

4" Wired Drill Pipe in the Granite Wash



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NATURAL GAS: FUELING AMERICA'S FUTURE

Outline



- **Background**

- ▶ Area / Geology overview
- ▶ Basis for Wired DP Project
- ▶ Wellbore Schematic

- **Wired DP**

- ▶ Major Components
- ▶ Topdrive modification kit

- **Wired DP Project**

- ▶ Initial 3 well trial with Wired DP & Nitrified OBM
- ▶ Next 6 well with just Wired DP

- **Summary**

- **Plan forward**

Area Map

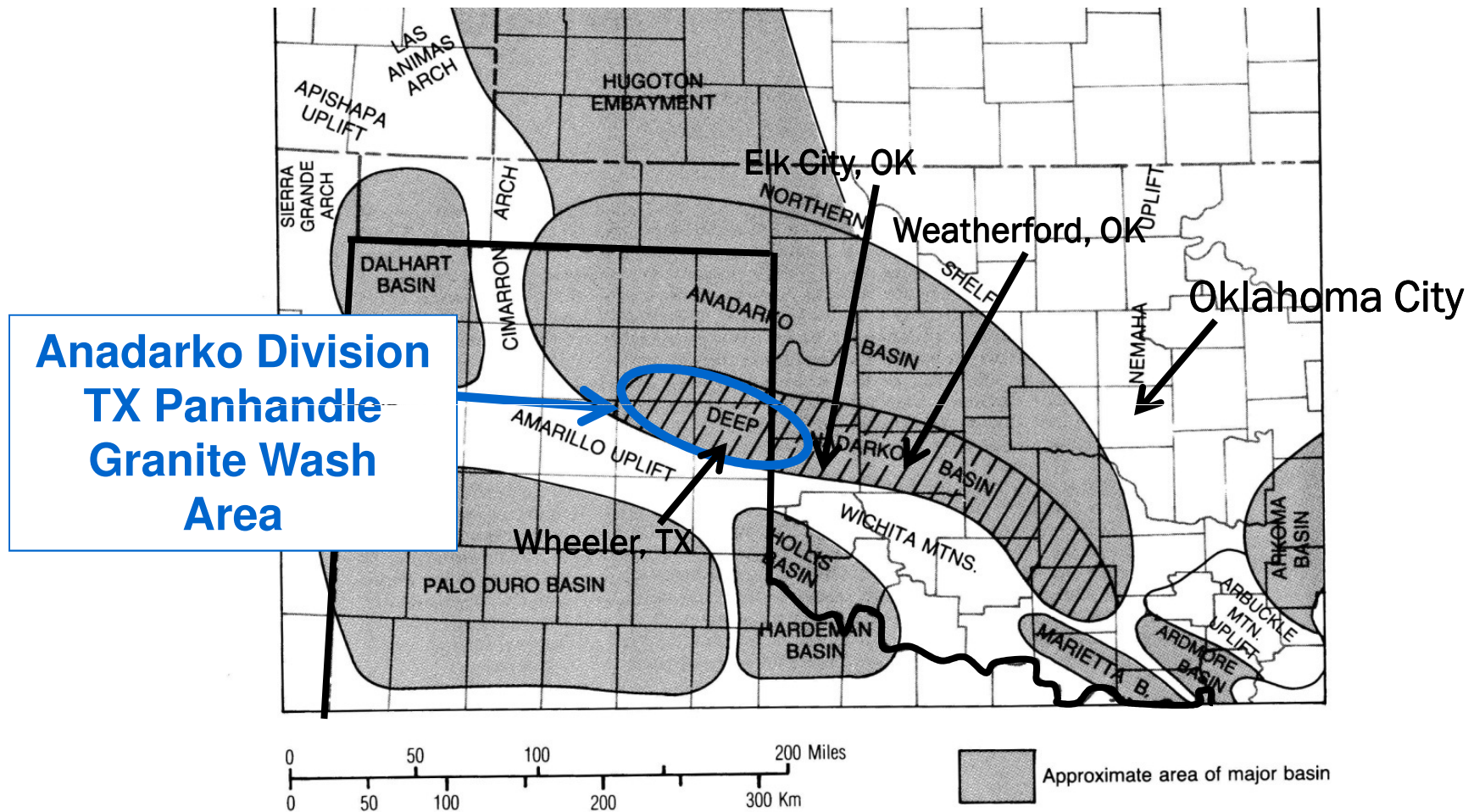
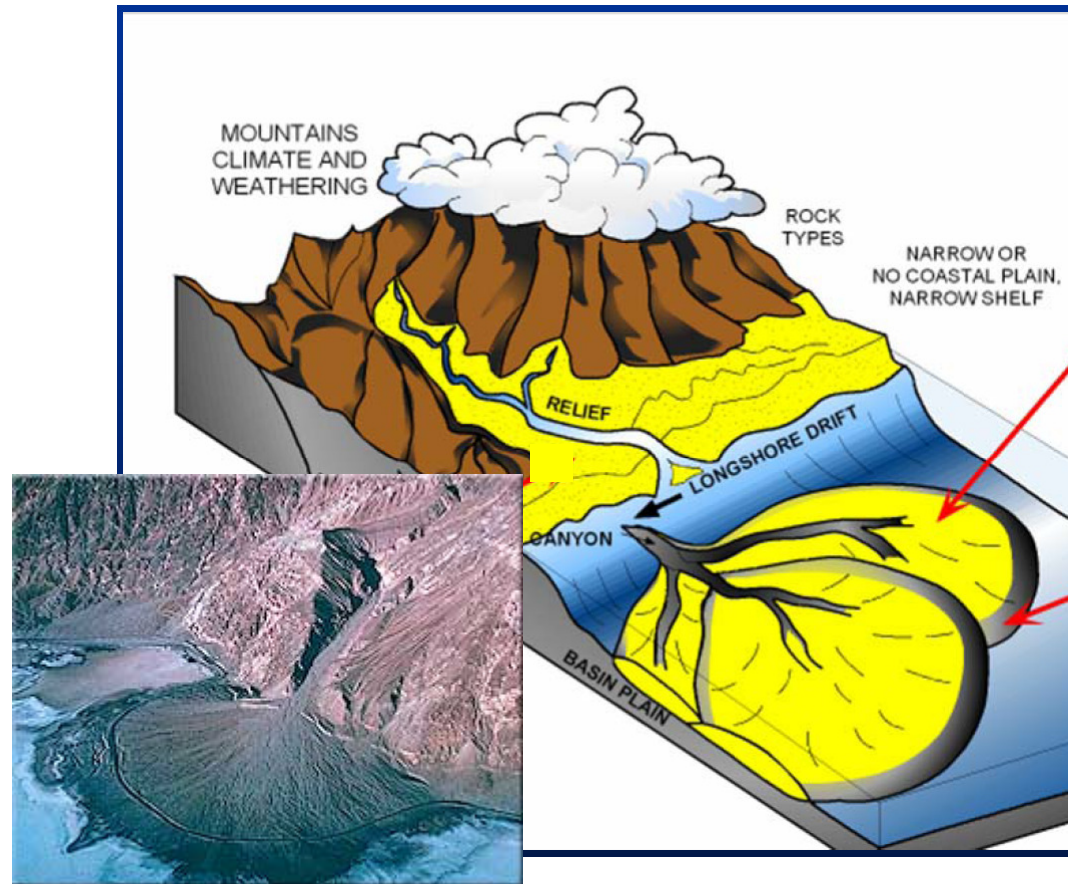


