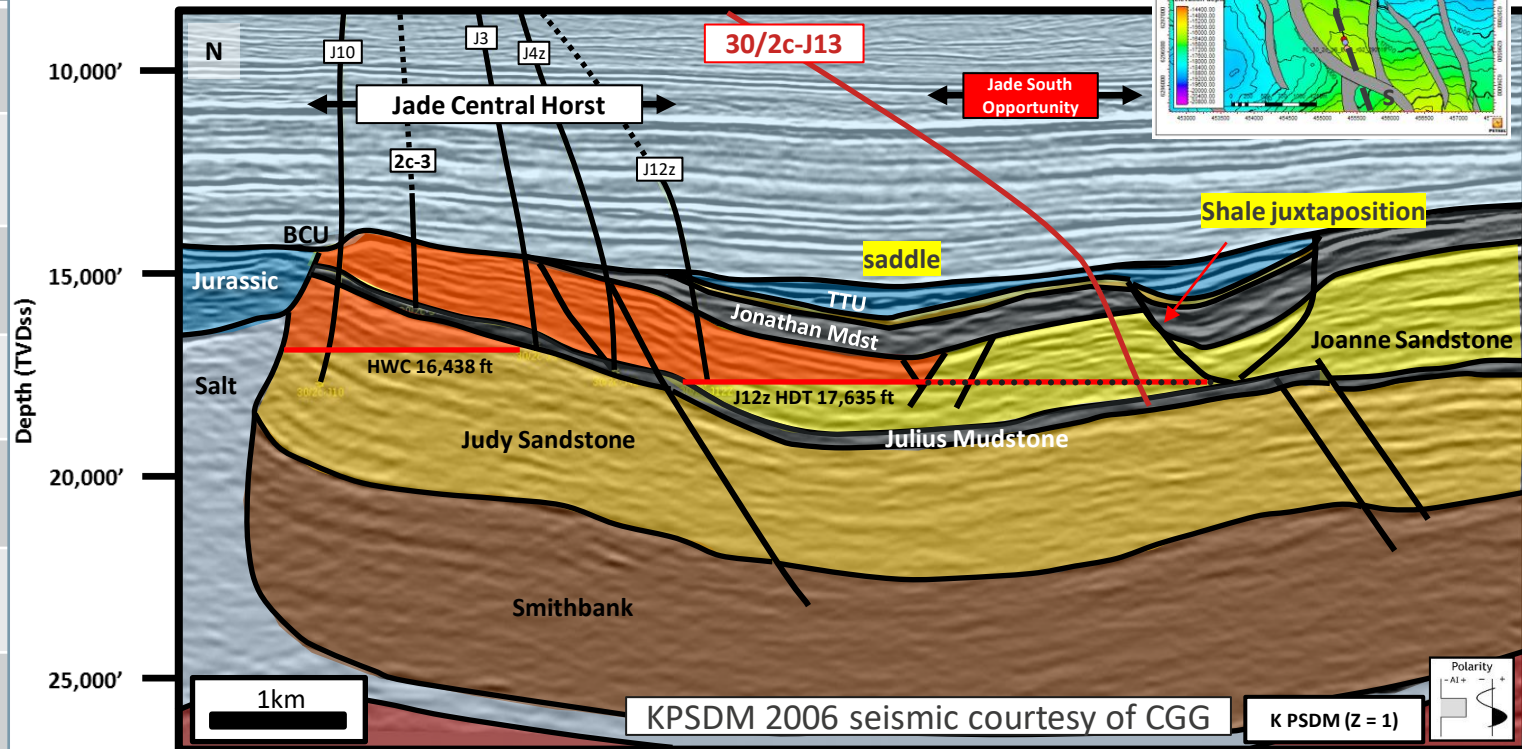
Jade South
30/2c-J13
Extreme Reach Well



Jade South | Material Near Field Opportunity

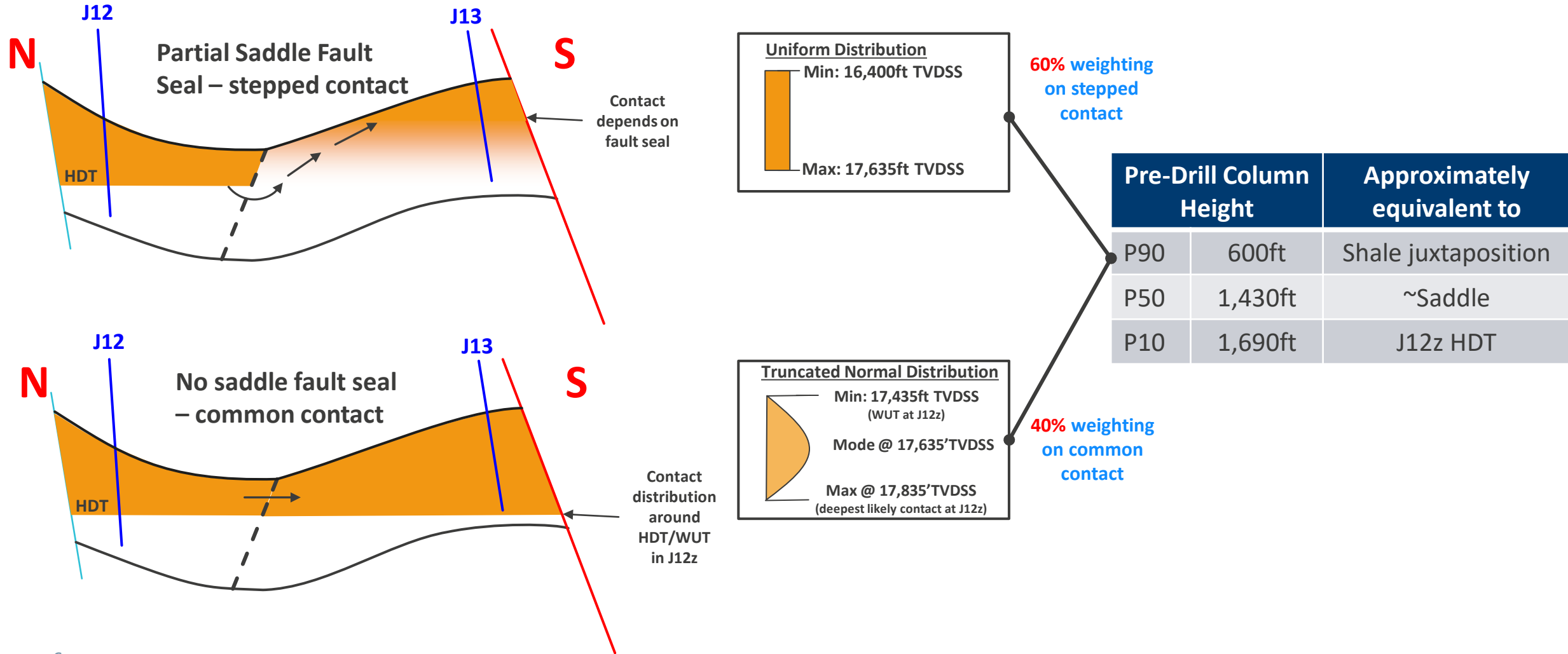
- Joanne sandstone structural closure across saddle from field but up dip of HDT proven by closest offset, J12z
- Accumulation of material hydrocarbon column reliant on top down charge through the Jade Field and effective fault juxtaposition seal to the south of the structure

Opportunity Summary – Jade South	
Primary Reservoir:	Triassic Skagerrak - Joanne Member Sandstone
Primary Trap:	Plunging Horst
Target Depth:	-16,000ft TVDSS
Structural Relief:	~1,400ft TVD
Primary Subsurface Uncertainty	Column Height
Reservoir Pressure:	12,450psi
Reservoir Temperature:	360°F (182°C)



Key Pre-Drill Subsurface Uncertainty | Column Height

- Independent trapping mechanism relative to Jade Field, some uncertainty on effectiveness of side seal
- Concern faults in saddle could act as an partial barrier to hydrocarbon migration into Jade South structure



