



Drilling 3 Mile Horizontal Wells in the Williston Basin

February 17, 2016

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Overview

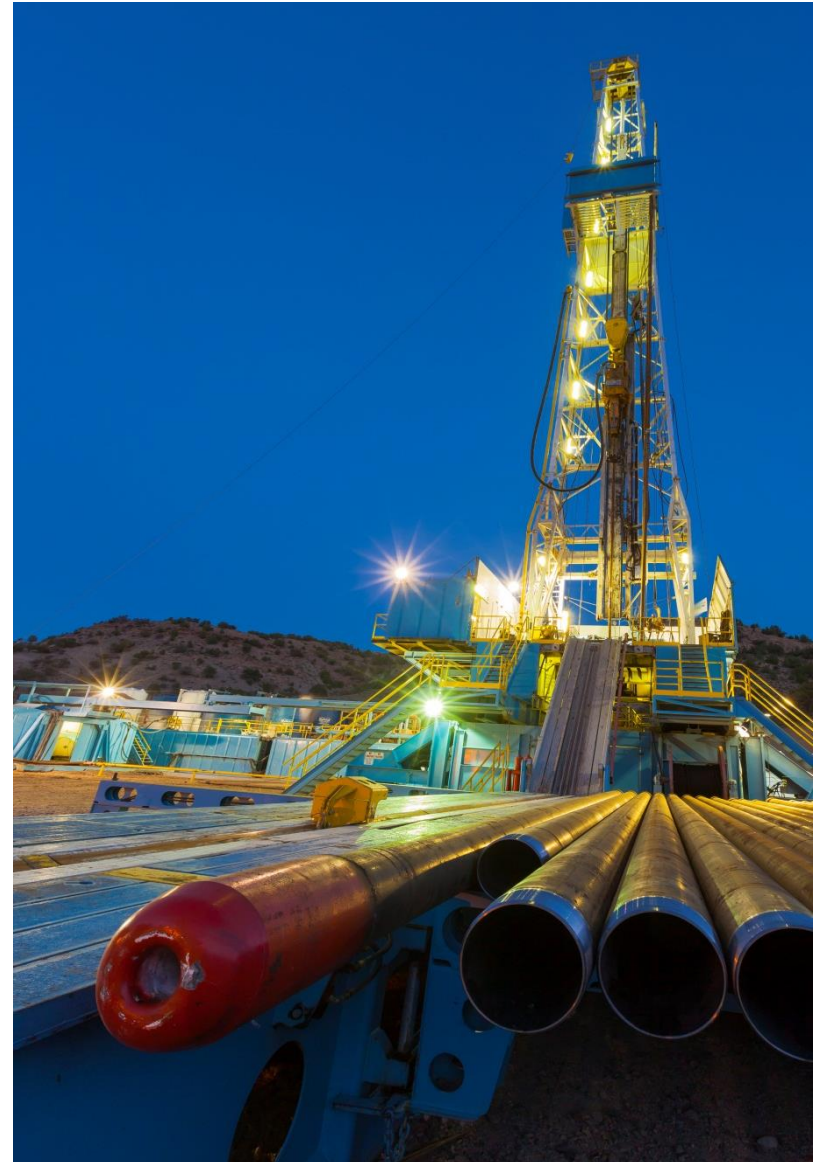
Williston Basin Introduction

Why 3 Mile Laterals?

Pad Progression

Drilling Analytics

Conclusion



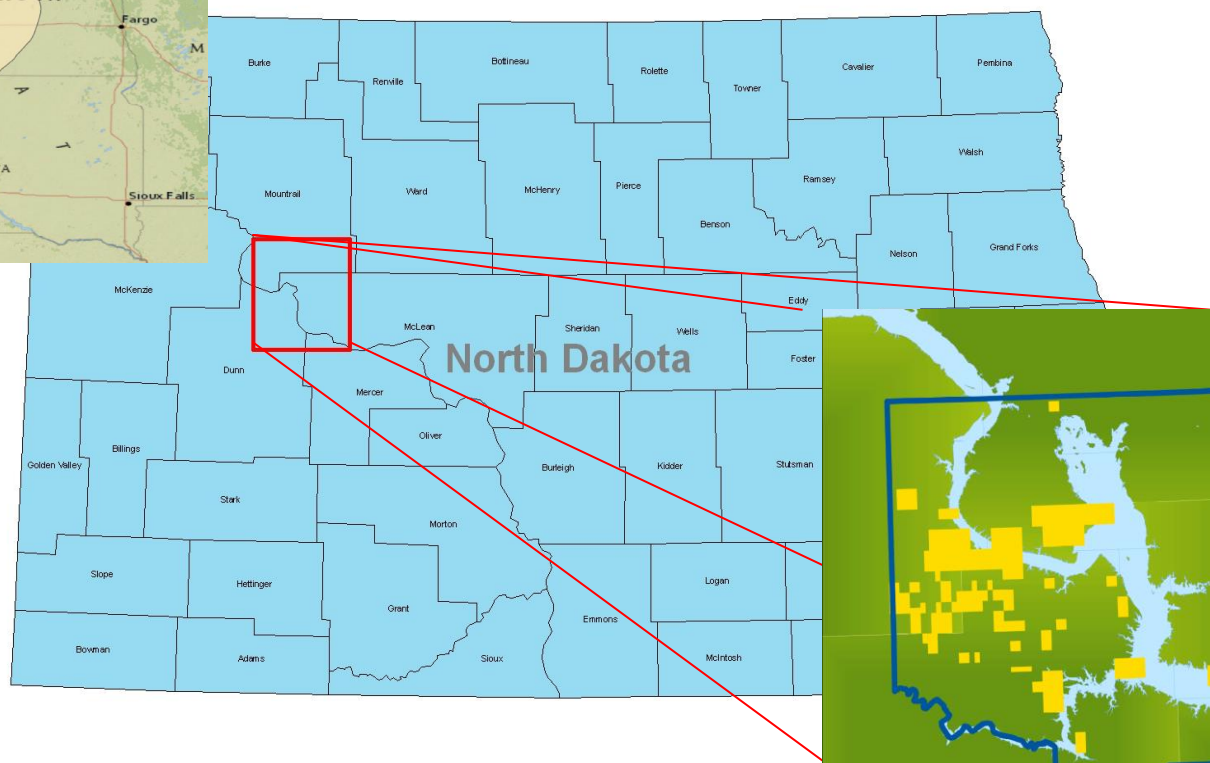
Williston Basin Introduction



Active in North Dakota since late 2010

85,000 net acres on FBIR

Proved reserves of 119 mmbbl



Why 3 Mile Laterals?

