



*Inceptro LLC*

**Development of Remaining Hydrocarbon Recovery in the Clinton and Berea Sandstone Formations Using Techniques and Lessons Learned from Unconventionals.**

Prepared For:



# Agenda

- About Me
- Clinton and Berea History
- Current Conventional Production
- Knox County Case Study-Applying Unconventional Techniques
- Case Study Results
- Recommendation



# About Me

Jay Chapin- Petroleum Engineer & Today's Presenter



- Ohio Born and Bred- Newark, OH
- B.S. Petroleum Engineering & Engineering Leadership Certificate- Marietta College; 2019
- Also Freelance Consultant- Consulted on Several Water Injection Projects & Exploration and Production Projects
- 3<sup>rd</sup> Generation Oil and Gas





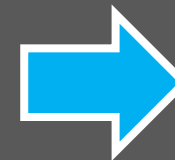
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**Background**



# Clinton and Berea History

Ohio's Oil and Gas History Mainly Consists of Three Major Plays.

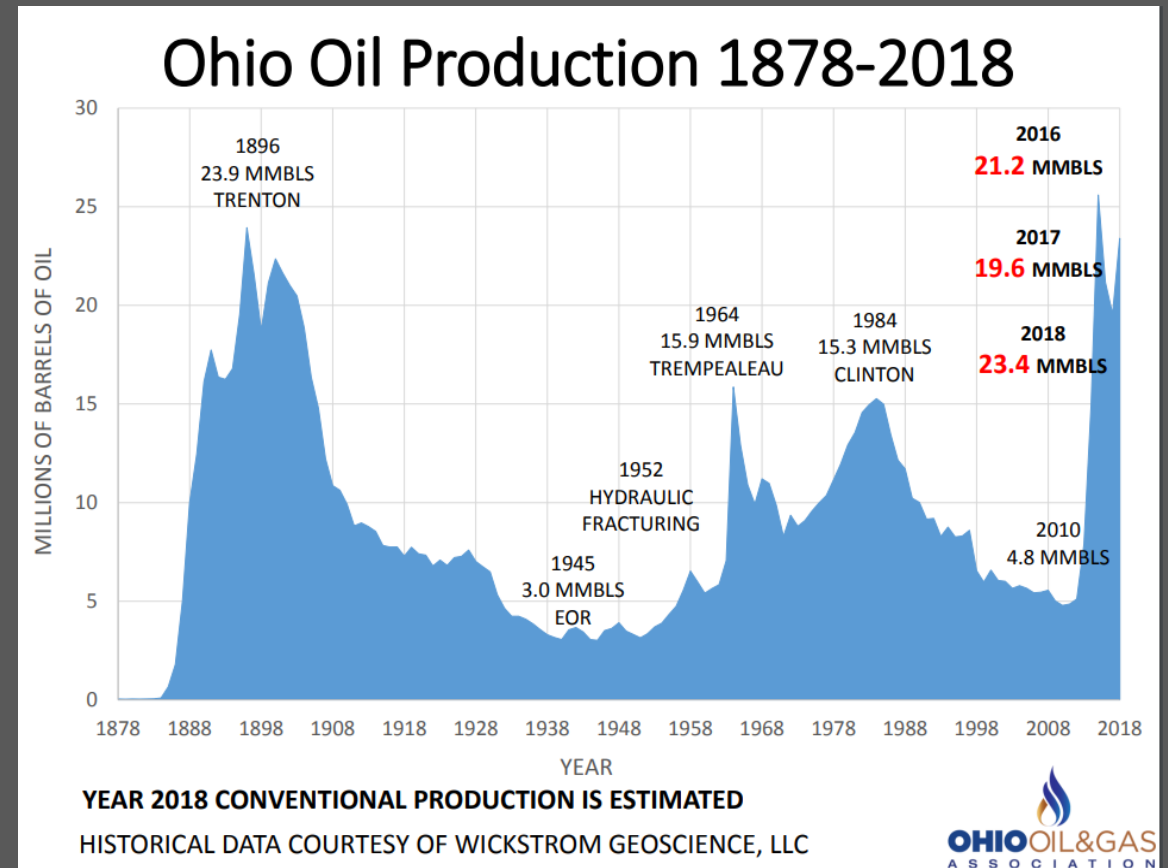
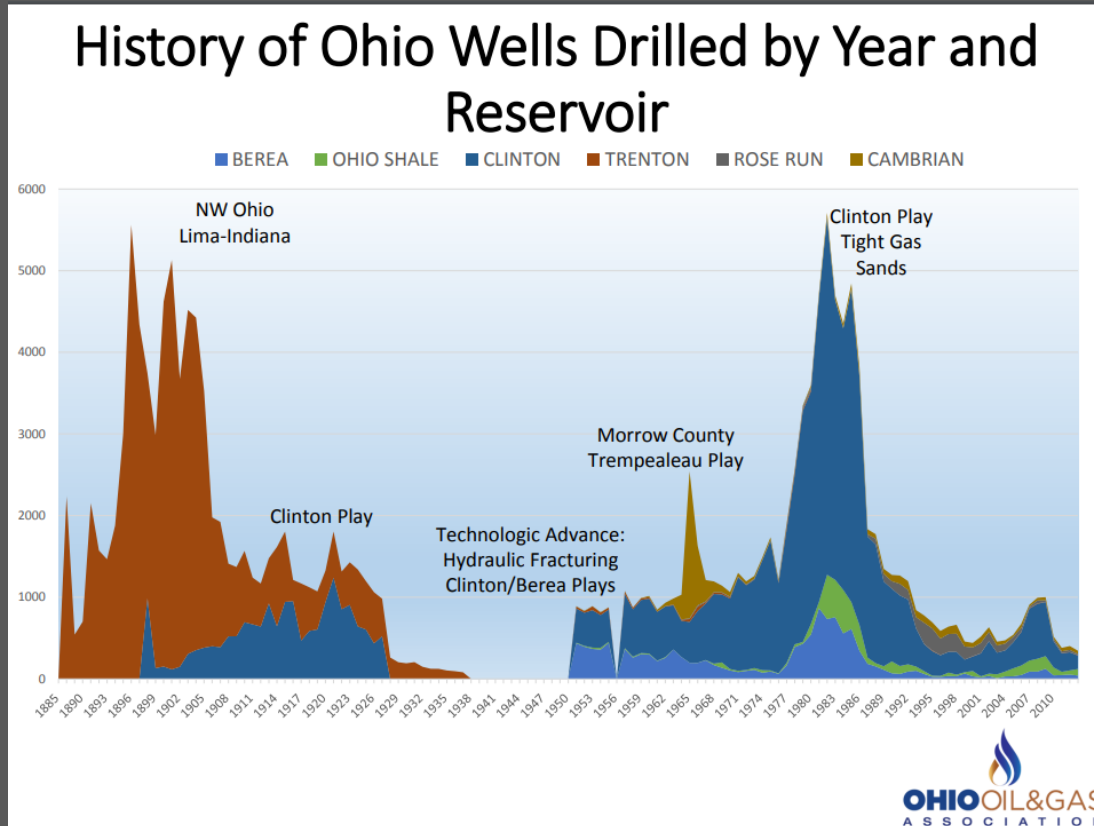


