Initial Results of a Six Horizontal Well Drilling Program Targeting Mississippi (Osagean) Reservoirs in Northeast Oklahoma

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Acknowledgement for Technical Contribution

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- Sal Mazzulo
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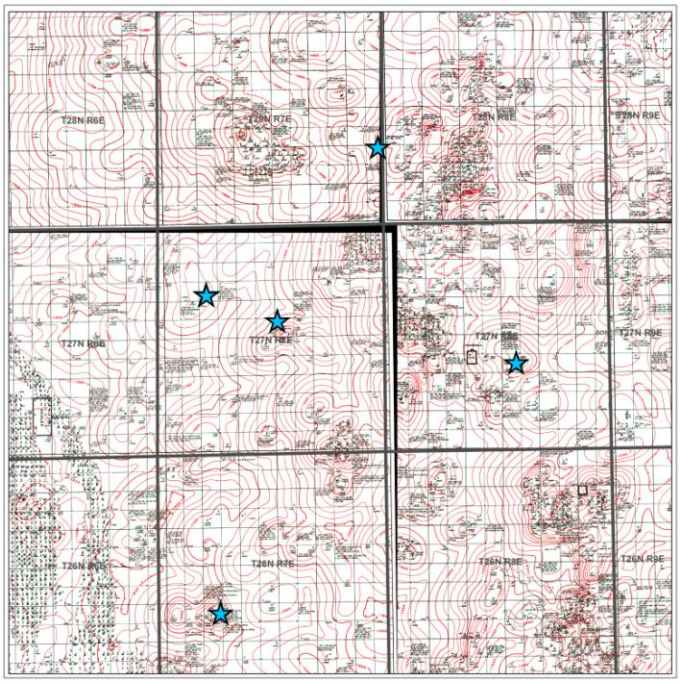
Presentation Outline

- Project History
- Geological Model
- Drilling, Logging and Completion Methodology
- Production Results to Date
- New Ideas
- Conclusion

Project History

- Strong history of exploitation of “Mississippi Chat” reservoirs
- November 2008: Completion of the DK 1-13 (SW/4 Sec 13 T25N R5E)
  - perforation and light stimulation of “Mississippi Lime” beneath “Mississippi Chat”
  - 180 mcfd, 1 bopd, 20 bwpd
- December 2009 Completion of 44 mi^2 3D seismic NE Oklahoma
  - Complex structural fabric illustrating left lateral wrench tectonics
  - Integration of Seismic Attributes, Potential Field Geophysics, and Field Geology
    - Regional fracture and jointing network in Paleozoic sedimentary section
    - Deep seated basement structures with evidence of reactivation
- May 2009 Mississippi Chat Completion of Whiles D2 (NE/4 Sec 18 T25N R6E)
  - Positive results of DST on “Mississippi Chat” warranted additional data capture
  - First Schlumberger FMI run for Spyglass in NE Oklahoma
    - Image log + PEX clearly illustrated interbedded chert and lime lithology (“Boone”)
- January 2010 Mississippi “Dense” horizontal test
  - Single stage IP 196 BOPD, 3400 BWPD (45’ perfs over 400’ of lateral)
- February 2011 Drilled to TD six Mississippi “Dense” horizontal wells



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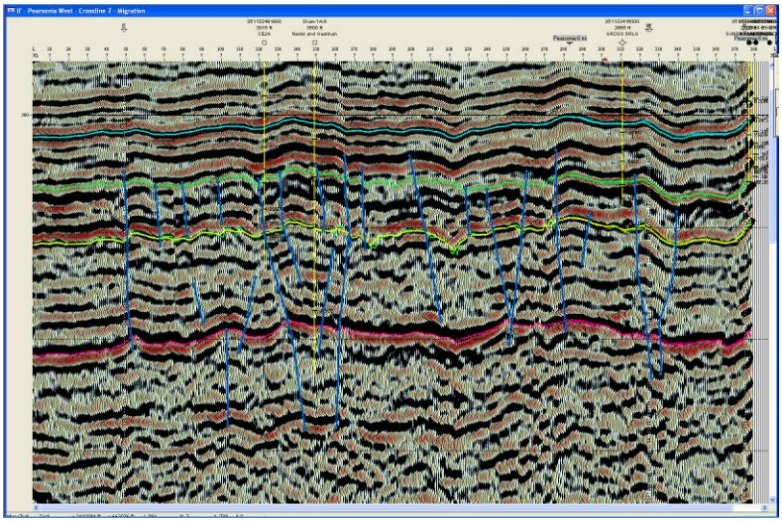
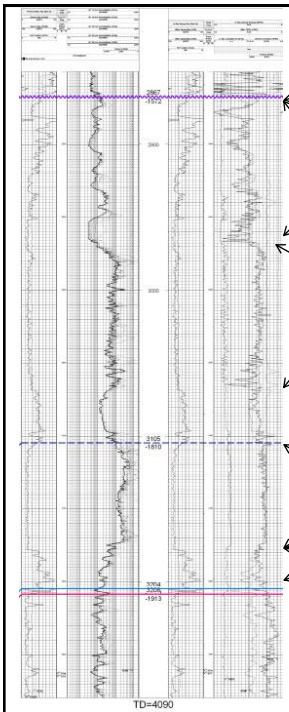
Geological Model