2 Units Extend from Van Hook Peninsula under Lake Sakakawea

13 Wells Total, 9 laterals drilled already

Expected Challenges

High T&D

Small geo windows

Tool failures

Design Highlights

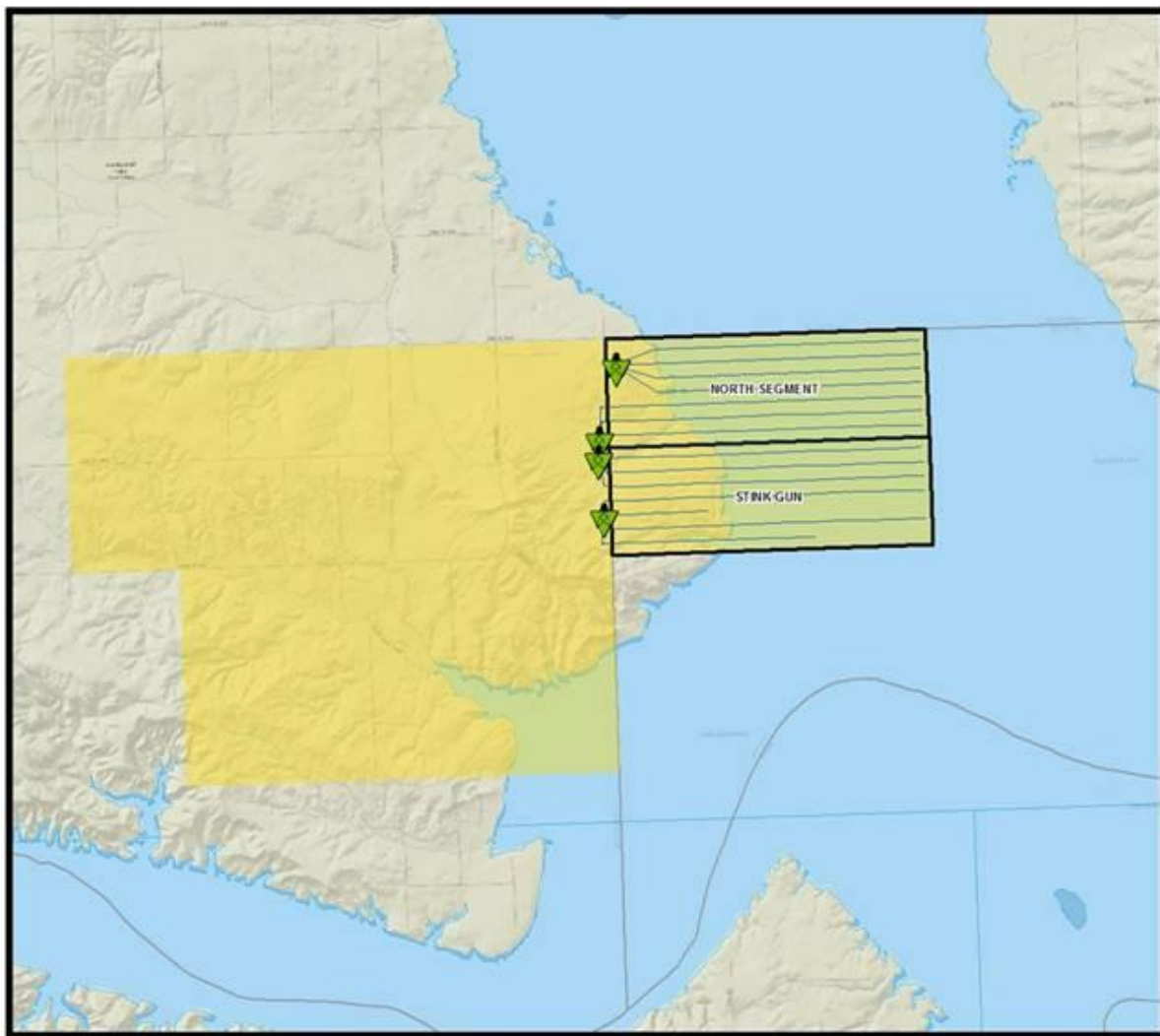
No major changes to casing design*

More robust liner running BHA

Increased centralizer count on liner

RSS for backup

7500 psi circulation system



Edward Flies Away Pad

Edward Flies Away 7-8-9HZ

25,575' MD

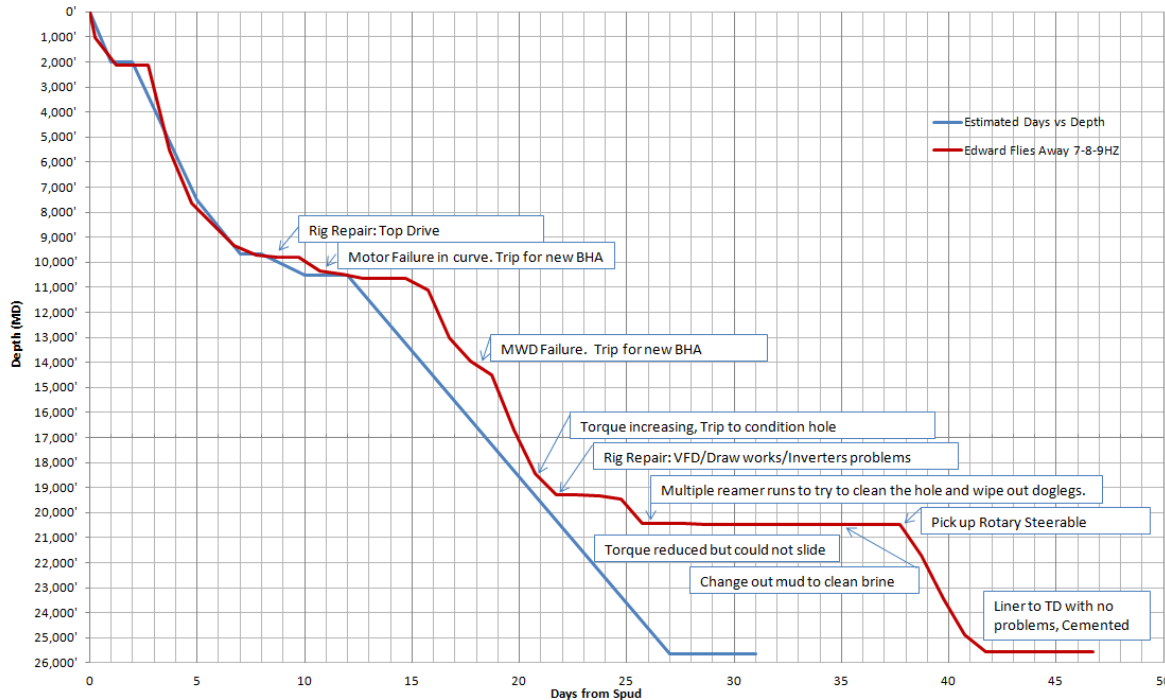