- **Discovery**
- 1. **Town Fuel Source- Findlay; Lancaster; Marietta**
- 2. **Nitroglycerin**
- 3. **Late 1800s- 1940's**

- **Technology Advance**
- 1. **Hydraulic Fracturing**
- 2. **Rotary Drilling**
- 3. **Seismology**
- 4. **Knox/Morrow Co.**
- 5. **1950's-60's**

- **Economic Advance**
- 1. **Oil Embargo**
- 2. **NGPA**
- 3. **1970's-80's**
- 4. **Last Great Conventional Boom**

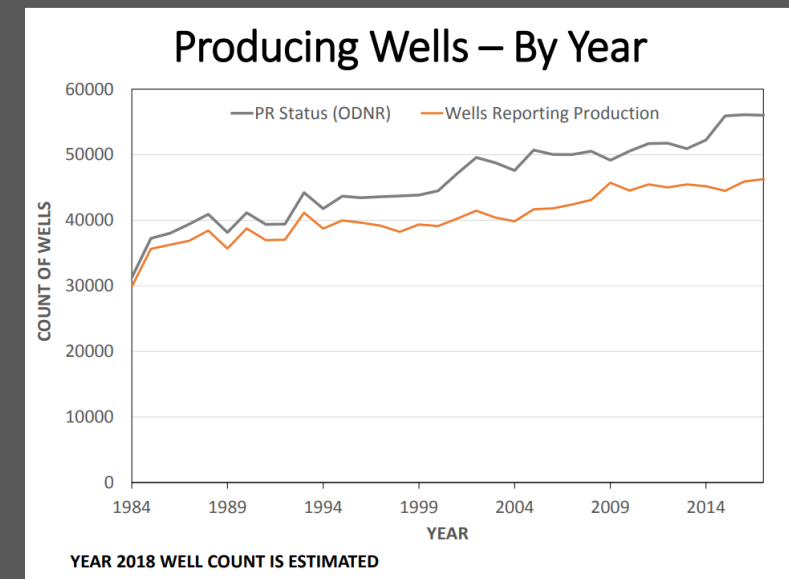
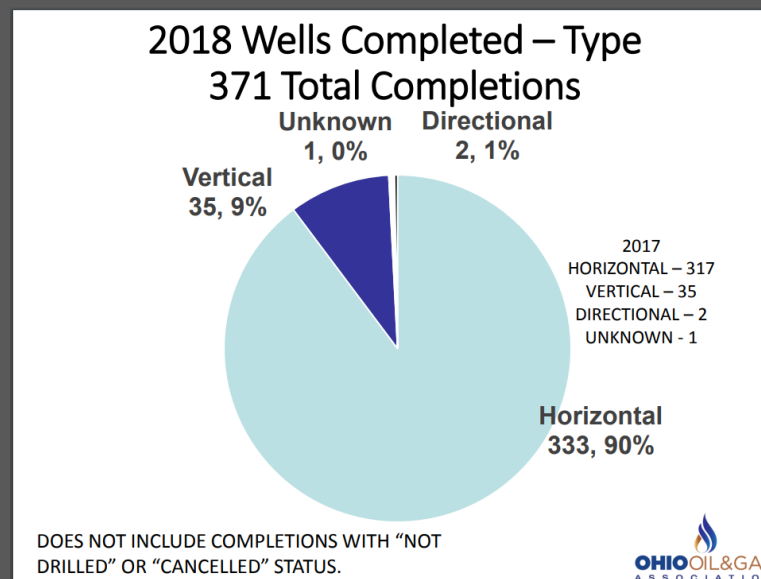
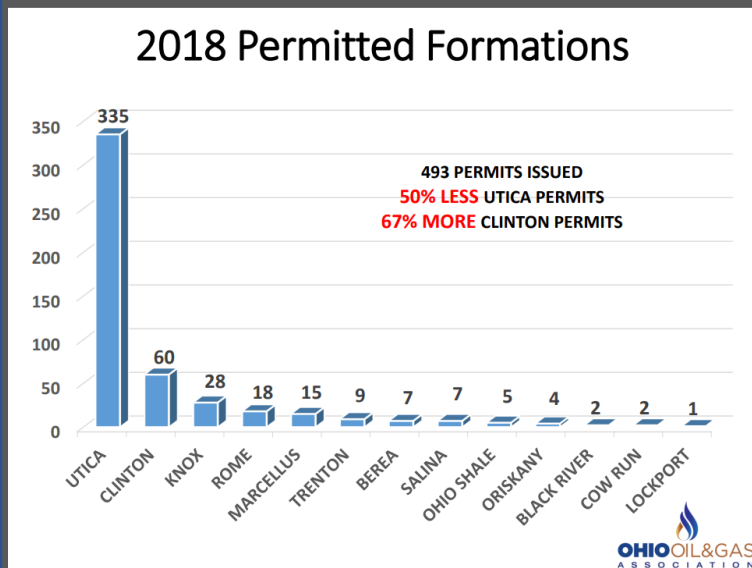
# Ohio Hydrocarbon Production History