- The Mississippian (Kinderhook to Osagean) section of NE Oklahoma can be correlated directly to the Mississippian Outcrop Belt of the Ozark Plateau
- Image Logs run on 8 full Mississippi penetrations offered unprecedented opportunity for detailed subsurface stratigraphic correlations and regional depositional system to be modeled
- Image Logs allow for confident identification of Intra-Osagean unconformities (tectonic vs. eustatic)
- Silica content in subsurface is very significant in the Osagean section
  - Understood early and well by geologists working the section
  - Sets up trapping mechanisms previously unrecognized
- Geophysical data integrated with Well Log and Surface Geology established clear evidence of tectonic history resulting in fracture creation

Seismic Section HW 60 Trend





Bird Creek 2A-15 SWD Mississippi Facies-Type Log

Base Pennsylvanian

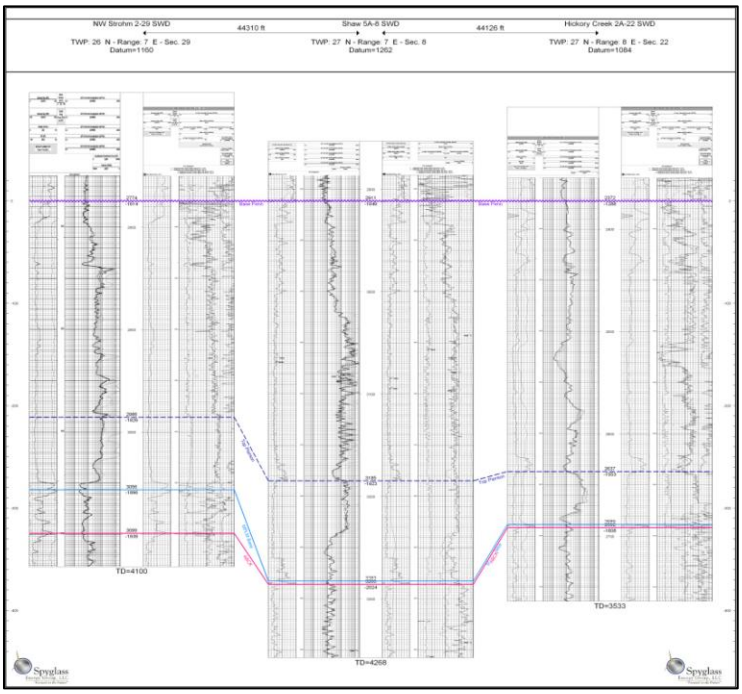
Weathered Reeds Spring: Interbedded Chert, Lime and Tripolite

Osagean Reeds Spring: Interbedded Chert and Lime (note PE)