46.6 days STR

Motor and MWD failures early in the lateral

Multiple reamer runs to clean hole

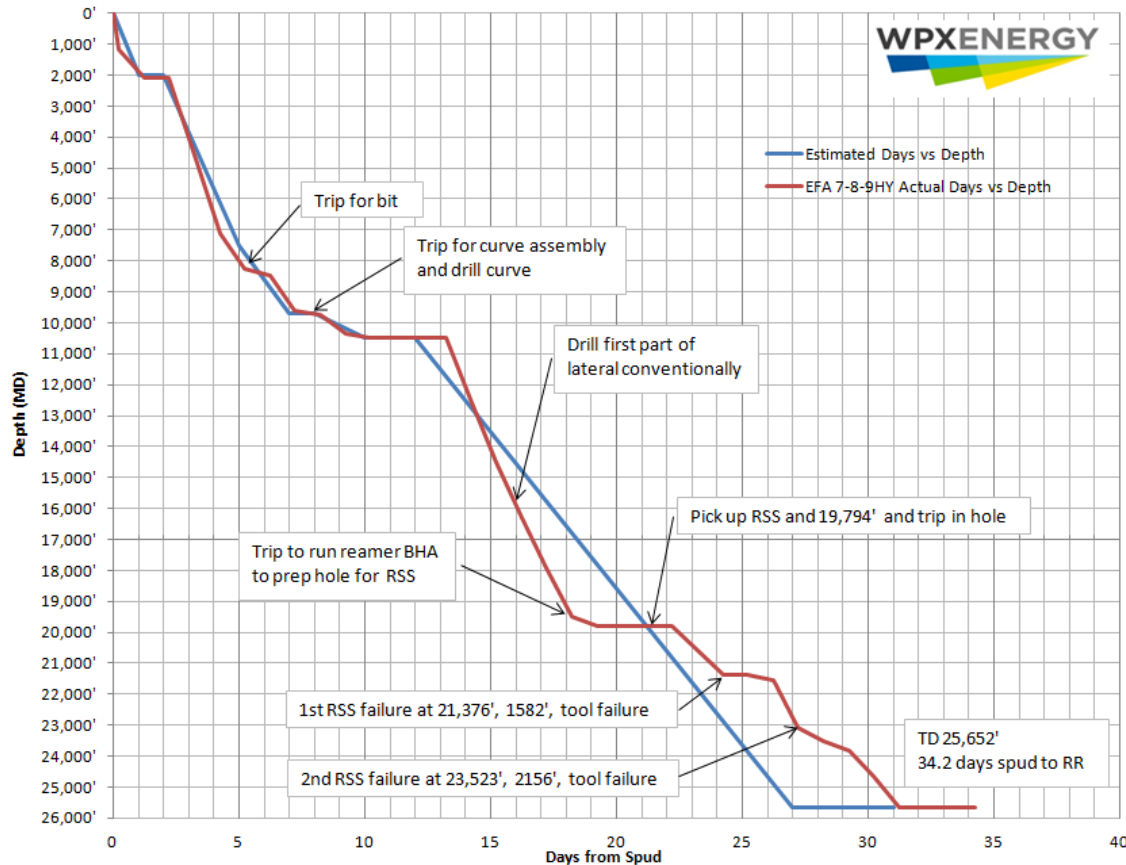
Conventional assembly to 20,471', finished well off with SLB RSS

Liner to bottom with no issues



Edward Flies Away Pad

Edward Flies Away 7-8-9HY



25,652' MD

34.23 days STR

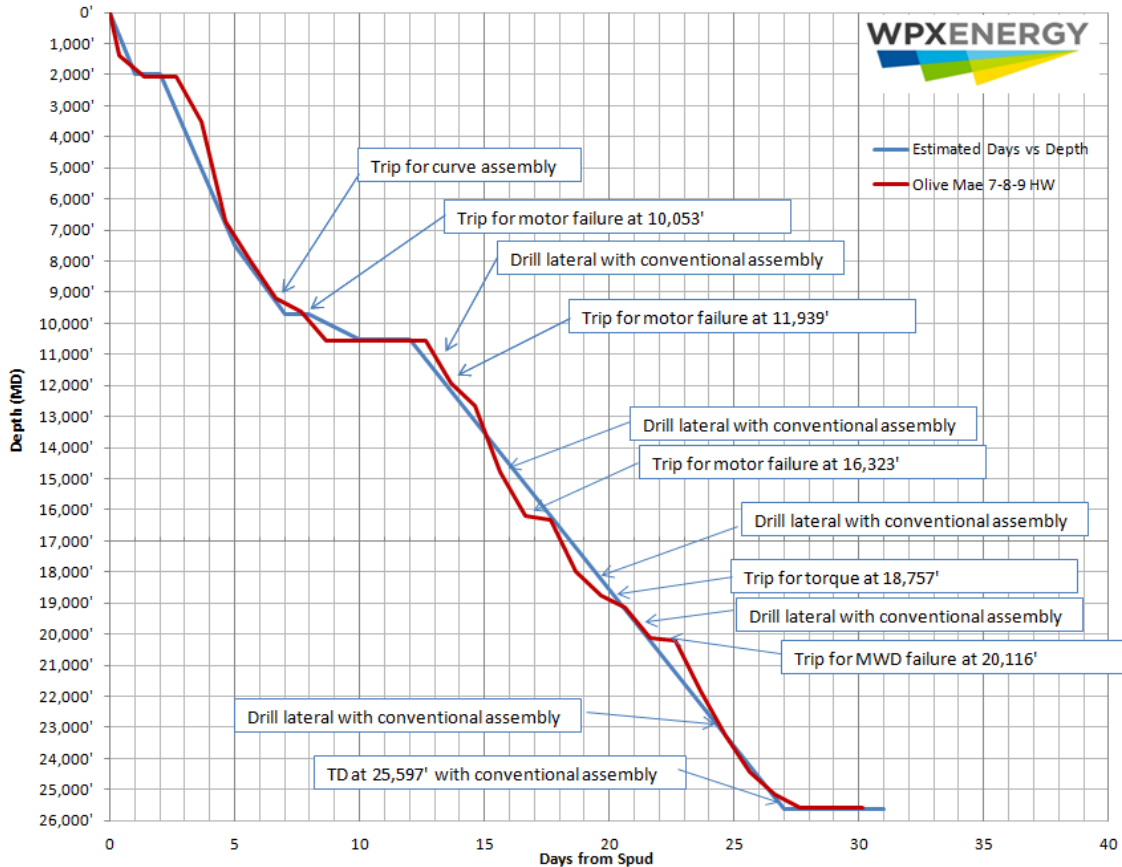
Dedicated reamer run for RSS

Conventional assembly to 19,794',
finished well off with SLB RSS

RSS tool failures at 21,376' and
23,523'