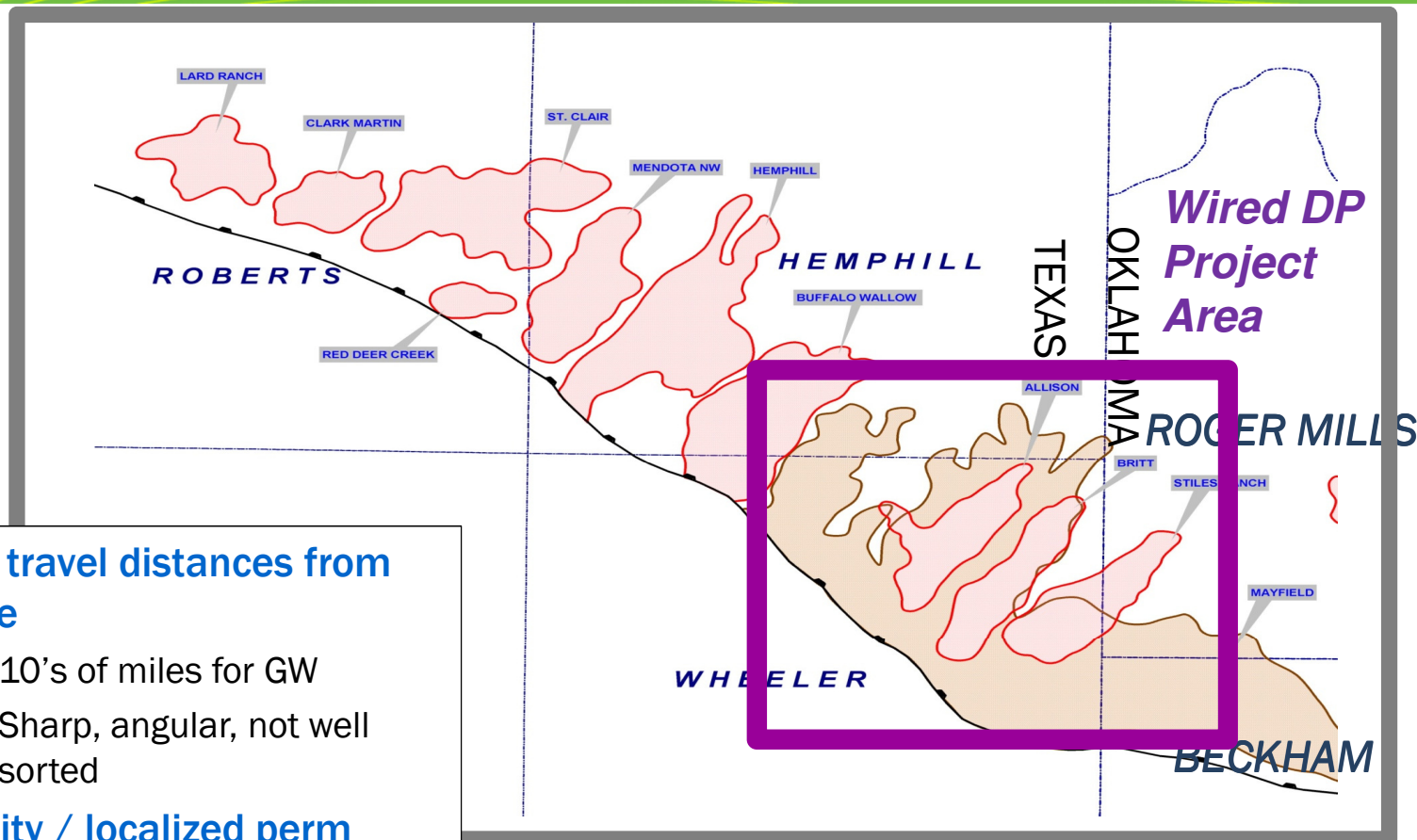
Figure 1. Location of Anadarko basin and surrounding geologic provinces (after Johnson and others, 1988).