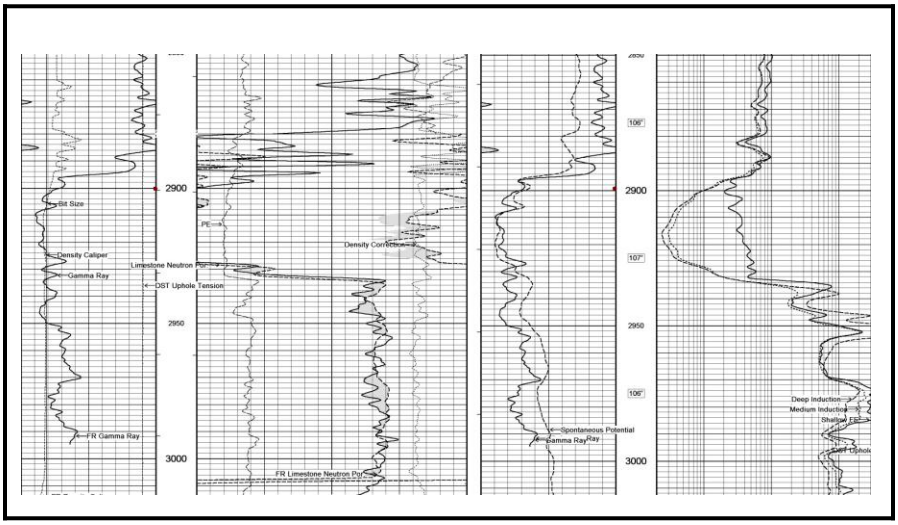
Pierson Limestone

Kinderhook – Compton Limestone and Northview Shale

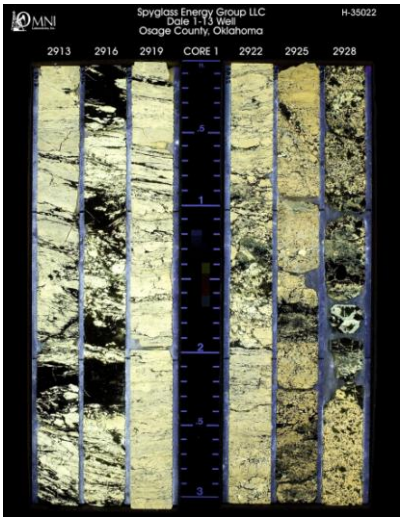
Base Mississippi / Top Arbuckle



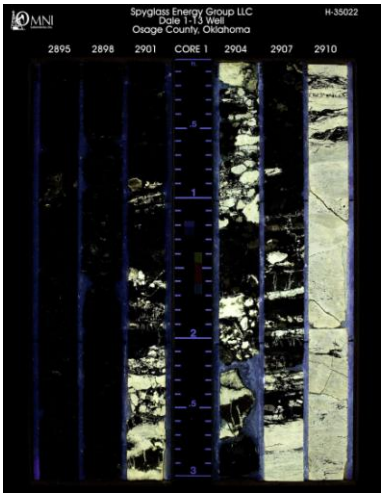
Type HW 60 Tripolite



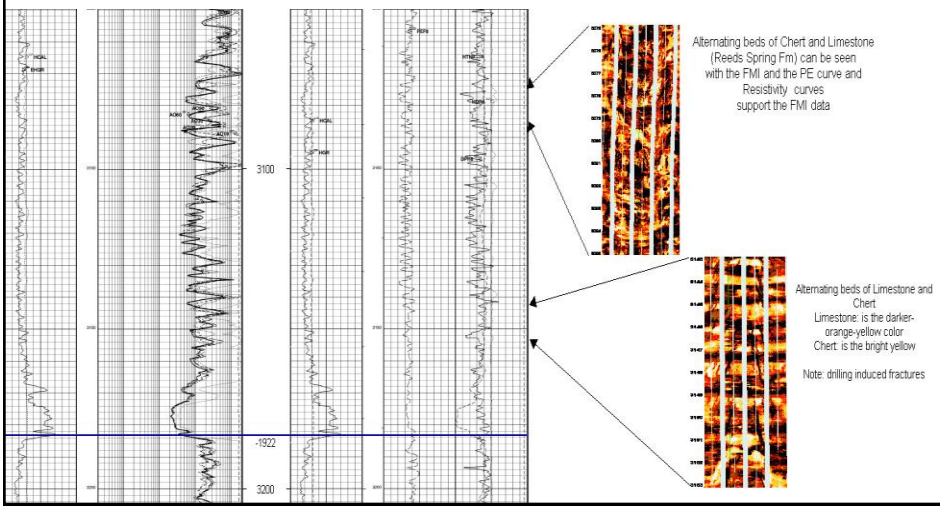
Chat Core Photo (2913 – 2931)