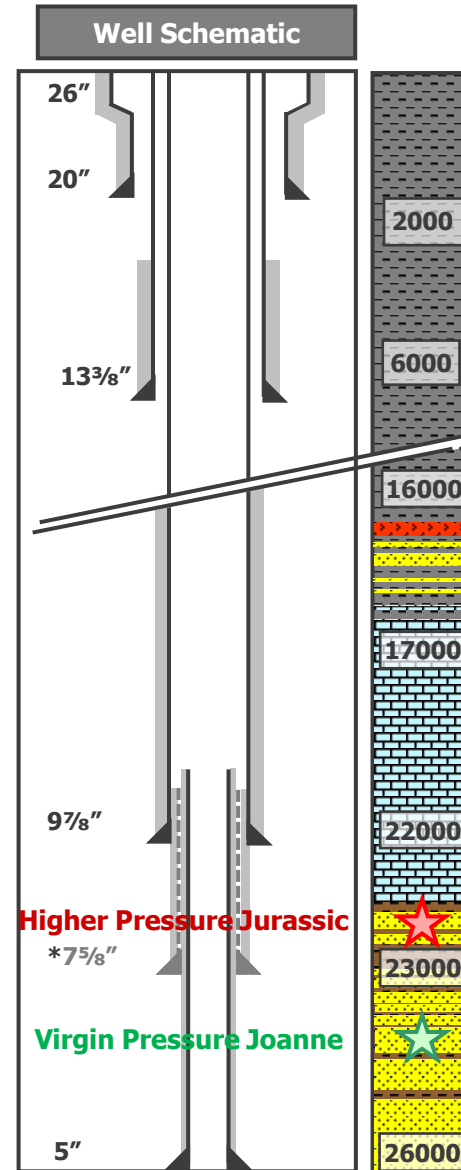
Well Planning

Challenges

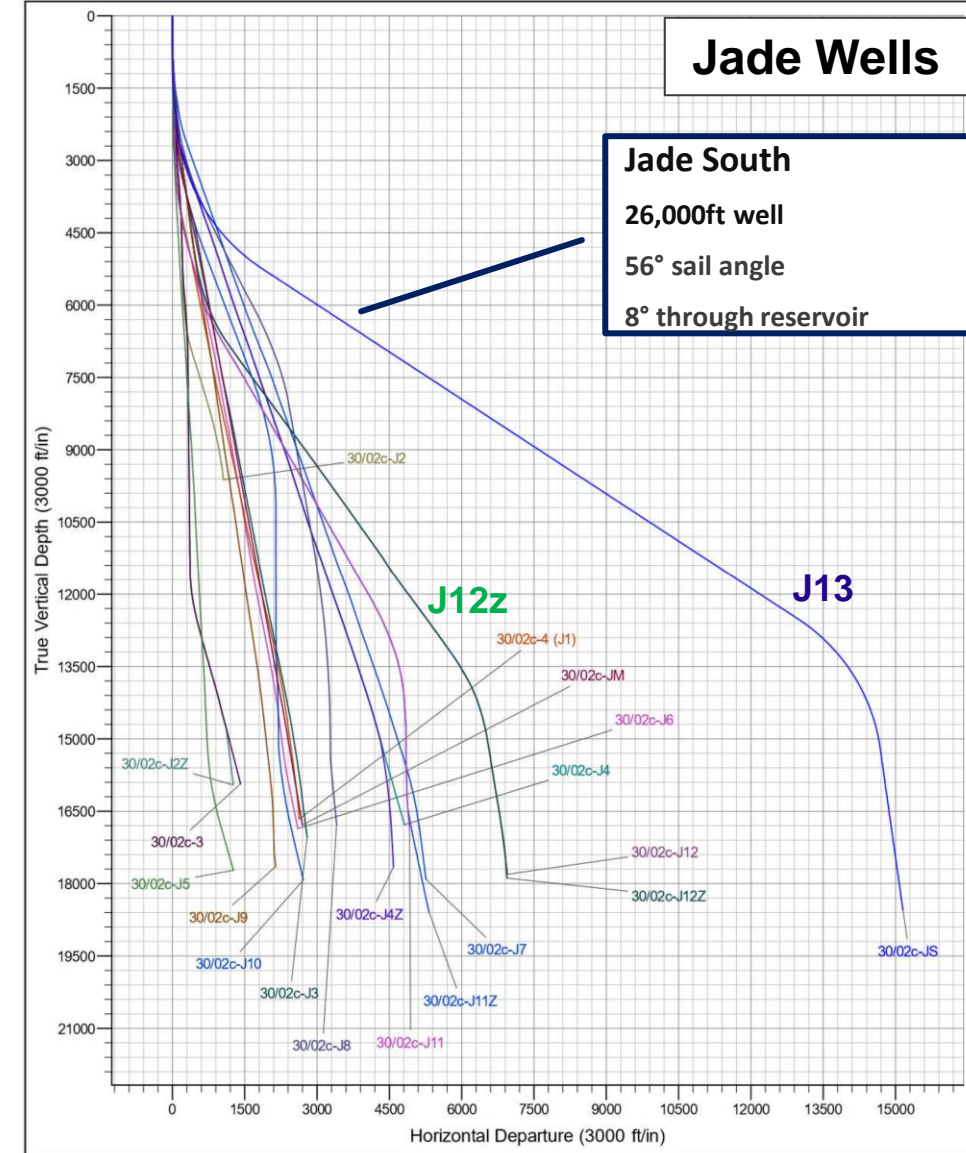
- High Pressure – 16.8ppg overlying 14.6ppg joanne
- High Temperature - 385°F at TD
- Longest step out HPHT well in the UKCS – 4.6km
- Potential for high H₂S relative to field average