Granite Wash Deposition

- Large Gathering of sediment
 - ▶ Cobbles, boulders, eroded Granite, etc.
- Mass wasting event
- Debris / Turbidite flow into submarine canyon
- Fan out / channels

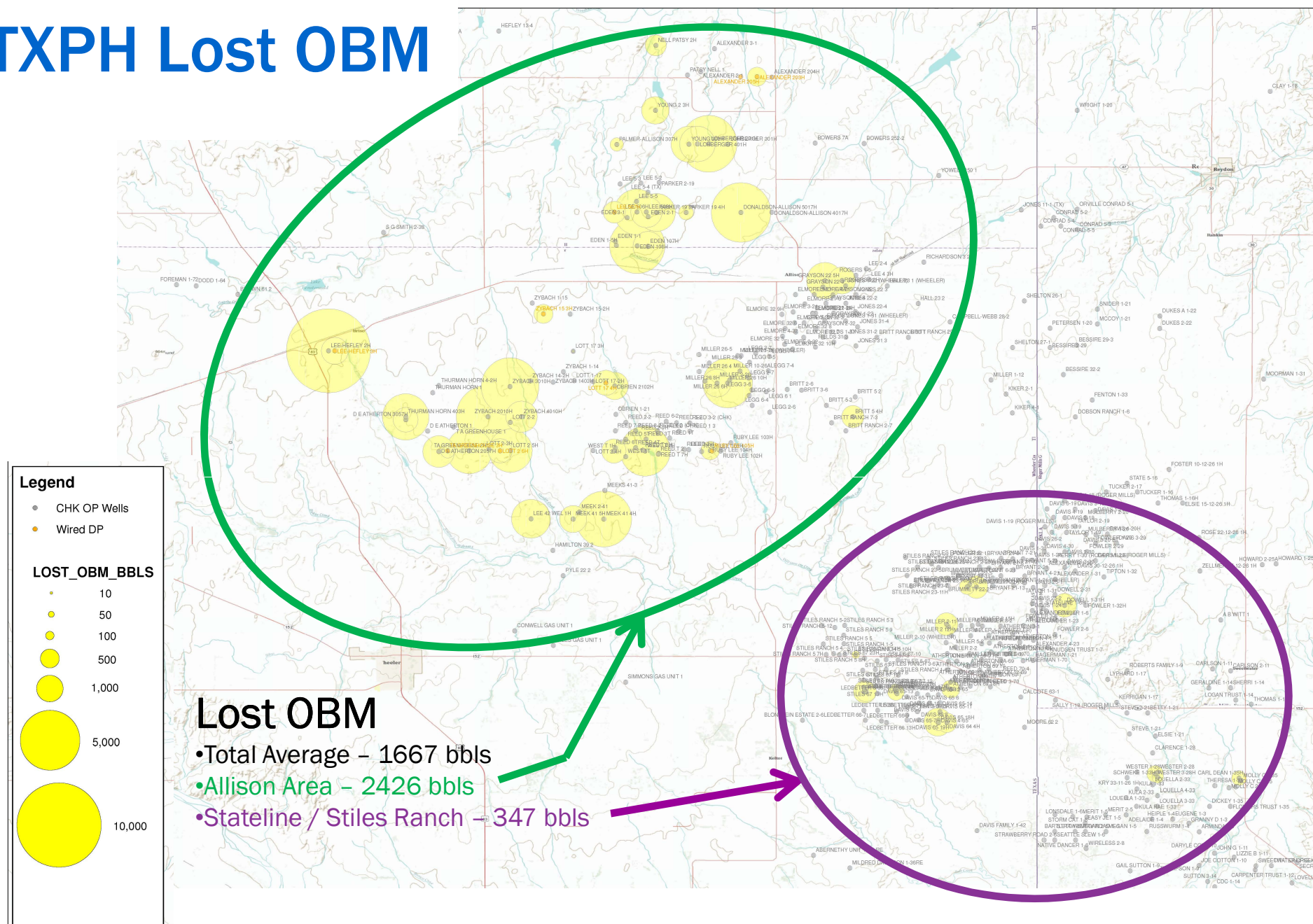


Granite Wash Deposition



- Short travel distances from source