OH Production History Graphs; Courtesy of OOGA's 2019 DeBrosse Report

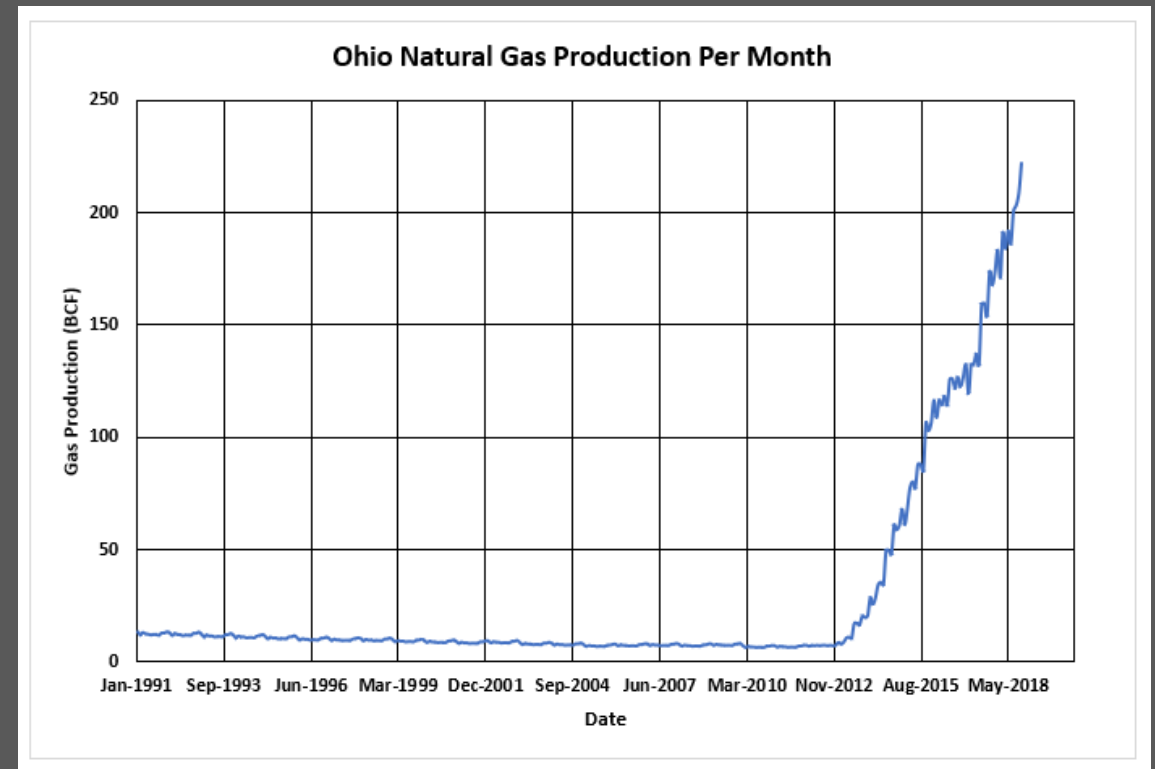
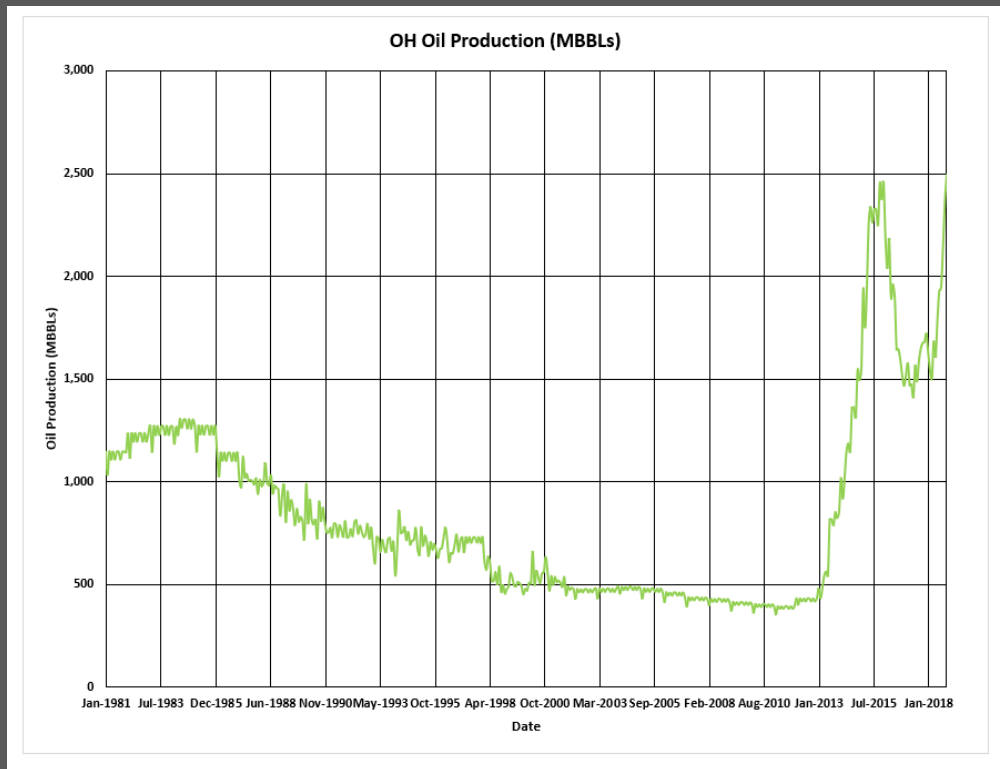


# Ohio Recent Hydrocarbon Activity



OH Hydrocarbon Activity; Courtesy of OOGA’s 2019 Debrosse Report

# Ohio Recent Hydrocarbon Production

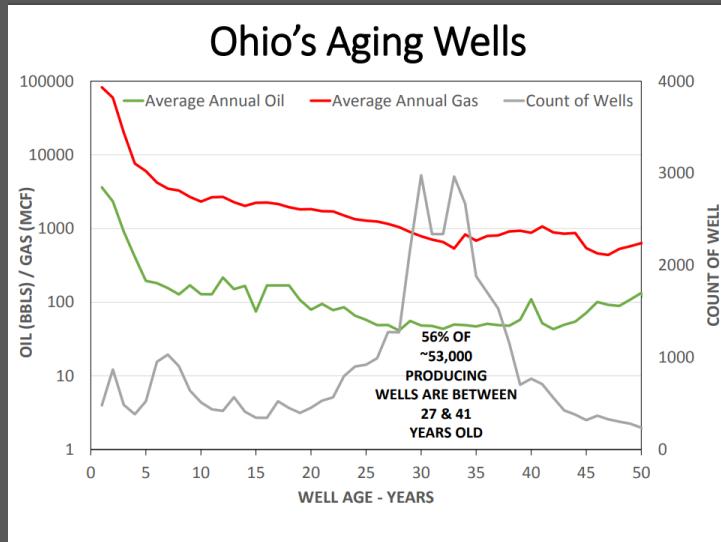


- Decline Until 2013 Due to Unconventional Discoveries
  - There is an issue though