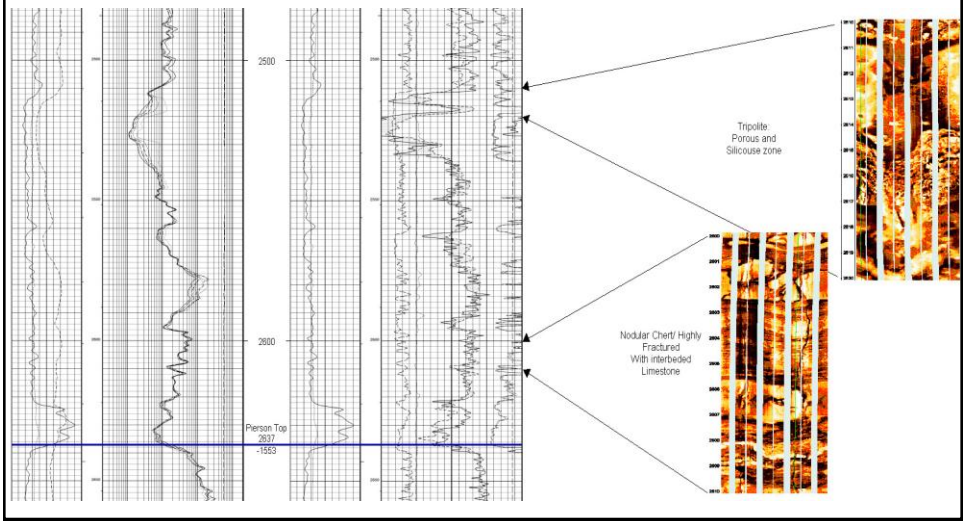
Chat Core Photo (2895 – 2913)



Shaw 5A-8
Triple Combo/FMI Correlation



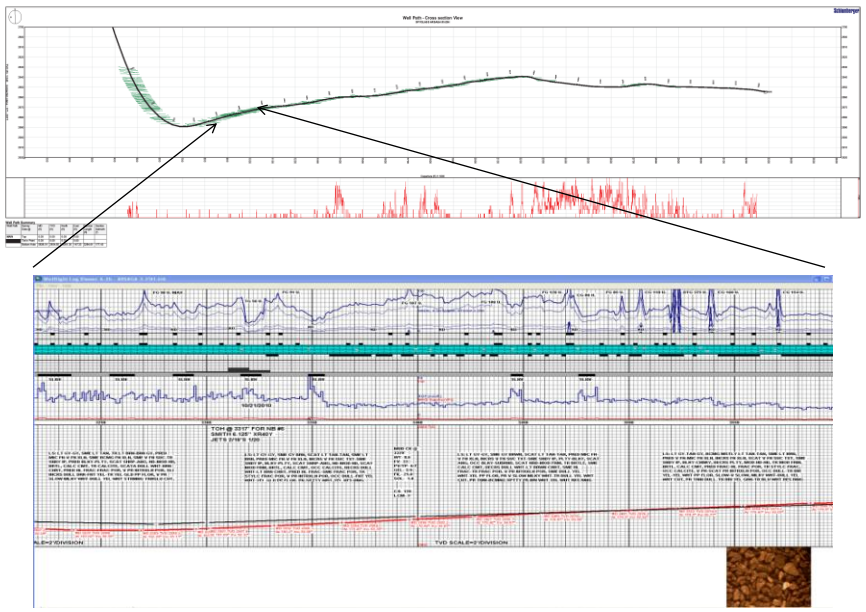
Hickory Creek 2A-22
Triple Combo/FMI Correlation



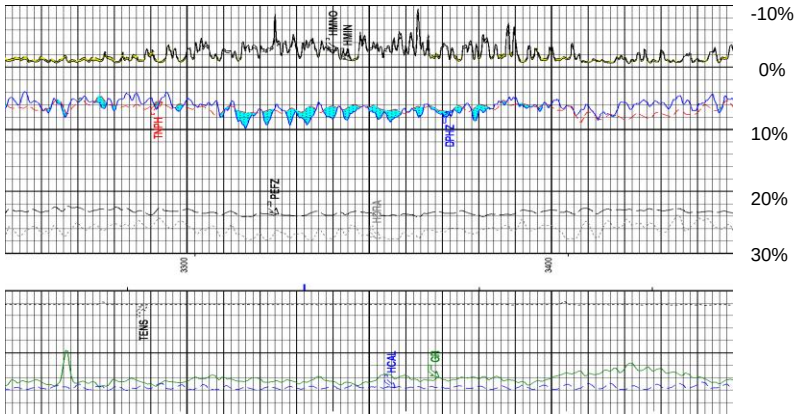
Horizontal Drilling, Logging and Completion Methodology