Well Design

- K&M extended reach specialists involved in planning and execution
- Long 12-1/4" section
- MPD to manage tight MW window through secondaries
- 7-5/8" liner to isolate HP secondaries, as required
- 5-7/8" heavy duty drill string
- Higher spec. 26ppf S13Cr95 superchrome completion tubing
- LWD for formation evaluation
- E-line fluid samples for H₂S analysis



*contingent



Operational Outcome

Base Case Plan

- Drill entire reservoir section in 8-1/2"

Reality

8-1/2"

- Challenging hole conditions whilst drilling interval containing HC bearing secondaries
- GR/RES/NEU/DEN/DTC acquired on LWD in real-time
- Wireline samples cancelled
- 7-5/8" liner set above primary reservoir

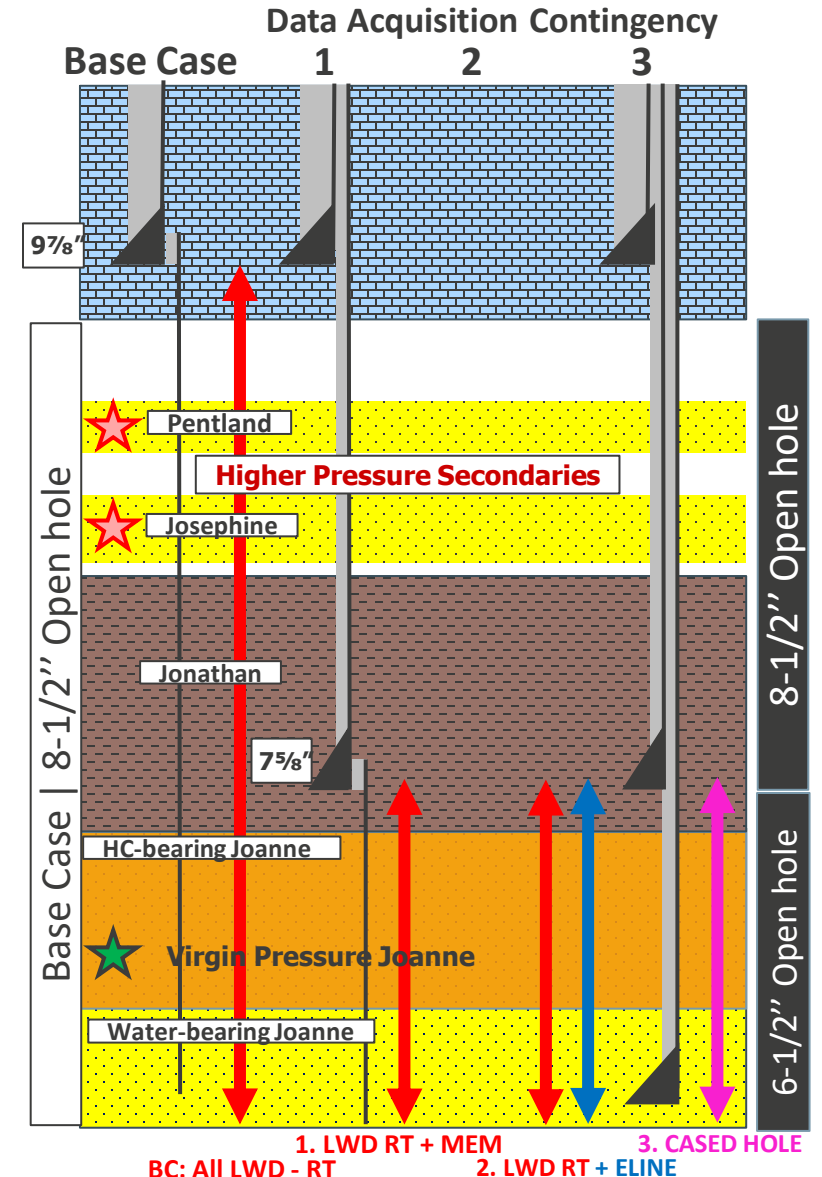
6-1/2"