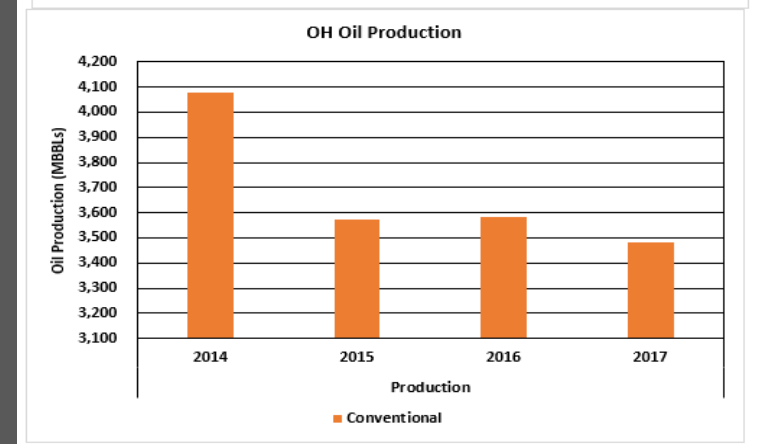
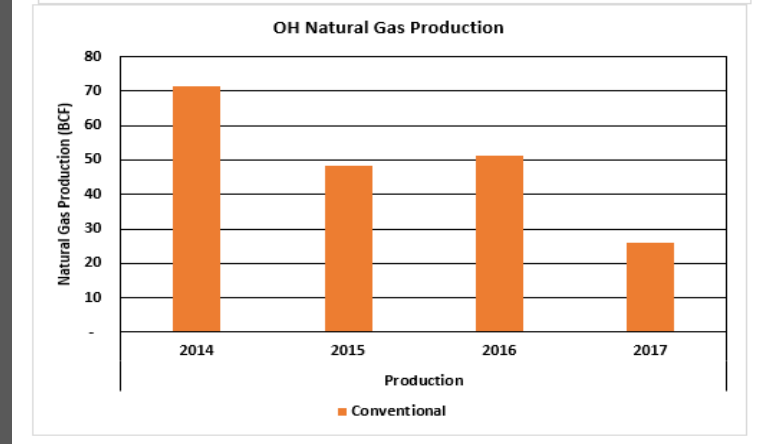
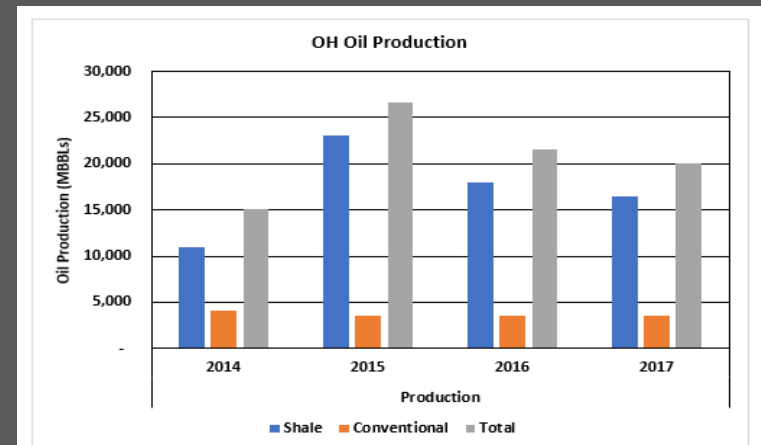
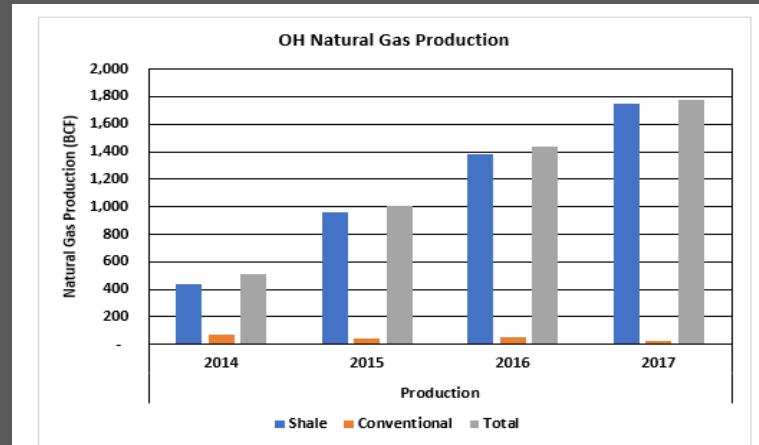




# Ohio Conventional Depletion



OH Hydrocarbon Activity; Courtesy of OOGA's 2019 Debrosse Report



- Continuing Conventional Dropoff
- 2018 is removed from this report as numbers have not been released yet.





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# Case Study



# What is the Solution?

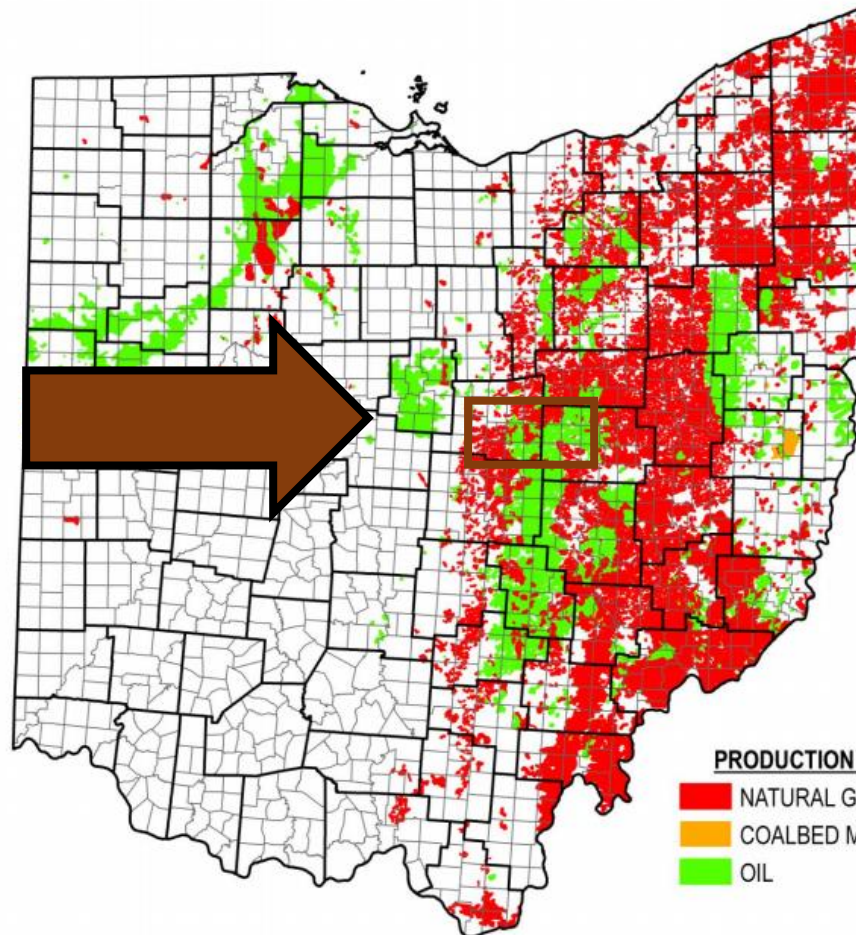
## Apply Unconventional Techniques

- Using Case Study, We will evaluate the feasibility of this option
- Case Study: Knox Co. Clinton Oilfield
  1. Evaluate Geological Characterization
  2. Evaluate Reserves
  3. Develop Drilling and Completion Plan
  4. Evaluate Reservoir Forecasting
  5. Evaluate Economic Feasibility
  6. Recommendations