- Drilled To TD Six Horizontal Mississippi Wells
- 100’ Tangent at 45 degrees
- 7” Casing at 60 degrees
- Build to 90 +/- for Lateral
  - Smith XR40Y Tri-Cone Bits
- Schlumberger Logging
  - 2 Latches – Single Run
    - Den/Neutron, RXOZ, PE, FMI
- 3 wells left open hole
- 3 wells cemented liner

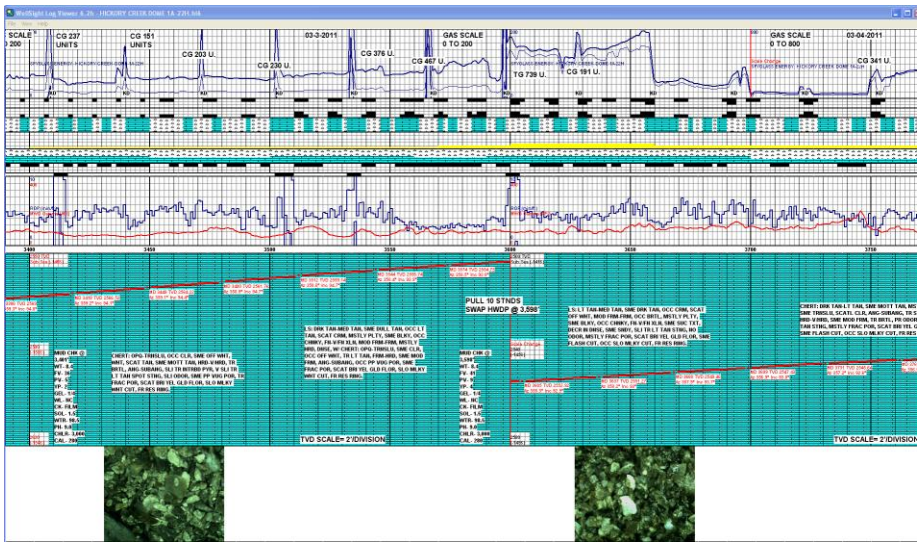
Arsaga 3H-25 - DXI



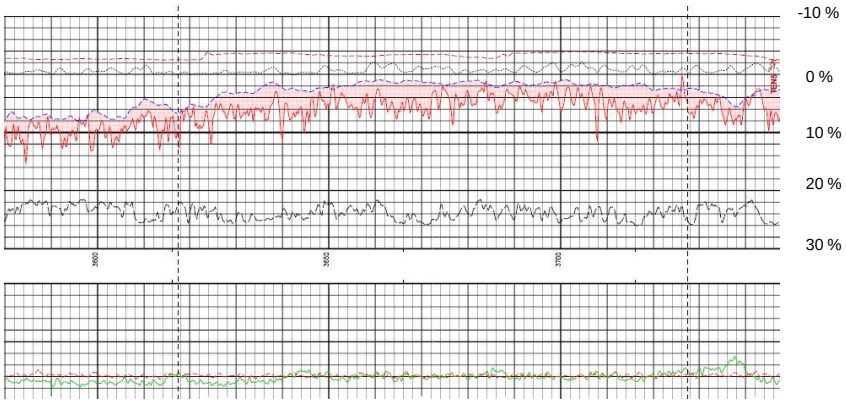
ARSAGA 3H-25 MD 3250-3500



Hickory Creek Dome 1A-22H – MD 3400 - 3750



Hickory Creek Dome 1A-22H – MD 3580 - 3750



Horizontal Well Surface and Bottom Hole Locations

Well Name	Well Number	Ground Elevation	SHL Northing NAD27	SHL Easting NAD27	BHL Northing NAD27	BHL Easting NAD27	Status
Arsaga	3H-25	1233	688947	2439857	685447	2439916	Horizontal
Bird Creek	1A-15H	1291	664780	2425854	660160	2425904	Horizontal
Bird Creek	2A-15 SWD	1290	664780	2427029			Salt Water Disposal
Hickory Creek Dome	1A-22H	1072	658968	2459160	662480	2459113	Horizontal
Hickory Dome	2A-22 SWD	1072	658978	2459076			Salt Water Disposal
NW Strohm	1A-29H	1160	624073	2417942	627704	2417936	Horizontal
NW Strohm	2-29 SWD	1160	624073	2417842			Salt Water Disposal
Shaw	4A-8H	1251	668428	2415911	671928	2415911	Horizontal
Shaw	5A-8 SWD	1251	668341	2415965			Horizontal
Shaw	1A-8H	1251	668270	2415911	665590	2415911	Horizontal