Liner to bottom with no issues

Olive Mae 7-8-9HW



25,597' MD

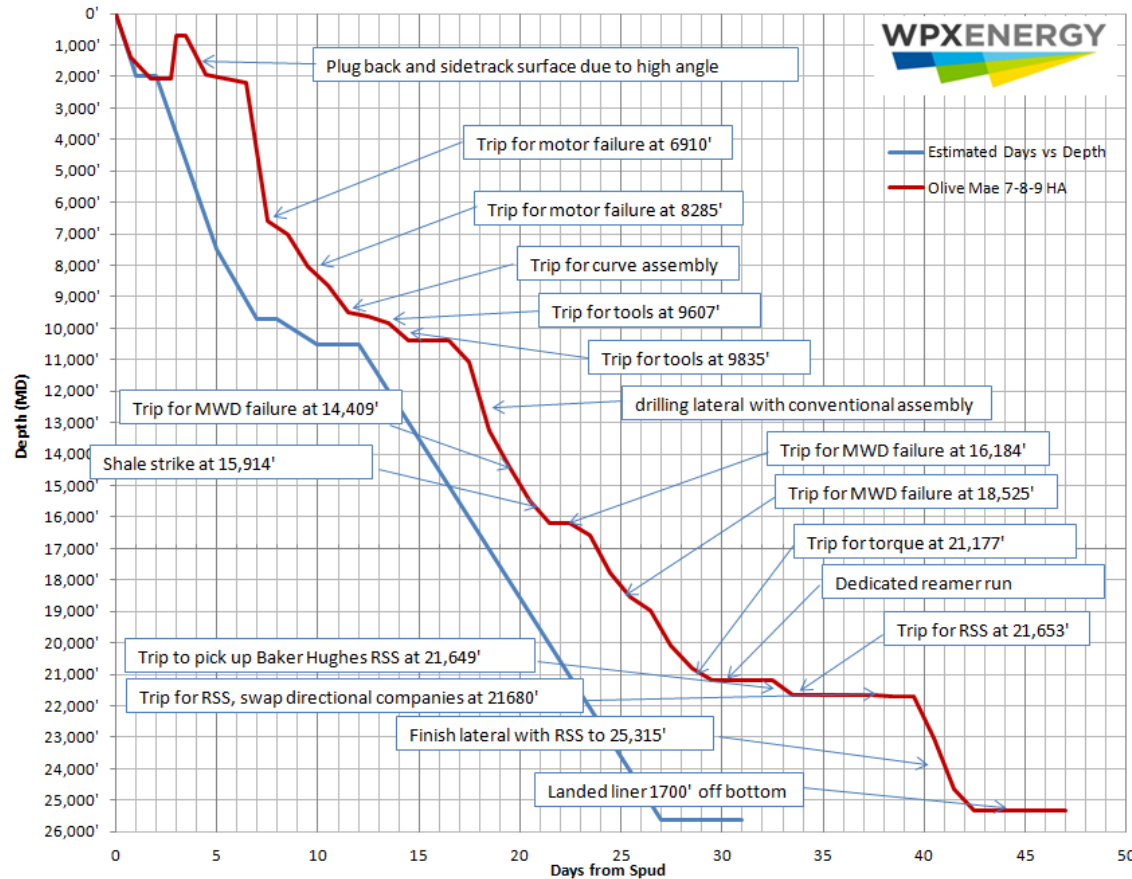
30.15 days STR

Motor and MWD failures early in the lateral

TD'd well with conventional assembly

Liner to bottom with no issues

Olive Mae Pad



Olive Mae 7-8-9HA

25,315' MD

46.98 days STR

Plug back and sidetrack in surface hole

Multiple MWD failures in the lateral

Shale strike at 15,914'

Dedicated reamer run

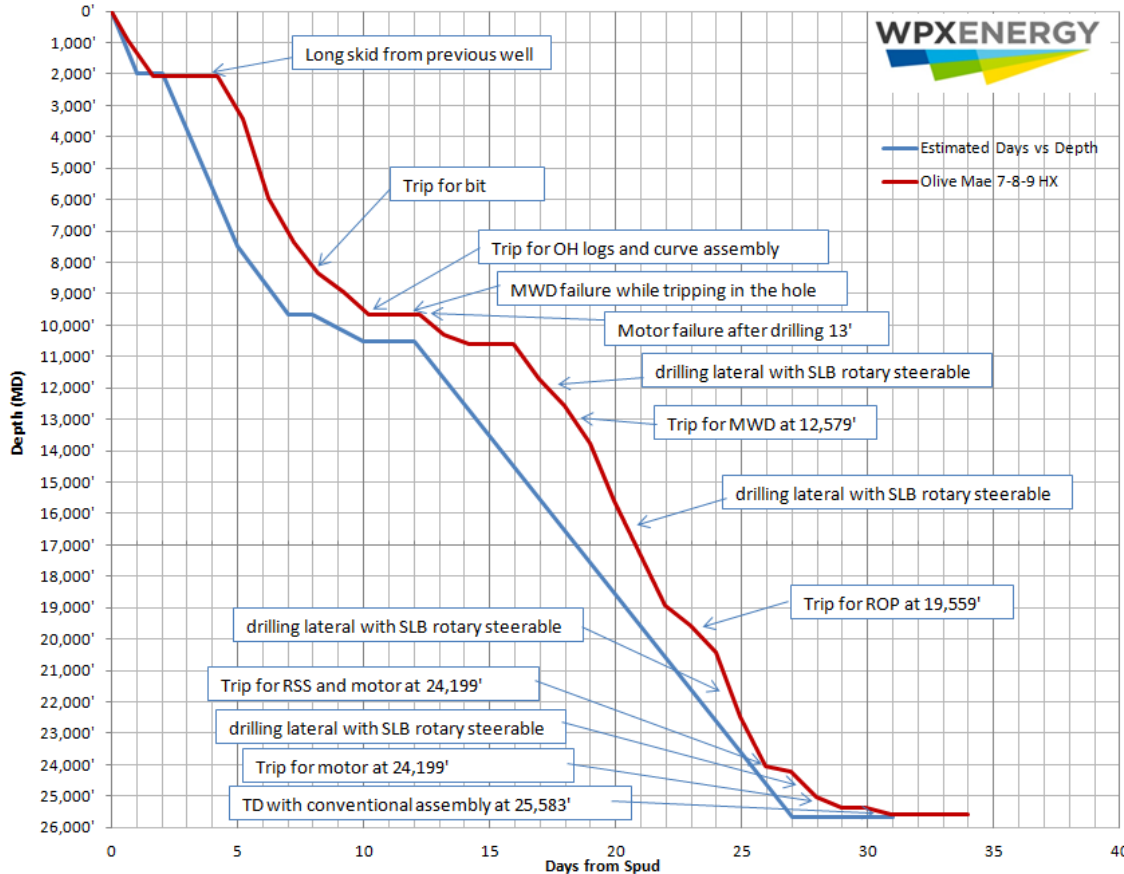
Conventional assembly to 21,177', picked up Baker Hughes RSS