 - ▶ 10's of miles for GW
 - ▶ Sharp, angular, not well sorted
- Porosity / localized perm
- Lateral variability

TXPH Lost OBM



Typical WBS

Water String

- ▶ 13-3/8" 48# H-40 STC to cover water protect depth

Surface

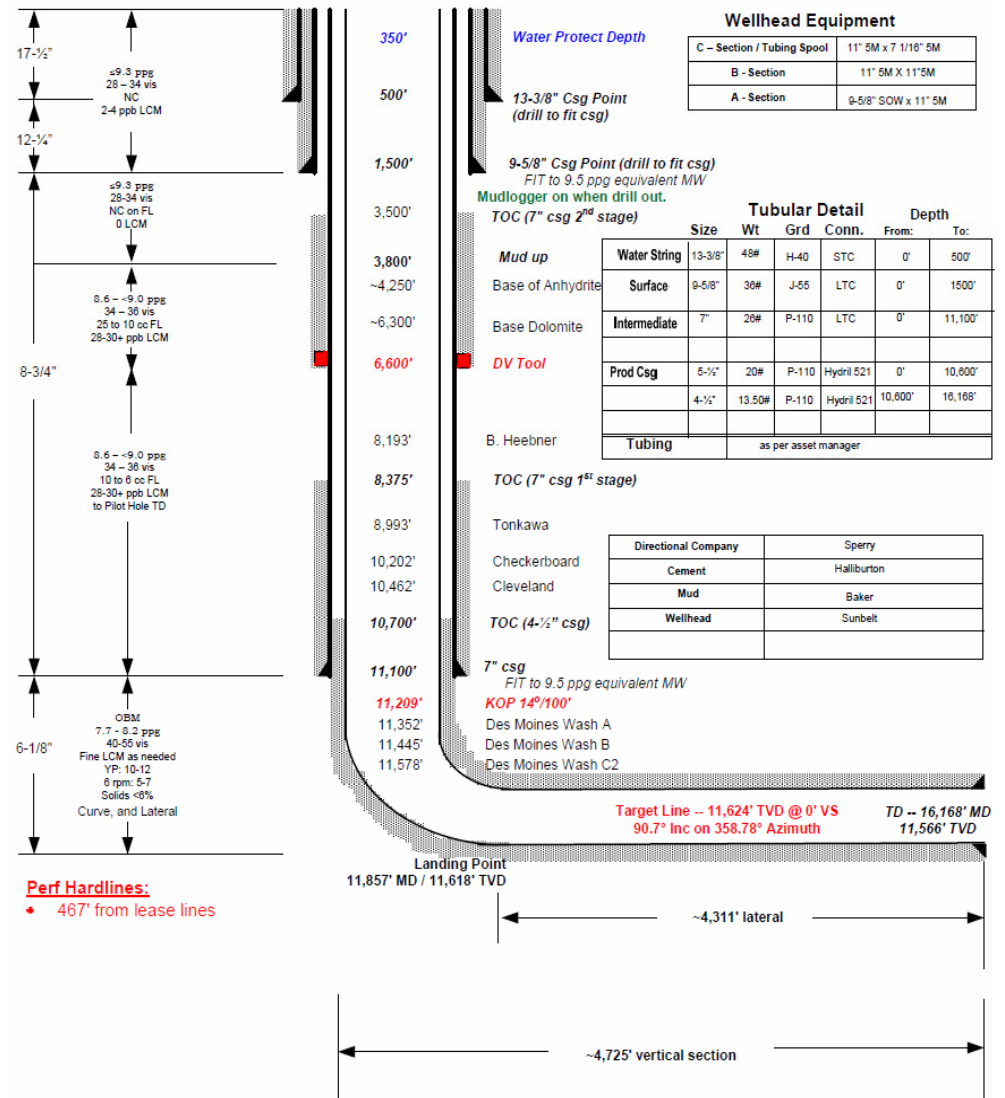
- ▶ 9-5/8" 36# J-55 LTC @ 1500'