# Knox County

## Oil & Gas Production in Ohio

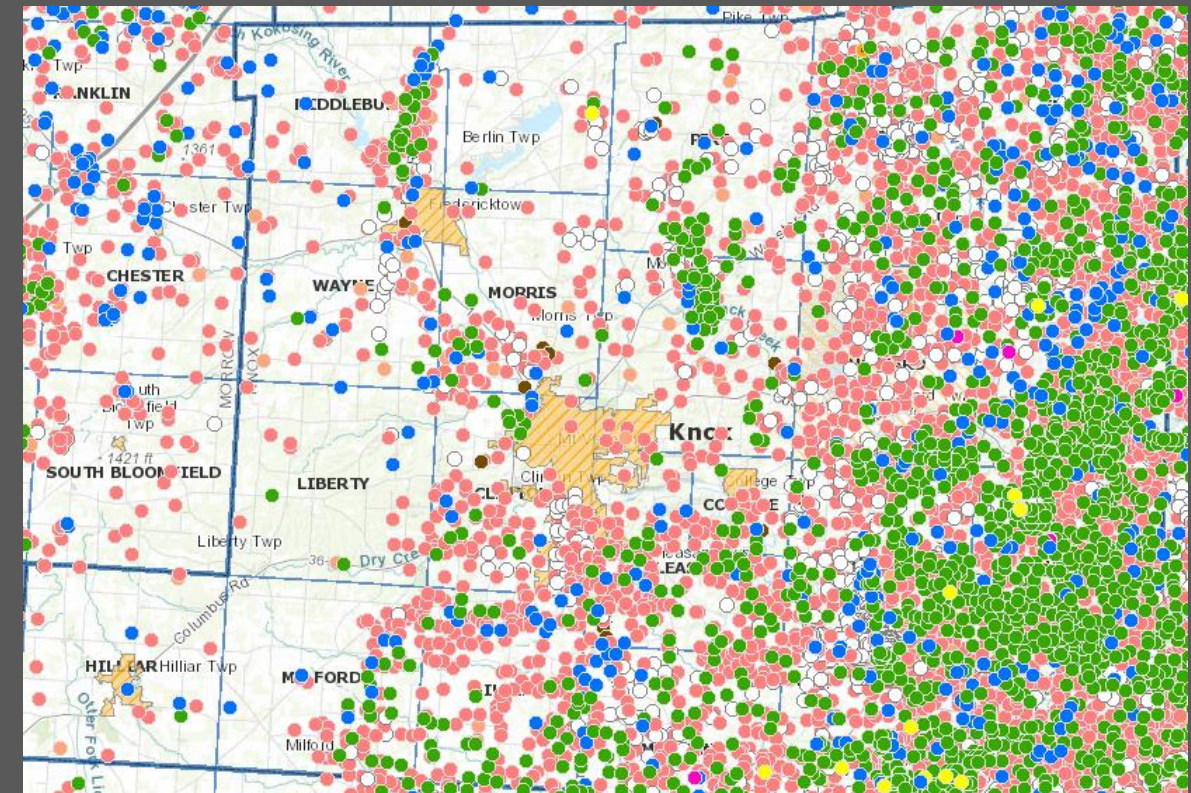
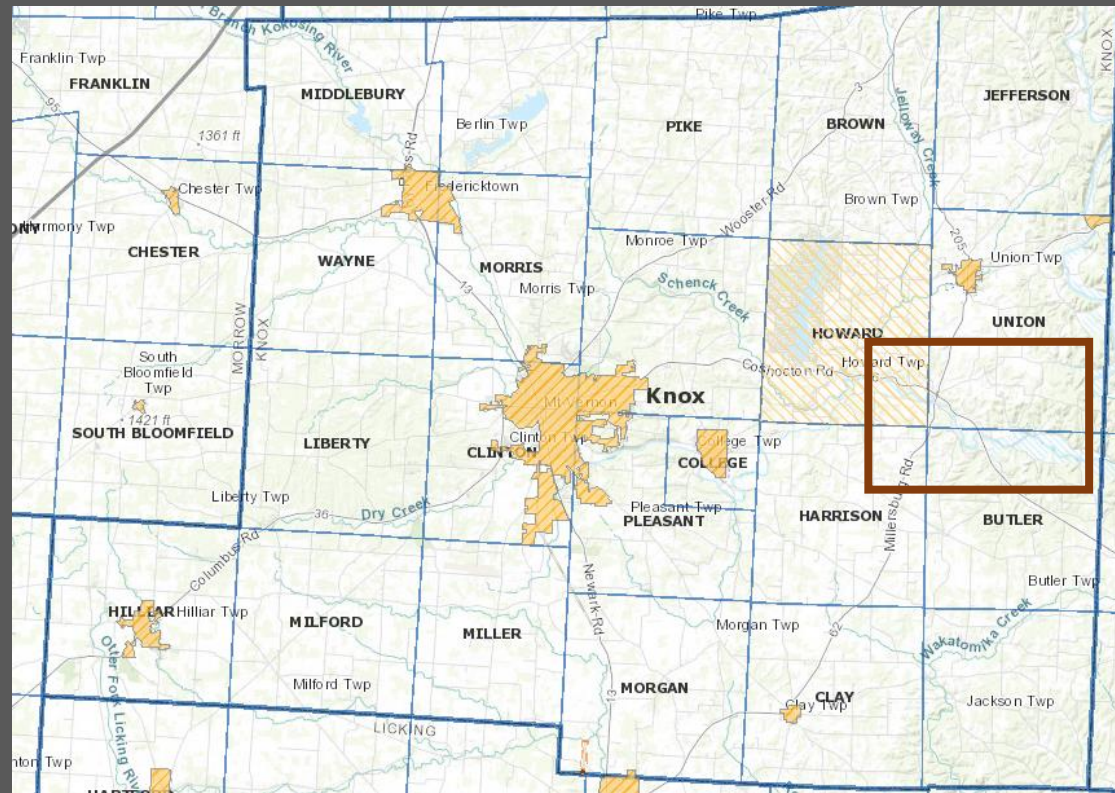


- More than 275,000 oil and gas wells drilled in Ohio since 1860
- More than 50,000 producing wells in 49 of 88 Ohio counties