Swapped directional companies after multiple failures while tripping

Finished with SLB RSS

Liner landed 1700' off bottom

Olive Mae 7-8-9HX



25,583' MD

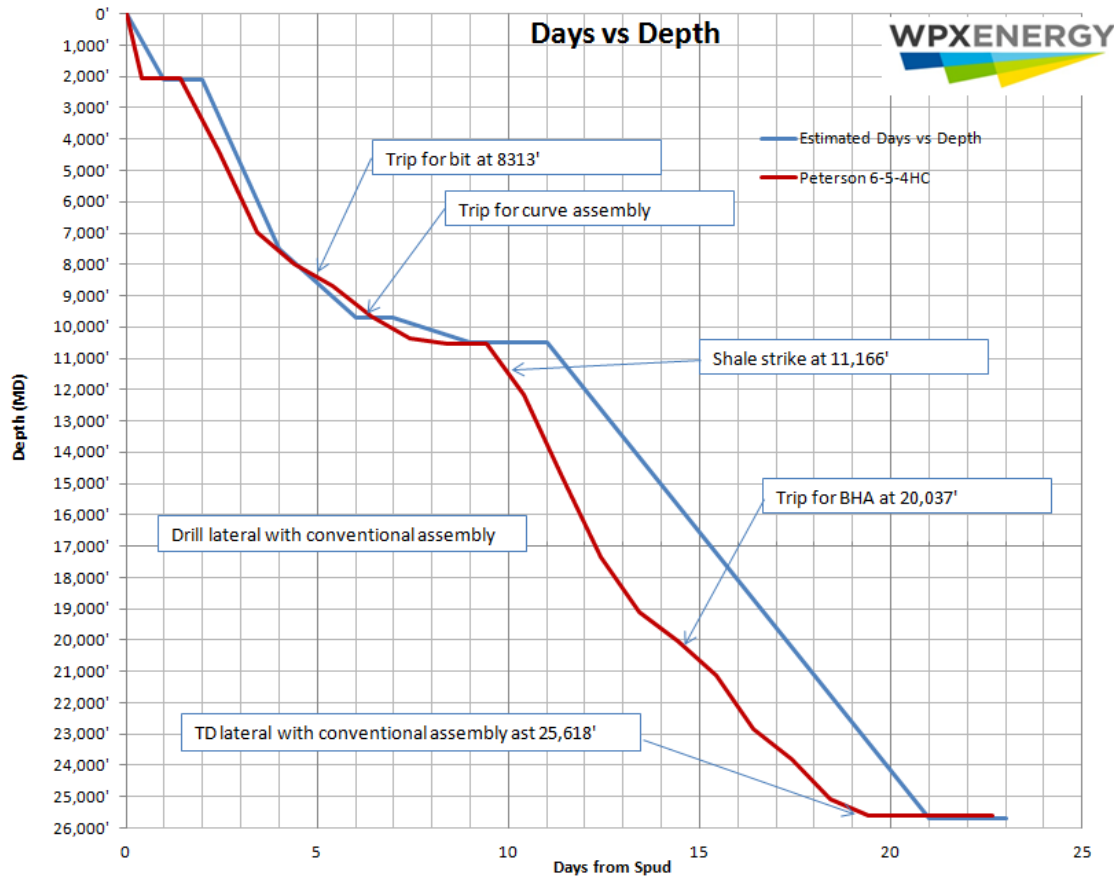
33.96 days STR

**Drilled with RSS to 24,199',
finished off with conventional
assembly**

Drilled 6980' with one RSS

Liner to bottom with no issues

Peterson Pad



Peterson 6-5-4HC

25,618' MD

22.67 days STR

Shale strike early in the lateral

TD'd conventionally

Liner to bottom with no issues

Peterson Pad

Peterson 6-5-4HQ

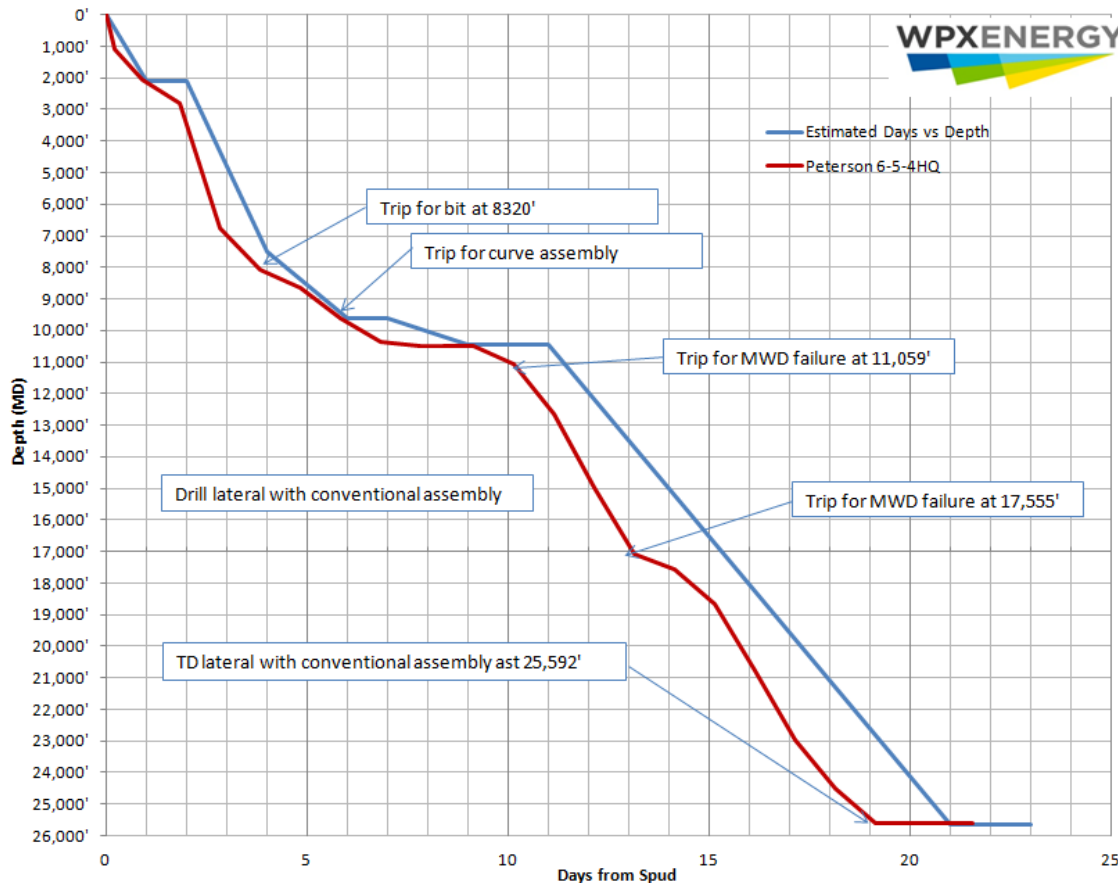
25,592' MD

21.56 days STR (fastest on the pad)