Intermediate

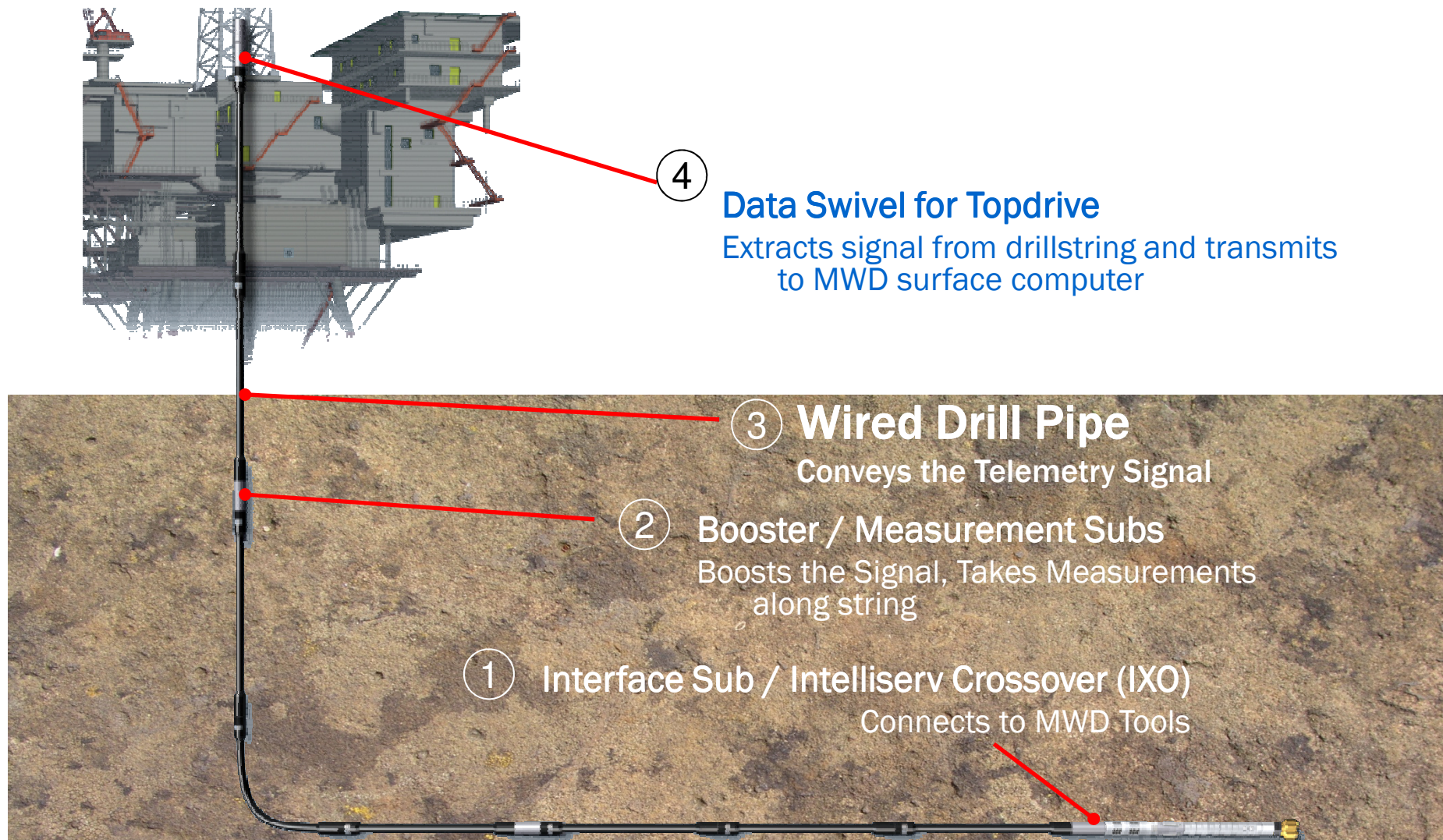
- ▶ 8-3/4" hole to 100' above KOP (between 10,500' to 13,000')
- ▶ WBM, 25-30 ppb LCM
- ▶ 7" 26# P-110 LTC
- ▶ DV Tool @ 6600' to isolate Brown Dolomite (SWD zone)

Production

- ▶ 6-1/8" hole to TD (15,500 to 18,000' MD // 11,000' TVD to 13,500' TVD)
- ▶ OBM. Can see no losses, minor seepage, to excessive losses (10,000 bbls max to date)
- ▶ 5.5" 20# P-110 Hydril 521 X 4.5" 13.5# P-110 Hydril 521 tapered string