**PRODUCTION TYPE**  
■ NATURAL GAS  
■ COALBED METHANE  
■ OIL

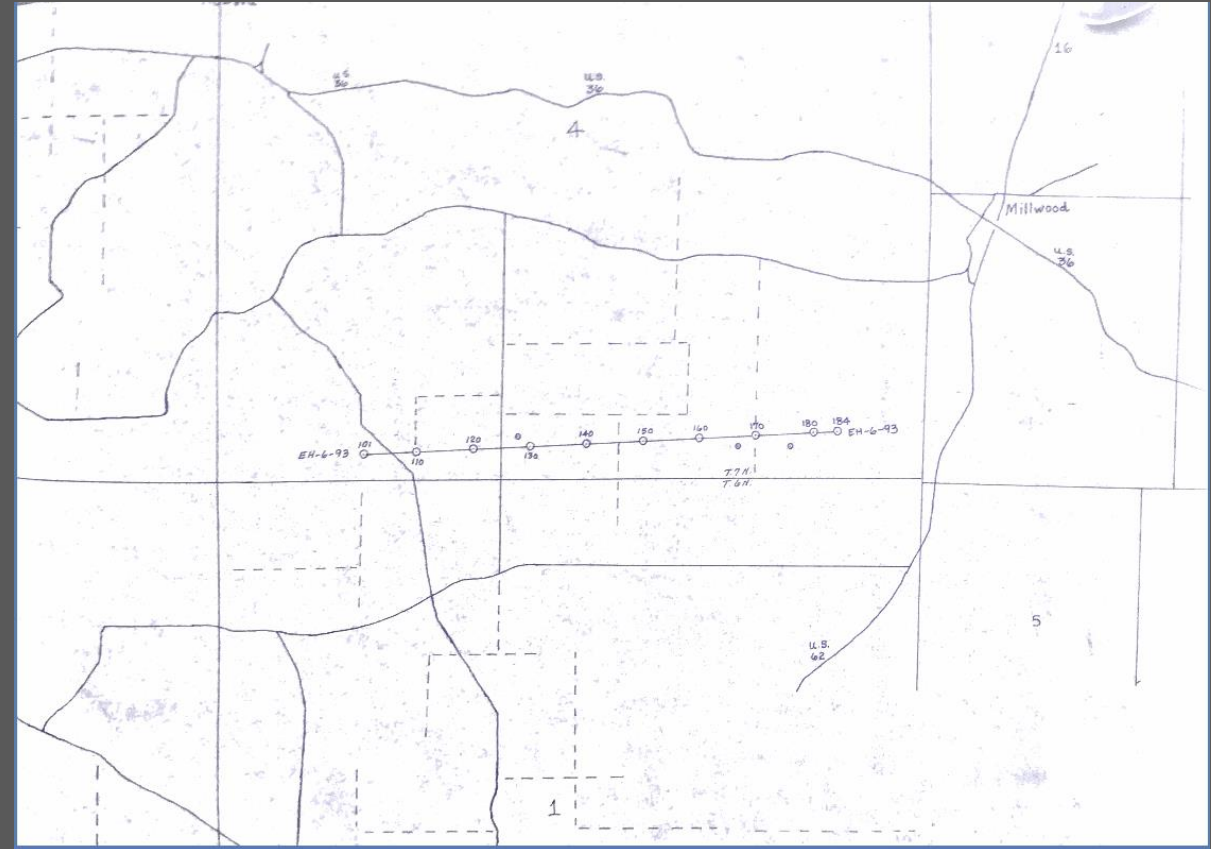
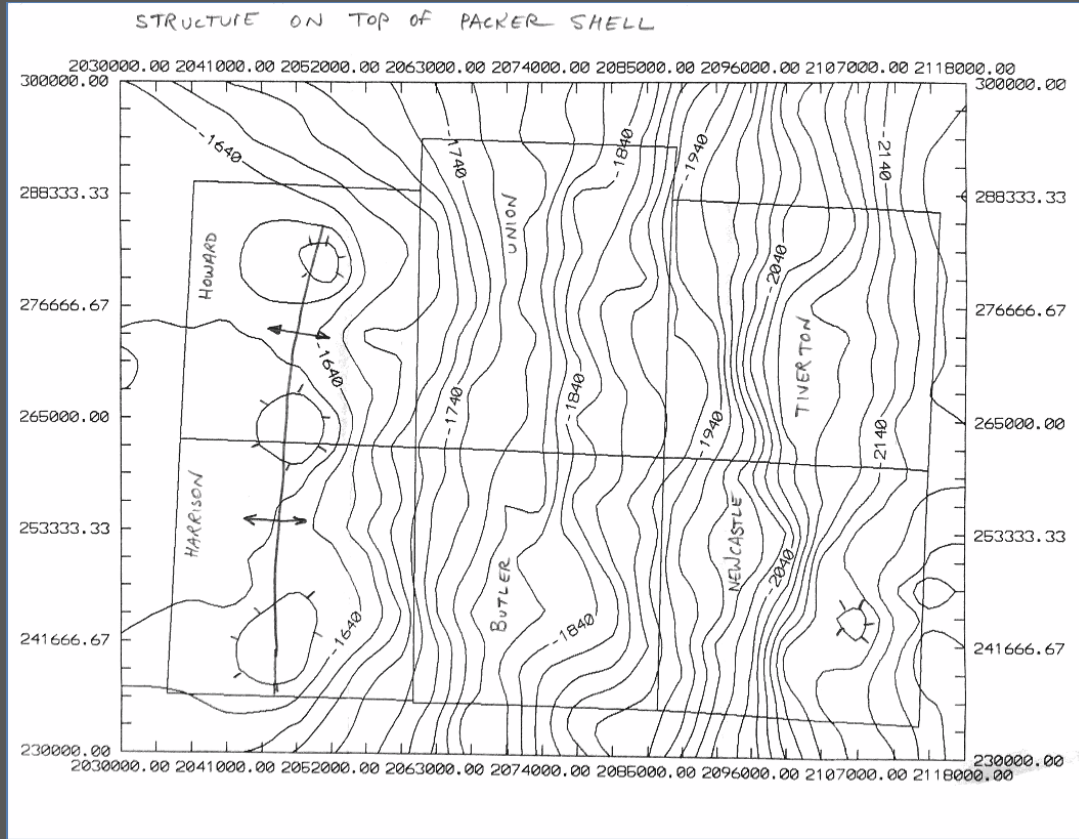


# Knox County



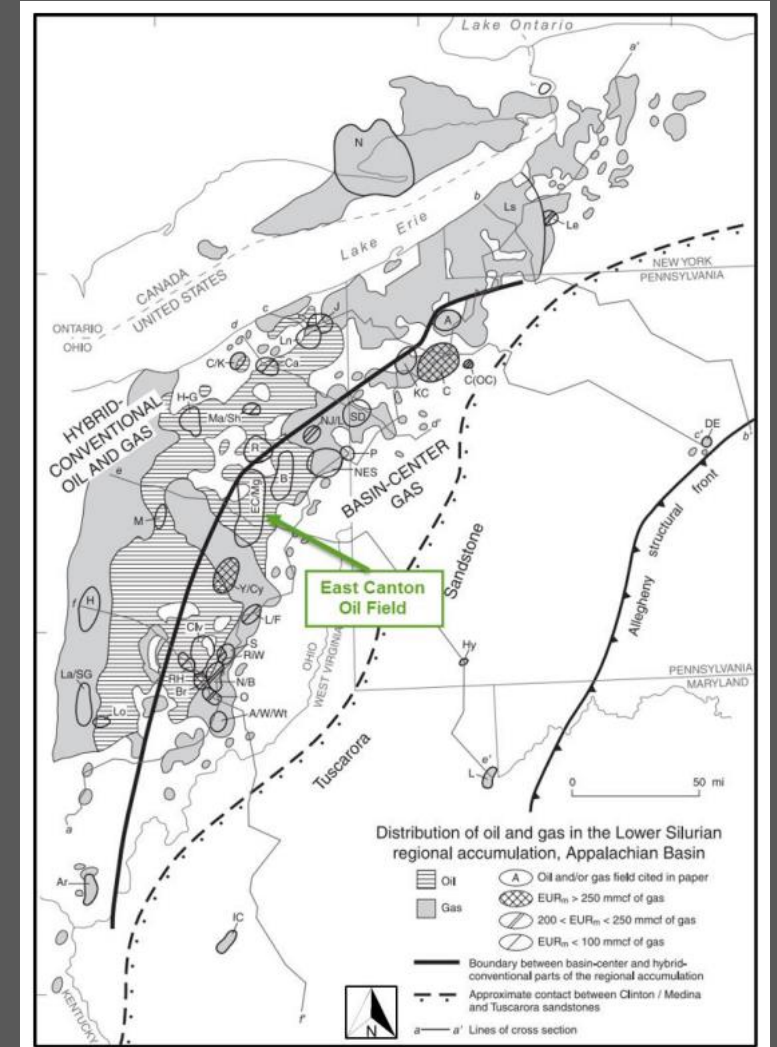
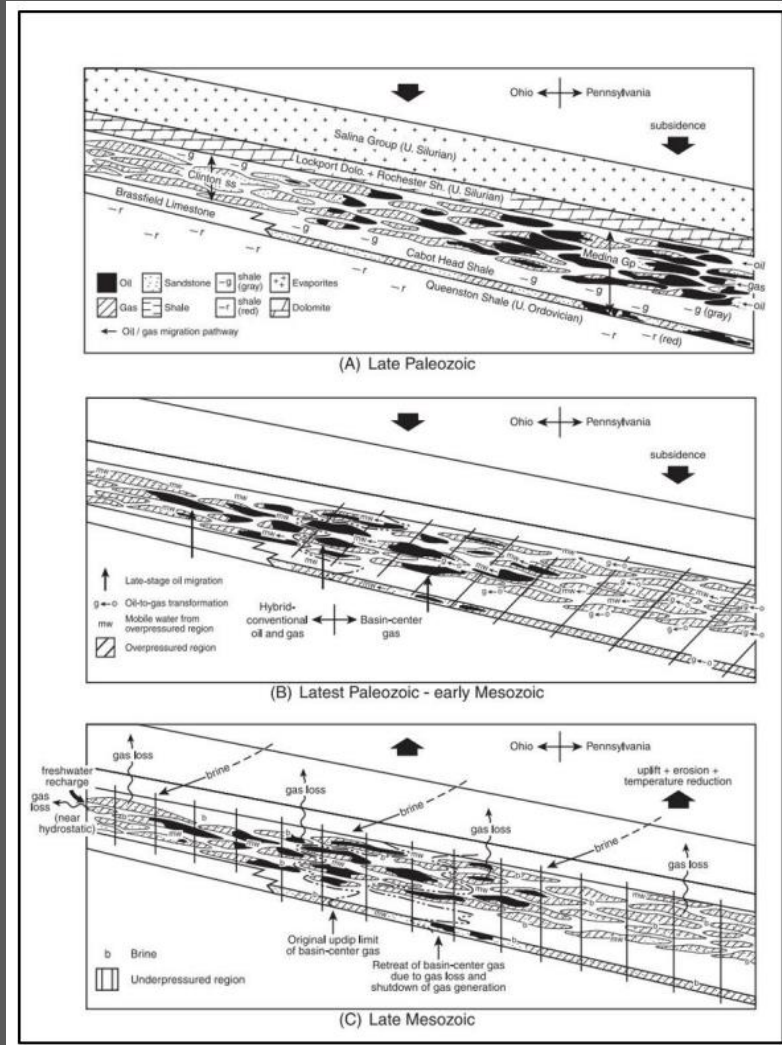
Knox County Well GIS Map; Courtesy of ODNR