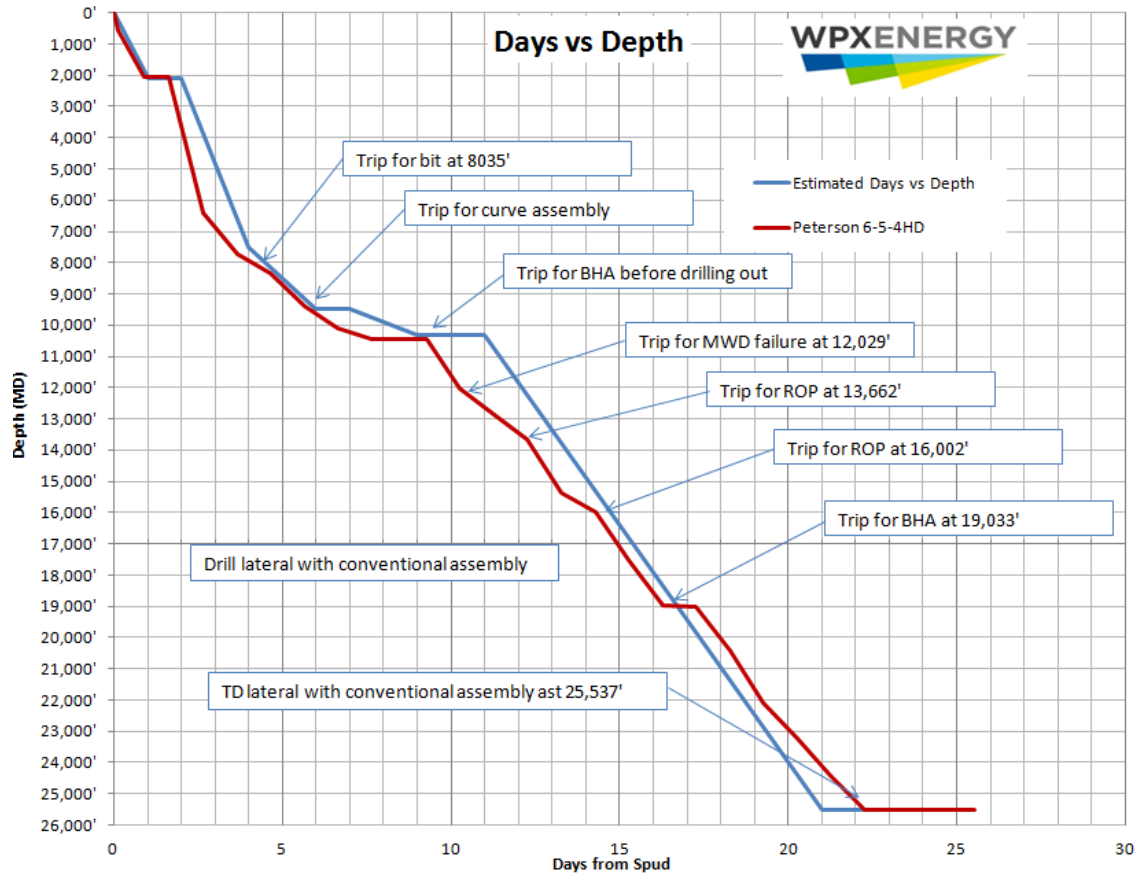
MWD failure early in lateral

TD'd conventionally

Liner to bottom with no issues



Peterson Pad



Peterson 6-5-4HD

25,537' MD

25.52 days STR (slowest on the pad)