- LWD (GR/RES real-time & N/D memory not possible as NEU/DEN sensor was not available
- Ran LWD GR/RES real-time with plan to secure missing data with Eline on TD
- Reservoir presence, column height & TD defined in real-time by LWD
- Eline logging operations cancelled following 2 failed attempts
- Proceeded to running the 5" liner

4.05" Cased Hole

- Cased hole programme put in place to satisfy requirement for porosity data
- Hydrocarbon sampling performed from production stream at surface
 - H₂S in line with field average

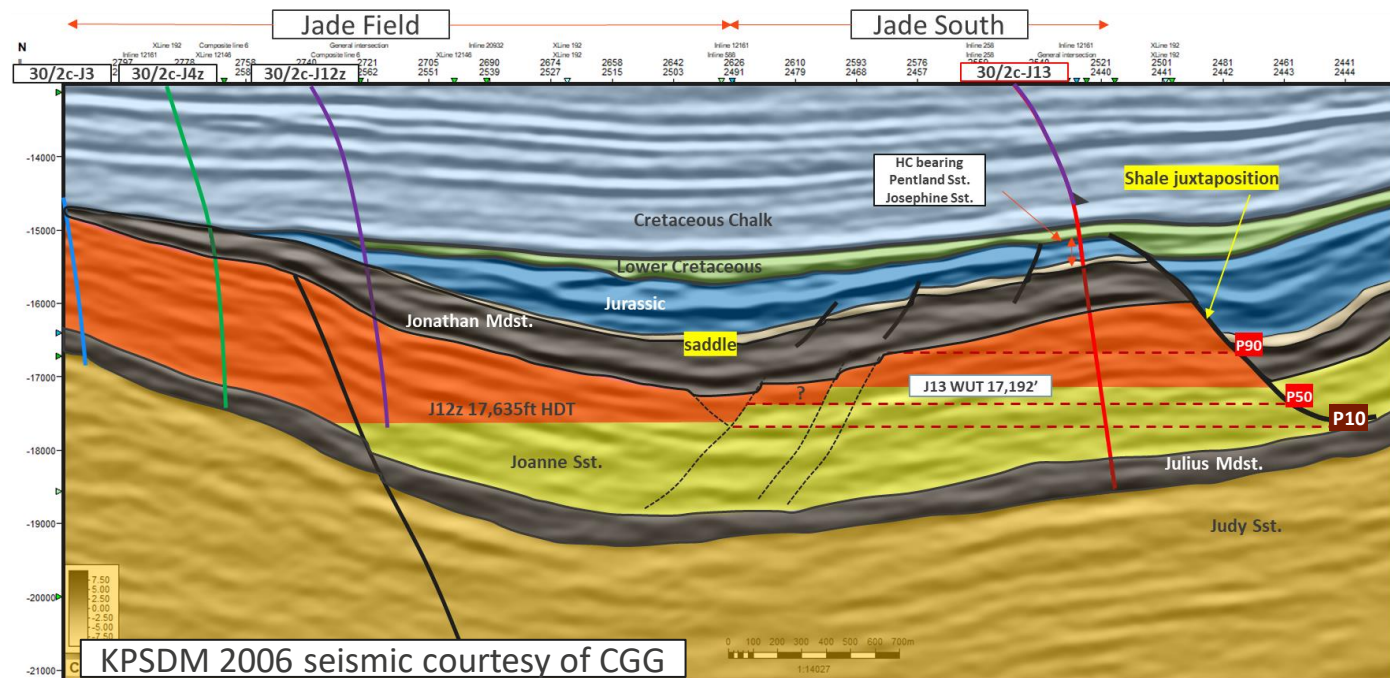
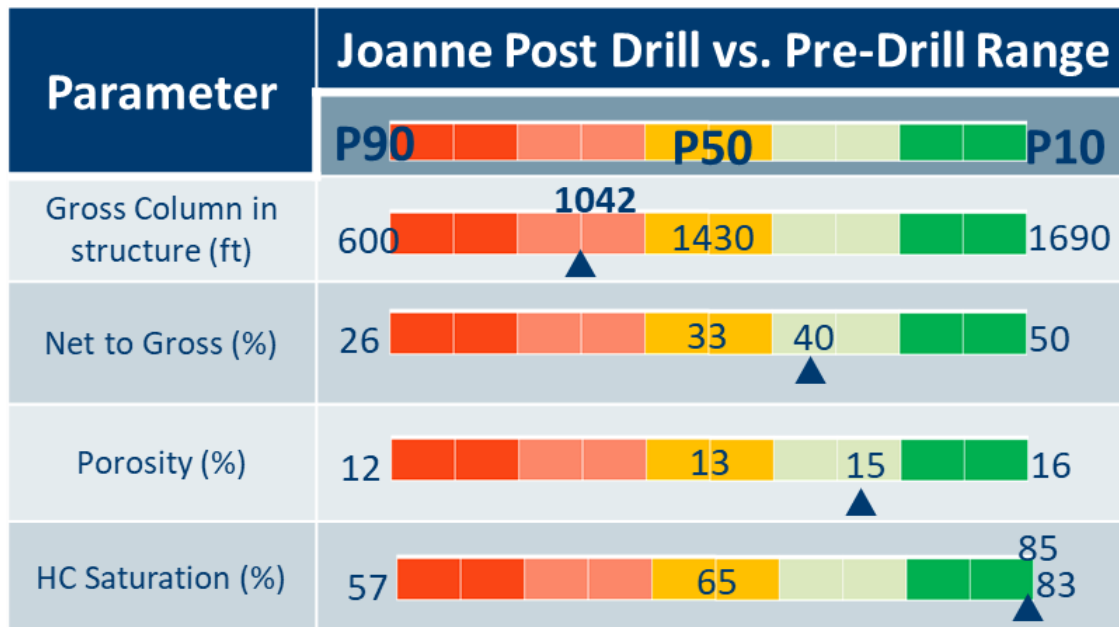
- Budgeted days 74%
- Budgeted gross cost 83%