# Knox County

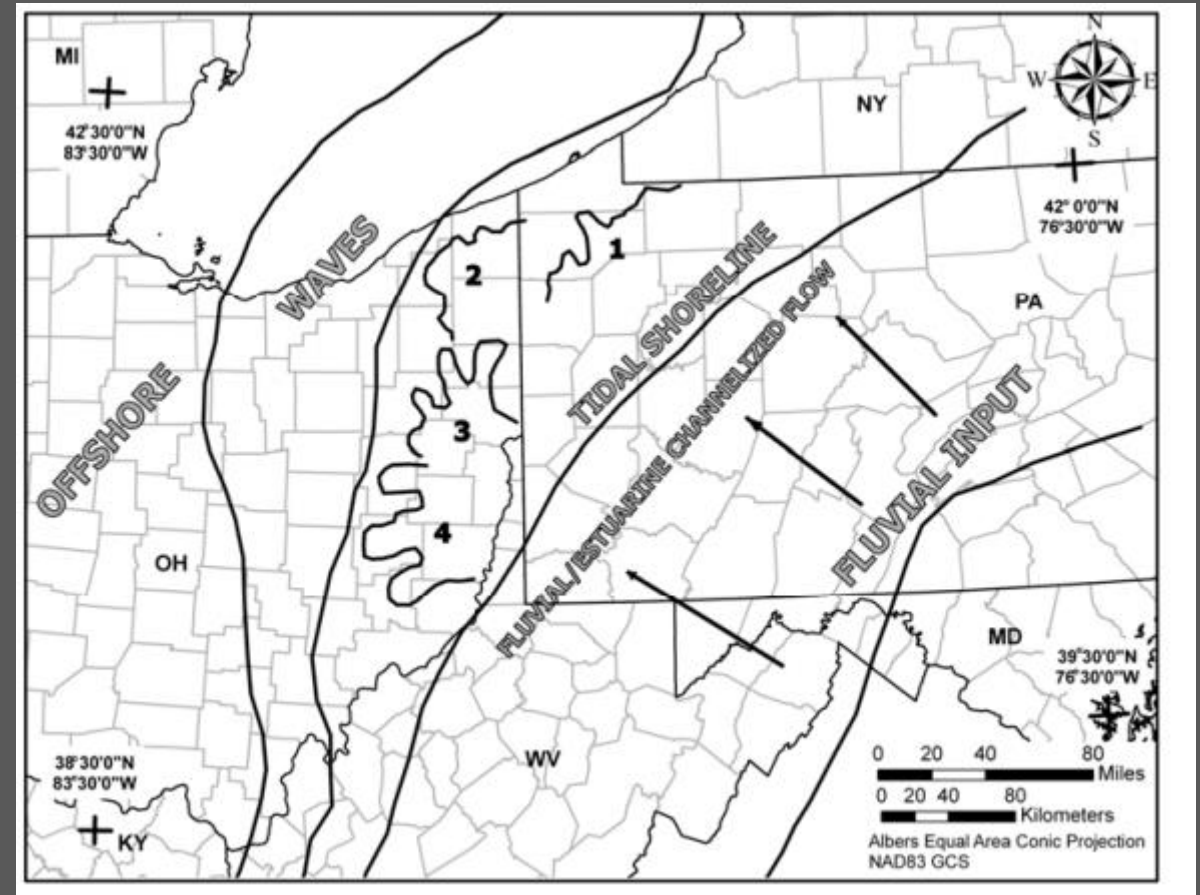
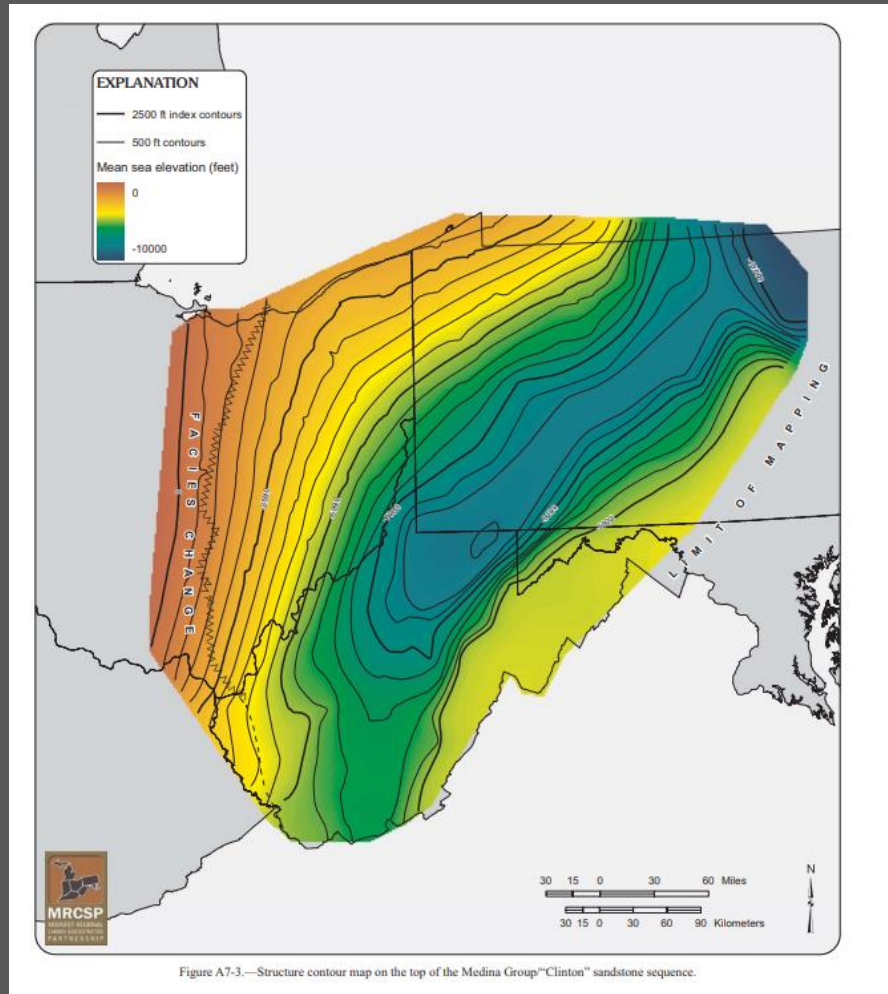