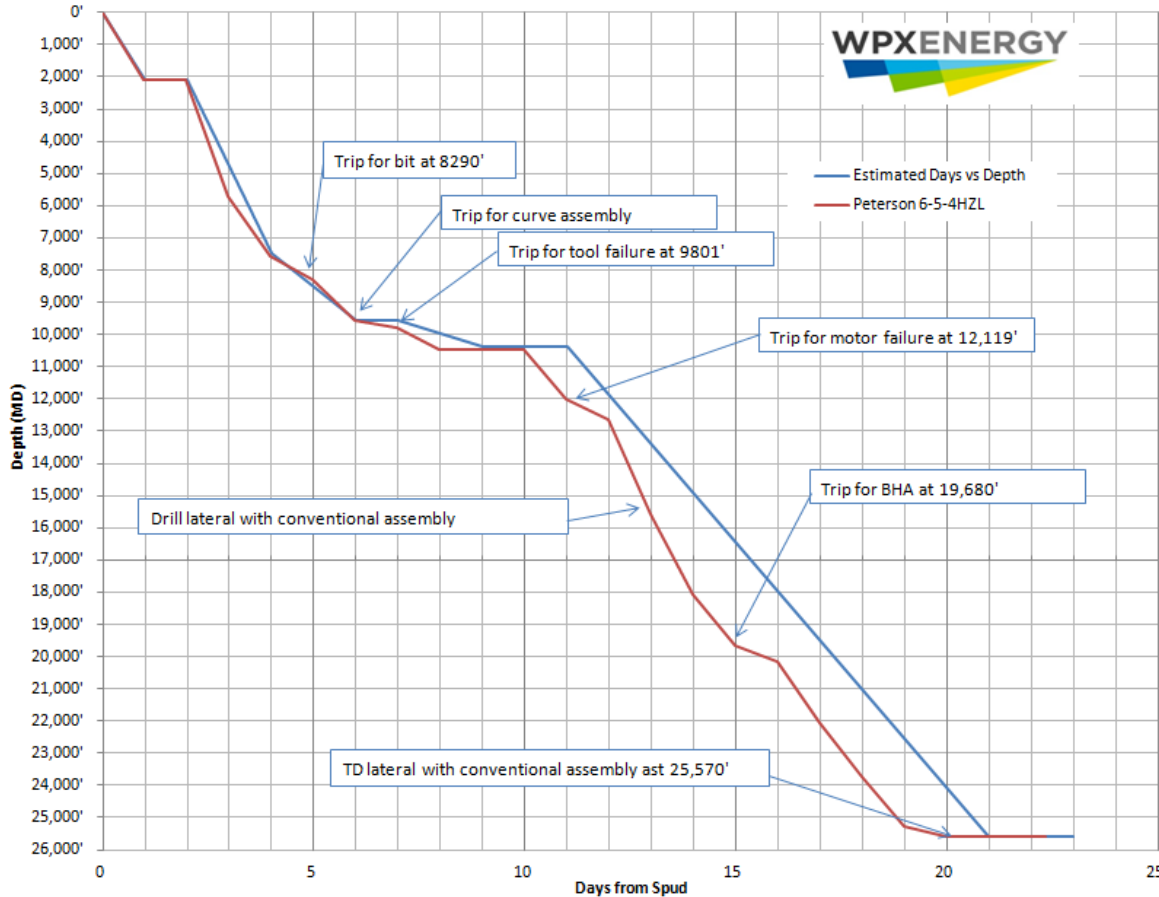
2 MWD failures early in lateral

Bit failures from geology change

TD'd conventionally

Liner to bottom with no issues

Peterson Pad



Peterson 6-5-4HZL

25,570' MD

22.35 days STR

Motor failure early in the lateral

TD'd conventionally

Liner to bottom with no issues

Pad Statistics

Edward Flies Away Pad (2014/2015)

2 wells averaged 40.4 days STR

34.23 days best STR

Olive Mae Pad (2015)

3 wells average 37.03 days STR

30.15 days best STR

Peterson Pad (2015)

4 wells averaged 23 days STR

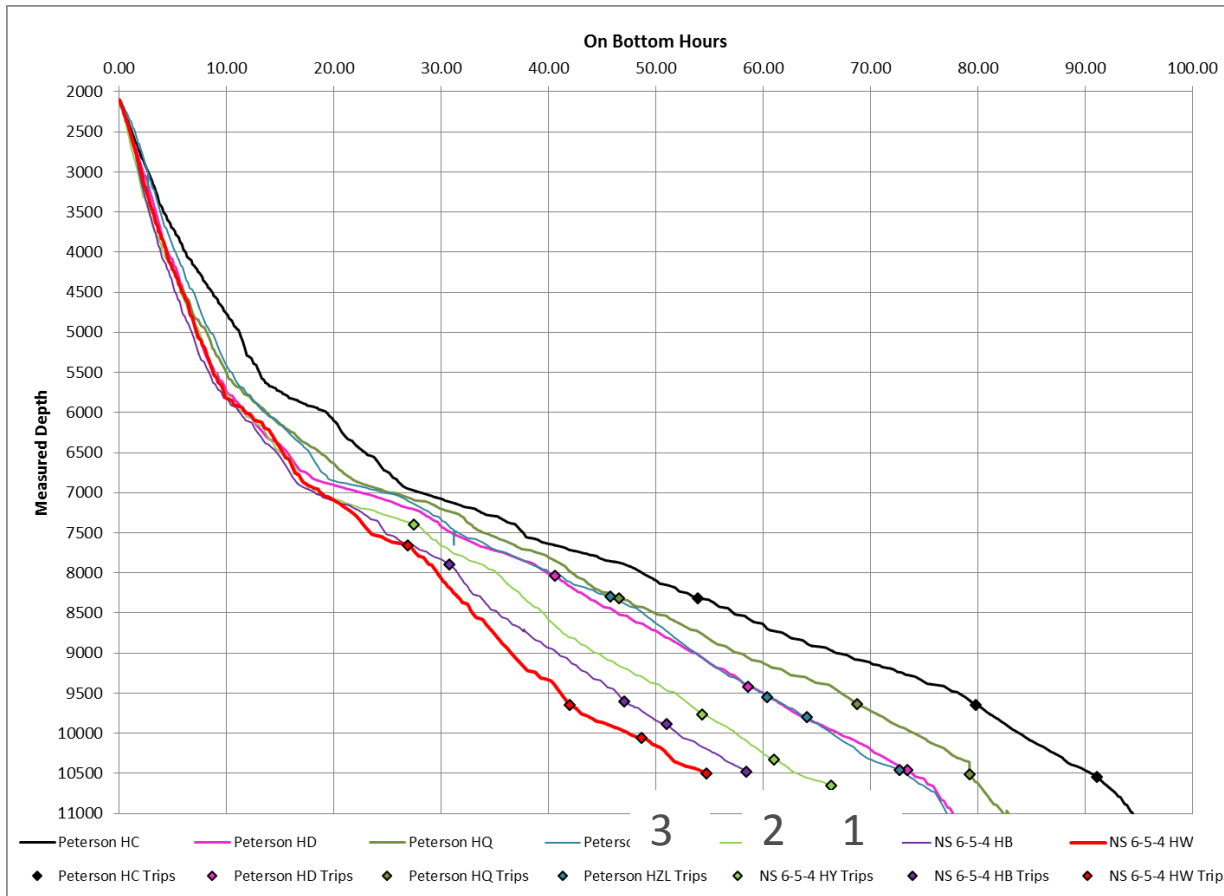
21.56 days best STR

North Segment Pad (2016)