HZ and SWD - Well Drilling,CLAT/TD, Status

Spyglass Energy Group - Pearsonia West Concession - Mississippi Lime Development Wells									
Well Name	**Well Number**	**Section**	**Township**	**Range**	**Completable Lat Length / TD**	**Drilling Data**	**Log Data**	**Status**	**Production Test History**
Shaw	1A-8H	8	27	7	2228 (6 bits)	MWD, ML, Crown Geo	DenPor, FMI	Cemented 4.5"	2 Stages tested indepently
Shaw	4A-8H	8	27	7	2832 (6 bits)	MWD, ML	DenPor, FMI	Cemented 4.5"	None; DV tool failed during cement job resulting in cemented liner to kick off point; liner situation limits pump size that can be placed in tangent section
Arsaga	3H-25	25	28	7	2867 (3 bits)	MWD, ML, Crown Geo	DenPor, FMI	Cemented 4.5"	Open Hole No Stimulation; Tested 2500 BWPD, 225 MCFD, Began cutting oil (4 BOPD) before running liner. 3 stage frac scheduled for May 25th
Bird Creek	1-15H	15	27	7	3135 (3 bits)	MWD, ML	NONE	Cemented 4.5"	5 stage frac completed last week April 2011
NW Strohm	1-29H	29	26	7	1546 (3 bits)	MWD, ML	NONE	Open Hole	Complicated test history; running Gas Lift pump first week of May
Hickory Creek Dome	1-22H	22	28	7	2905 (6 bits)	MWD, ML, Crown Geo	DenPor, FMI	Open Hole	Estimate 2nd Week of May for first production test
Shaw	1A-8 Pilot	8	27	7	Top Arbuckle	ML, Crown	PEX, FMI, Dipole	Cemented Back	This well was drilled as pilot for the 1A-8H; Well TD top Arbuckle, logs run, cemented back and kicked off up hole to build curve for hz
Shaw	5A-8 SWD	8	27	7	Basement	ML	PEX, FMI, SWRCP	Active SWD	Permitted 15K Vacume
Arsaga	1-25 SWD	25	28	7	400' into Arbuckle	ML	Den, Por, Res, Micro	Active SWD	Permitted 15K Vacume
Bird Creek	2-25 SWD	15	27	7	Basement	ML	PEX, FMI	Pending MIT	Permitted 15K Vacume
NW Strohm	2-29 SWD	29	26	7	Basement	ML	PEX, FMI	Active SWD	Permitted 15K Vacume
Hickory Creek Dome	2-22 SWD	22	28	7	800' in Arbuckle	ML, Crown	PEX, FMI	Pending MIT	Permitted 15K Vacume

Production History to Date

- Shaw 1A-8H
  - Two Single Stage Tests
    - Stage 1- two 5' perf clusters, 2 spf, 5,600 BW, 50K# 20/40, 60 BPM; IP 45 BOPD, 4500 BWD
    - Stage 2 – nine 5' perf clusters, 2 spf, 10,000 BW, 21K# 20/40, 45 BPM; IP 196 BOPD, 3400 BWPD
- Arsaga 3H-25
  - Open hole natural completion
    - IP 5 BOPD, 225 MCF, 3400 BWPD
- NW Strohm 1-29H
  - Open hole natural completion
    - 250 BOPD, 5 MMCFPD, 2500 BWPD
- Bird Creek 1-15H
  - 5 Stage Frac; 400' Interval, 100' perf spacing, 0.3#/gal, 10K BW/stage, 50 BPM with ball sealers
- Hickory Creek Dome 1-22H
  - Open hole natural completion

New Ideas

- Land Base Penn at 60 degrees
  - Drill Penn Section with PDC
- Rotate Tangent then Build to 90
- Set 8.5” Intermediate at 90 degrees
- 5.5” Liner

Conclusions

- Successful Exploration Strategy
- Inter-Osagean traps, seals, and source
- Drilling Environment Understood
- Multiple Productive Facies
- Prospective Regional Scale to Local Scale
- Complex Fill and Trapping Mechanisms
- Infrastructure Development Proceeds Horizontal Drilling