Intelliserv Wired DP Components



Intelliserv Wired DP

Drill Pipe At Rest



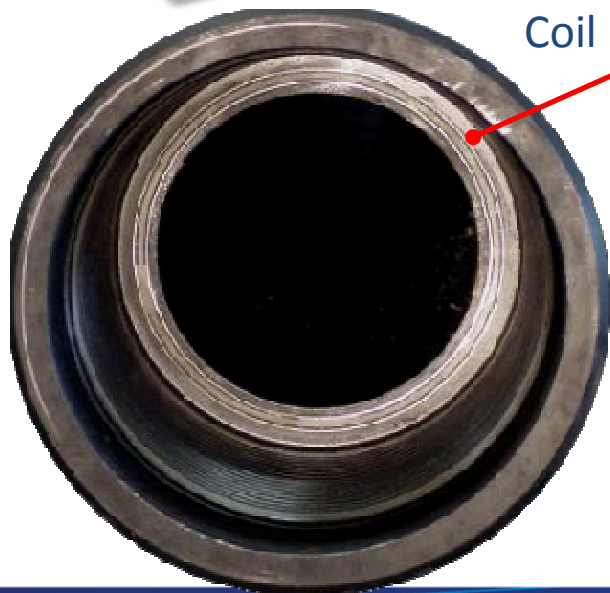
Cable under tension in tubular interior

Drill Pipe Under Bending



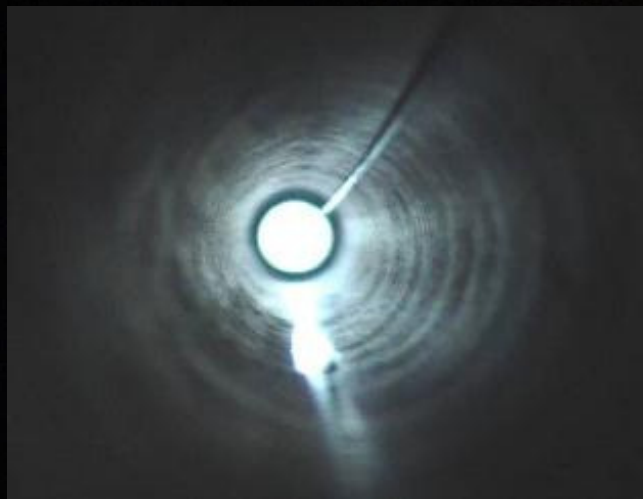
Coil in Box End

Coil in Pin End



- No Orientation Required
- Stabbing Guide Required
- No Impact on Thru-String Operations