Drilling intermediate intervals

On track to beat 23 day average

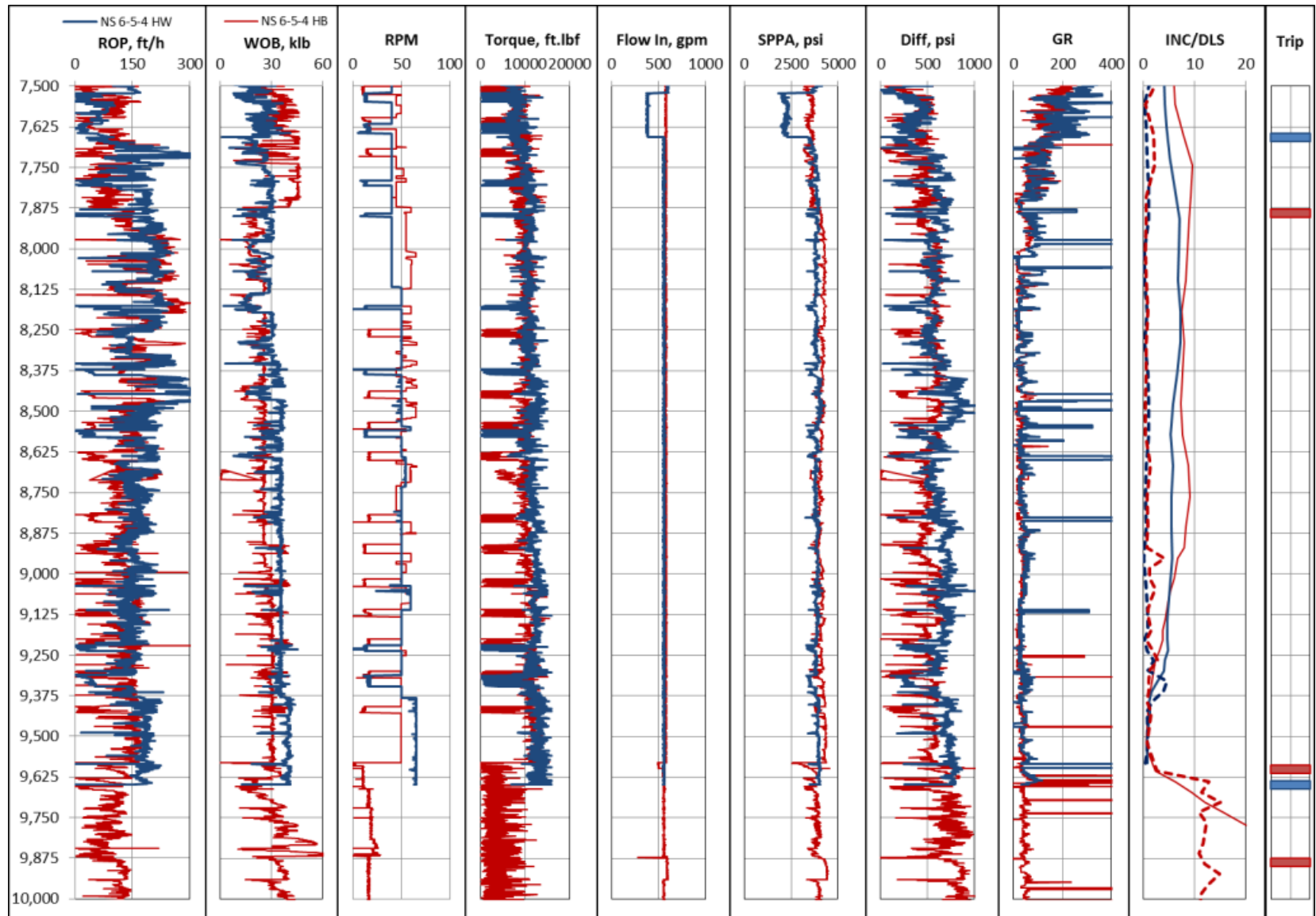




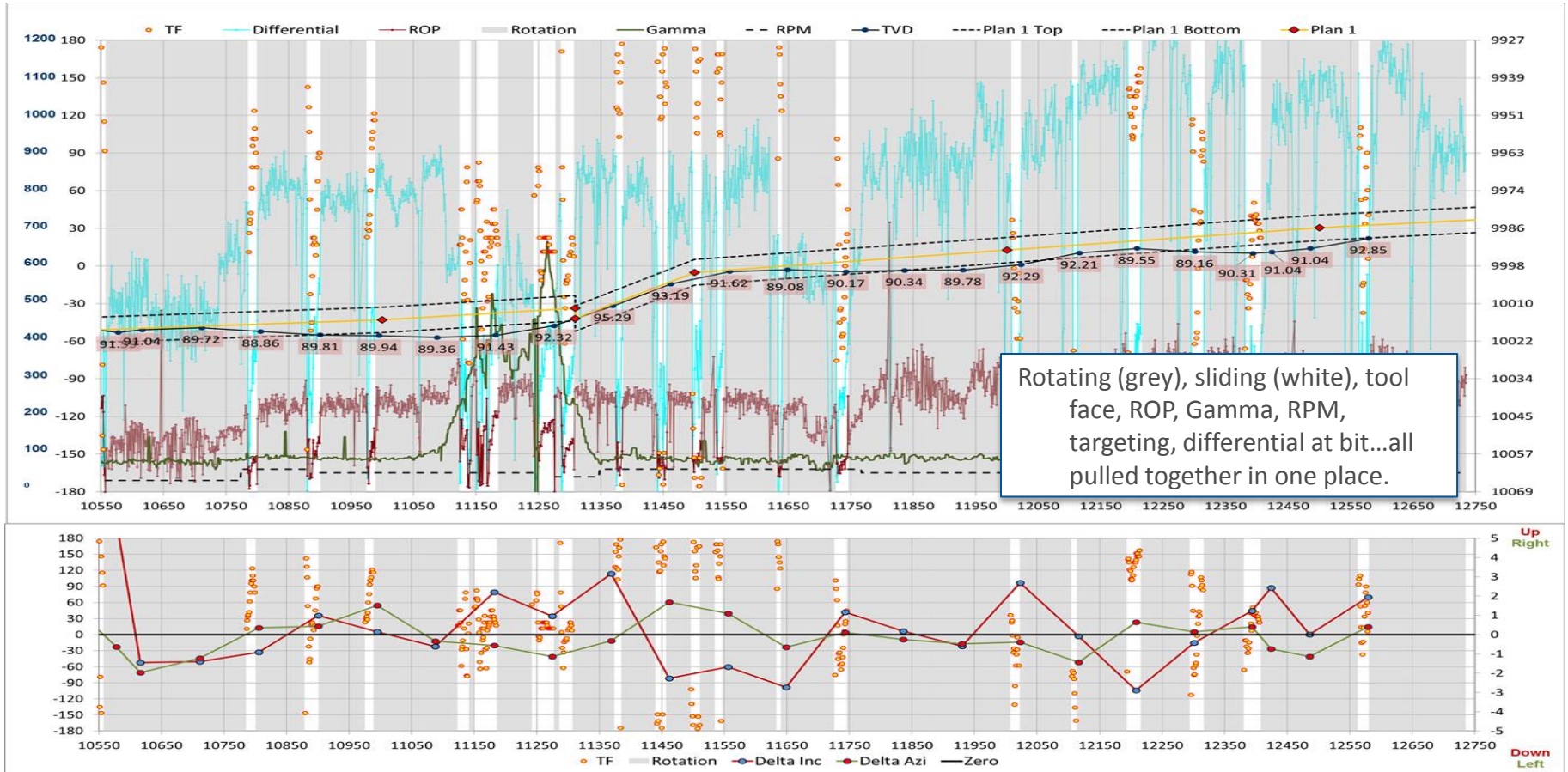
Common sayings in the oilfield...

- *That's the way we've always done it*
- *That's what everyone else does*
- *That's just how it is*
- *So and so said to do it this way*
- *Last time it worked ok*

Drilling Analytics



Drilling Analytics



TEAMWORK and ATTITUDE

Smooth wellpath and small dog legs are important

Consistent lube program in the lateral

Dedicated reamer runs are not necessary for RSS

Wells can be finished with conventional tools

Real time drilling analytics is our step change