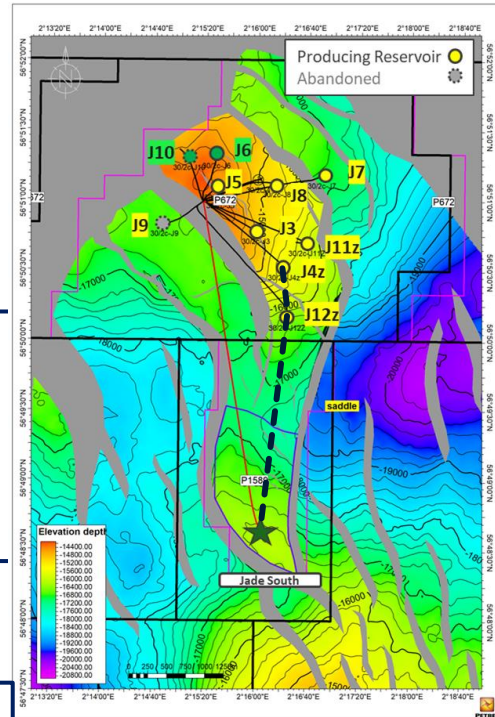
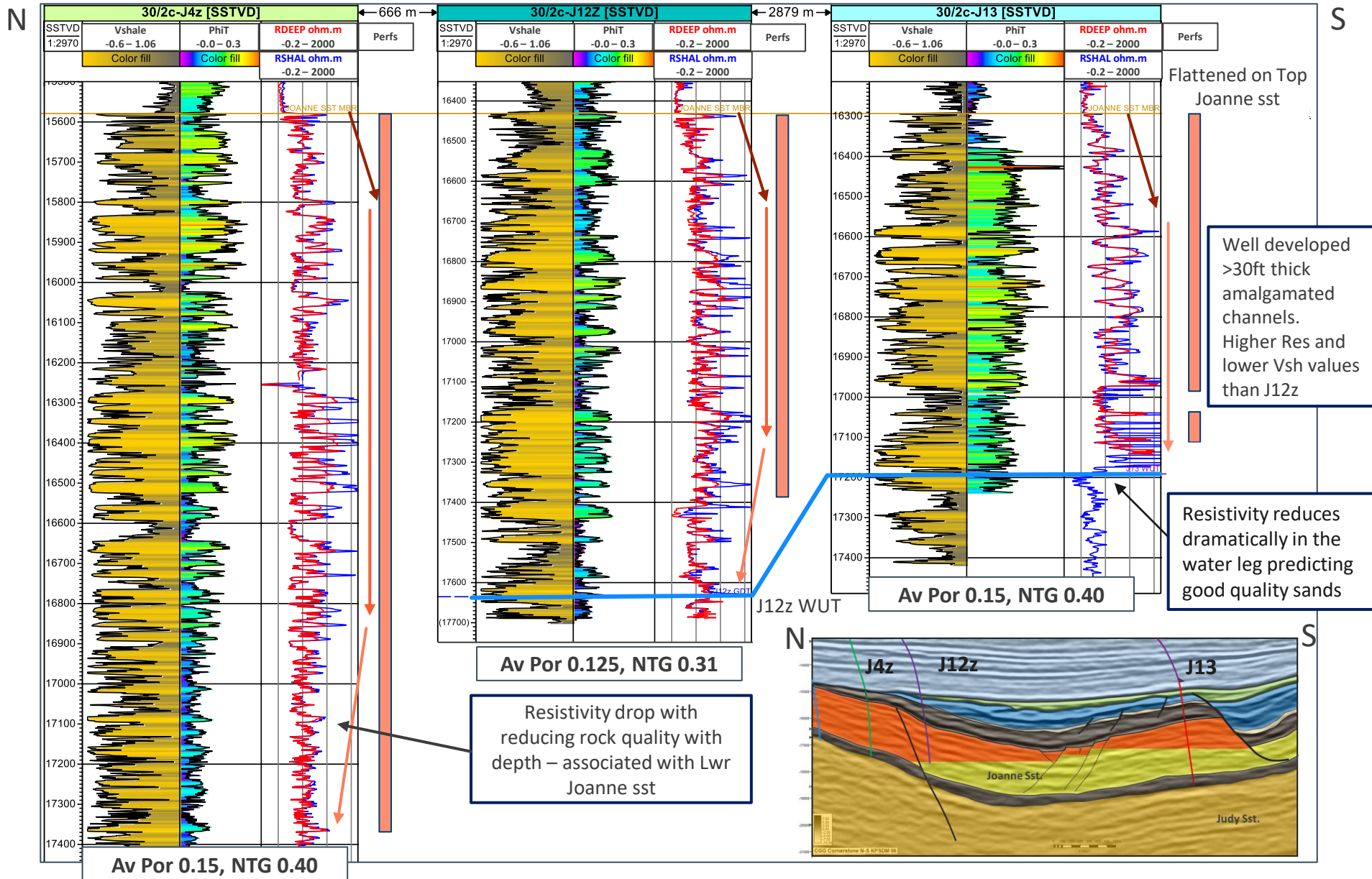
Joanne Result | Real-time (GR/RES) + Cased hole Sonic and Neutron