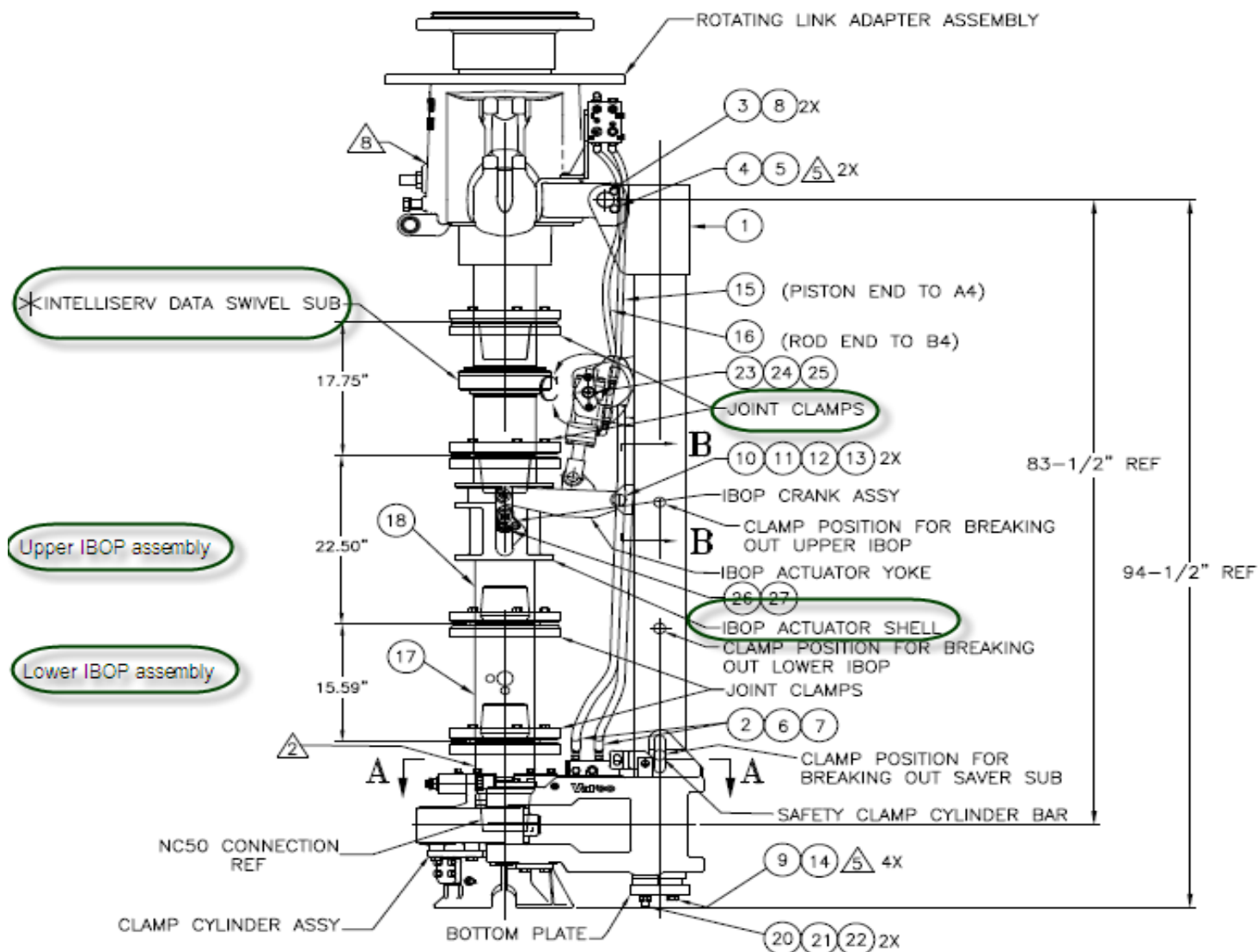
Intelliserv Wired DP



Armored coax

D = 0.2 inches //
5.08mm

Data Swivel on TDS-11



Intelliserv Wired DP



● Wired Components

- ▶ Drill Pipe and HWDP
- ▶ Drill Collars and Monels
- ▶ Jars
- ▶ Shock Subs
- ▶ IBS's and Roller Reamers
- ▶ Saver Subs
- ▶ Float Subs
- ▶ Crossovers
- ▶ IBOP's
- ▶ ETC.
- ▶ No Agitator currently available

● Booster Subs

- ▶ Along string Temp, Annular Pressure, and Internal Pressure
- ▶ Only temp available in 4" DP

Project Overview



● **Wired DP and nitrified OBM – Why?**

- ▶ Lost OBM while drlg lateral
 - 1667 bbl/well average for 2010 and 2011 for Wheeler, Hemphill, and OK stateline
 - 2426 bb/well average in Allison area
 - \$250K overall average // \$364K Allison area @ \$150/bbl
- ▶ Minimal tolerance of LCM for 4-3/4" MWD's
- ▶ Too deep for current EM tools

● **Nomac 21 – initial 3 well trial**

- ▶ Intelliserv
 - 4" XT 38 Wired DP – 17,500'
 - Data Swivel
- ▶ Sperry
 - Motors and MWD/IXO
- ▶ Weatherford
 - N2 membrane unit
- ▶ Mathena
 - 2nd choke manifold and separator

Initial 3 well trial



- **Wired DP w/ Nitrified OBM on 3 wells**

- **Observations**

- ▶ 1st lateral BHA noticed high stick slip, ended up cutting off N2, tightened up jetting on subsequent BHA's (150 psi)
- ▶ C/O Weatherford's membrane unit to high pressure kit.
- ▶ 0.3 to 0.5 ppg ECD reduction when injecting N2 ~200 to 750scfm
- ▶ Hole stability issues on trips in lateral, had to W/R to bottom, shut off N2 and within a day back to normal
- ▶ Slight reduction in trip speed – 2180 fph conventional XT-39 // 1820 fph wired DP (2nd and 3rd well average)
- ▶ Increased Telemetry speeds – “on demand” surveys, checkshots, and toolface updates
 - Survey / Checkshot – 1 min wired DP // 6 min mud pulse
 - Toolface to orientate f/ slide – 30 sec wired DP // 4 min mud pulse
- ▶ No lost OBM while drlg curve / lateral on 3 initial wells

- **Cost**

- ▶ \$320K incremental = \$190K N2 and surf equipment + \$130K Wired DP (2nd and 3rd well averages)
- ▶ Need to save 2130 bbls OBM @ \$150/bbl

Next 6 wells

- **Wired DP only**

- **Observations**

- ▶ Get rid of N2 unit and surf equipment // can call out in event of significant loss
- ▶ If losses encountered get aggressive w/ LCM (cedar fiber)
- ▶ Pricing increase over trial
- ▶ Trip speed 4th thru 9th wells – 1915 fph Wired DP
- ▶ Increase in Telemetry speed vs. slower trip time = 4.9 hrs after 4th thru 9 wells
- ▶ SCC – changed to a “softer” material for conduit
- ▶ Lost OBM
 - Wired DP in Allison area = 529 bbls
 - Conventional DP in Allison area = 2426 bbls