Geological Outcome

- Hydrocarbon bearing primary reservoir; 900ft in Joanne Sandstone, 1,042ft in the structure
 - Equivalent to a Pre-drill P69 hydrocarbon column
- Reservoir quality in line with pre-drill expectations [cased hole sonic & neutron]
- Hydrocarbon bearing secondary reservoirs; 120ft Pentland and 90ft Josephine
 - Static properties compare favorably to offsets
 - Perforation candidate for later in well life.



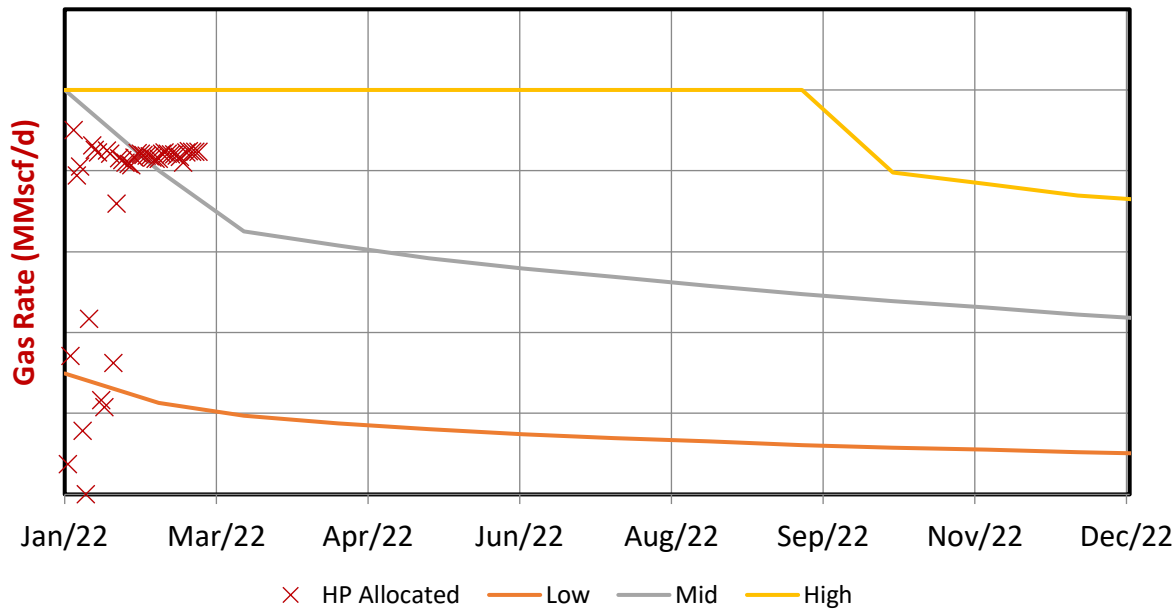
Reservoir Characteristics



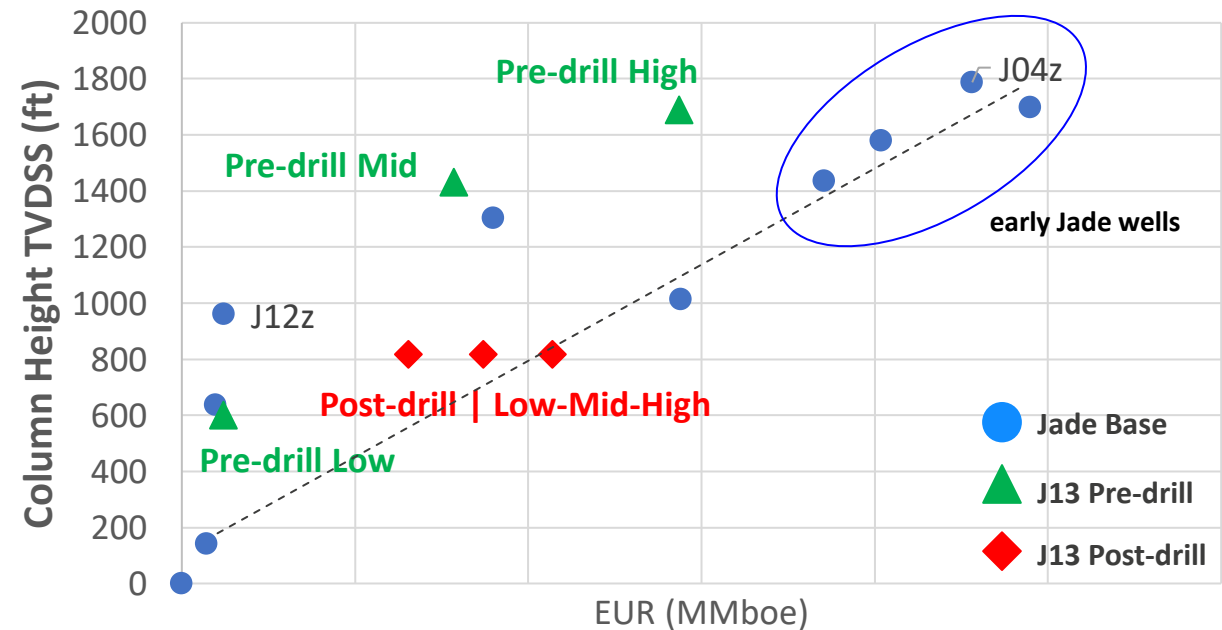
J13 Performance

- J13 despite the smaller hydrocarbon column vs. J12z, is expected to outperform it
- Ahead of budgeted P50 rate
- Initial results show that J13 is behaving more on trend with the early Jade wells

Initial J13 Gas Rate vs. Budget (Separator)



Jade Field Column Height (perforated in well) vs EUR (Joanne & Judy Reservoirs)



Conclusion

Key Outcomes

- J13 is the longest step out HPHT well in the UKCS
- Executed safely & ahead of budget
- Total well days vs. feet drilled was P25 outcome versus Rushmore data base
- Despite P69 HC column outcome, well performance in line with Pre-drill P50 expectations
- H2S in line with field average

Learnings

- Built capacity in extended reach drilling
 - Potential to unlock future near field opportunities
- Effective methodology for defining column height range
- Outcome demonstrates need for multiple data acquisition contingencies

Acknowledgements

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