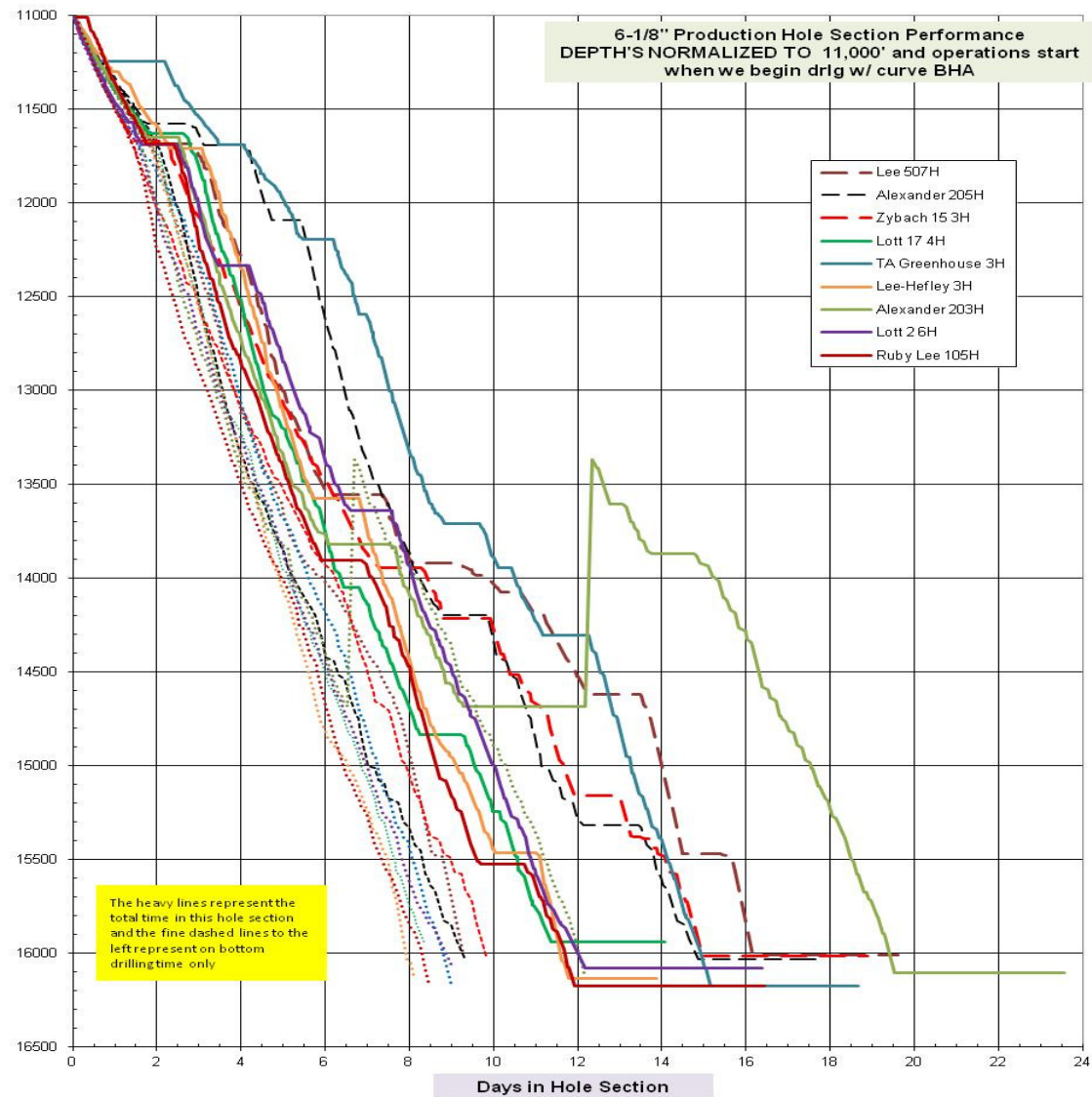
	Total Estimated Time Saved	Additional Tripping	Faster Telemetry Speed less Extra Trip Time
Well	Hrs	Hrs	Hrs
Lee 507H	13.6	30.7	-17.1
Alexander 205H	13.4	16.4	-3.0
Zybach 15 3H	13.3	8.0	5.3
Lott 17 4H	12.7	4.1	8.6
TA Greenhouse 3H	10.7	6.9	3.8
Lee-Hefley 3H	14.1	4.8	9.3
Alexander 203H	12.3	21.0	-8.8
Lott 2 6H	13.6	3.8	9.8
Ruby Lee 105H	14.2	7.8	6.4

- **Cost**

- ▶ \$170K incremental for 4th thru 9th wells
- ▶ Need to save 1133 bbls OBM @ \$150/bbl

Wired DP DVD

Curve and Lateral Performance of Wired DP wells



Summary



● Benefits

- ▶ Enable telemetry transmission in high LCM or aerated mud with 4-3/4" tools
- ▶ Need to save 1133 bbls OBM to break even at 2011 pricing (4th thru 9th wells)
 - Allison Area 2426 bbls
 - Overall TXPH Average OBM loss 1667 bbls
- ▶ Increase in Telemetry data rates
 - Faster Surveys
 - Increase in sliding efficiency
 - More on bottom drlg time
 - 57,600 bps data rate

● Other Considerations

- ▶ Extra Personnel on location
- ▶ Slight decrease in trip speed ~265 fph
- ▶ 4 to 5 days of Intelliserv electrical qualification each well
- ▶ Failure mechanisms
 - Saver Sub
 - Damaged Coil
 - Booster Sub
 - Coax Cable
 - IXO tools
 - Intelliserv Service Loop
- ▶ Minimal IXO tools
 - LWD strings – offshore / international
 - Personnel to run / service

Plan Forward



● 2012

- ▶ Continue with Wired DP on current rig
- ▶ Additional IXO's and backups being manufactured
- ▶ Planning to pick up 2nd wired DP rig
- ▶ Schedule Wired DP wells in areas of high OBM losses, depletion, etc.

Questions