Packer Shell Contour Map & Seismic Proposed Shotpoints; Courtesy of Elkhead Gas & Oil Co.

# Knox County



# Knox County



Structure Contour Map & Depositional Environment; Courtesy of MRSCP Project



# Knox County

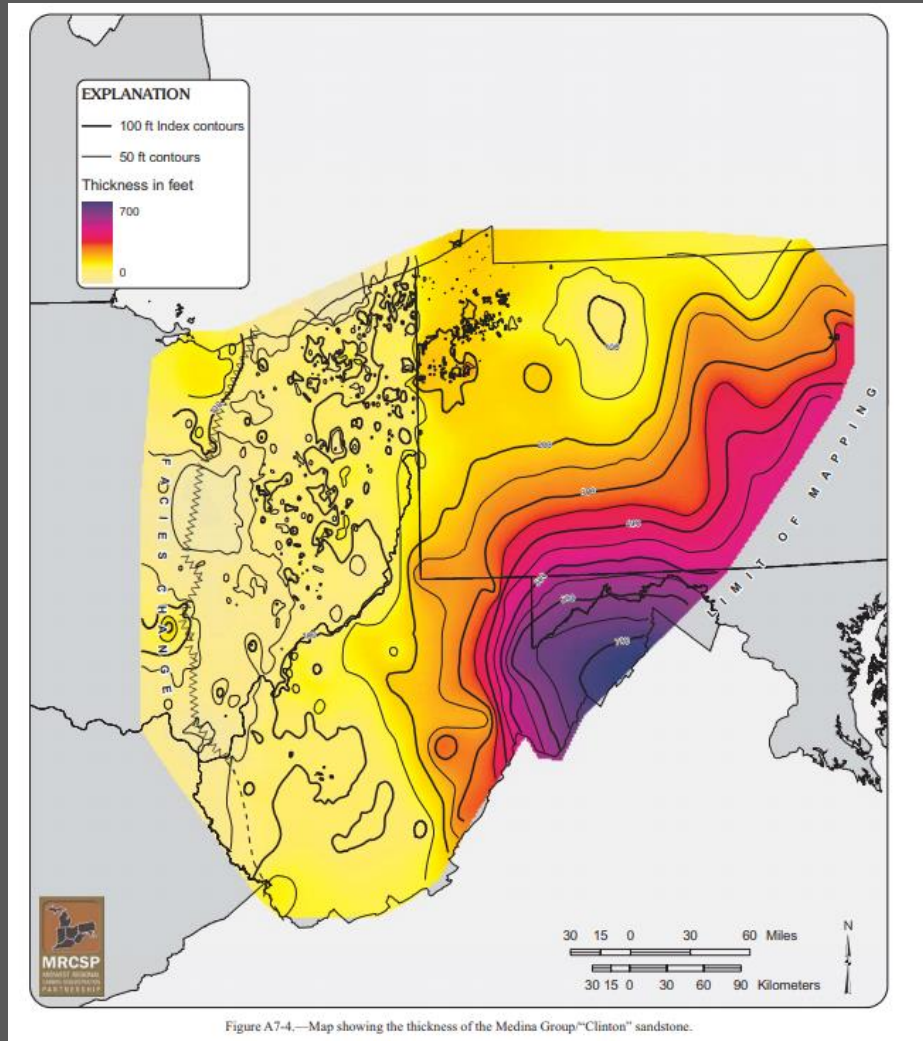


Figure A7-4.—Map showing the thickness of the Medina Group "Clinton" sandstone.

SYSTEM	SERIES	Eastern and Central OH	Northwestern PA
SILURIAN	UPPER	Clinton Group	Rochester Shale
		Clinton Group	Rochester Shale Irondequoit Dolomite
	LOWER	Clinton Group	Dayton Dolomite
		Clinton Group	Reynales Dolomite
ORDOVICIAN	UPPER	Cataract Group	Medina Group
		Cabot Head Formation Grimsby Sandstone- "Clinton" Sandstone	Grimsby Formation
		Brassfield- Manitoulin Dolomite "Medina" Sandstone	Cabot Head Shale/ (PowerGlen Shale) Whirlpool Sandstone Manitoulin Dolomite
		Queenston Shale	Queenston Shale

Structure Contour Map & Formation Layout; Courtesy of MRSCP Project

# Reported Production

Database Recorded Production End 2017

Knox County Hydrocarbon Production		
API	Total Oil Production	Total Gas Production
	688	-
	901	-
	415	-
	116	-
	371	-
	2,961	18,428
	465	1,381
	2,554	-
	932	12,159
	841	15,443
	3,026	8,431
	223	13,765
	1,505	4,015
	5,122	17,544
	2,149	5,936
	114	7,473
	135	2,916
	240	16,537
	4,363	15,723
	4,584	12,556
	135	2,915
	2,496	5,591
	1,954	18,261
	3,838	12,515

Field Requested Production		
API Requested	Total Oil Production	Total Gas Production
	4070	900
	1312	0
	#N/A	#N/A
	1051	0
	#N/A	#N/A
	#N/A	#N/A
	#N/A	#N/A
	7890	416
	#N/A	#N/A
	#N/A	#N/A
	#N/A	#N/A
	#N/A	#N/A
	#N/A	#N/A
	902	0
	10402	22592
	10401	22591
	10374	22592
	927	2405
	2151	5016
	4485	5732
	5351	6658
	12153	7866
	3732	4131

Requested Reported Field Production	
Oil (BBLs)	Gas (MCF)
113,927	173,202

- Reported Production Started in 1984
- 2018 Production Not Released Yet
- Most Wells in this field drilled between 1980-2012
- Gives Good Estimate of Recovery so far



# Reserves

<b>AVG THICKNESS</b>	44.47
<b>A</b>	832.53
<b>h</b>	44.47
<b>φ</b>	9%
<b>S<sub>wi</sub></b>	53%
<b>B<sub>o</sub></b>	1.22
<b>OOIP</b>	9,958,686 BBLs

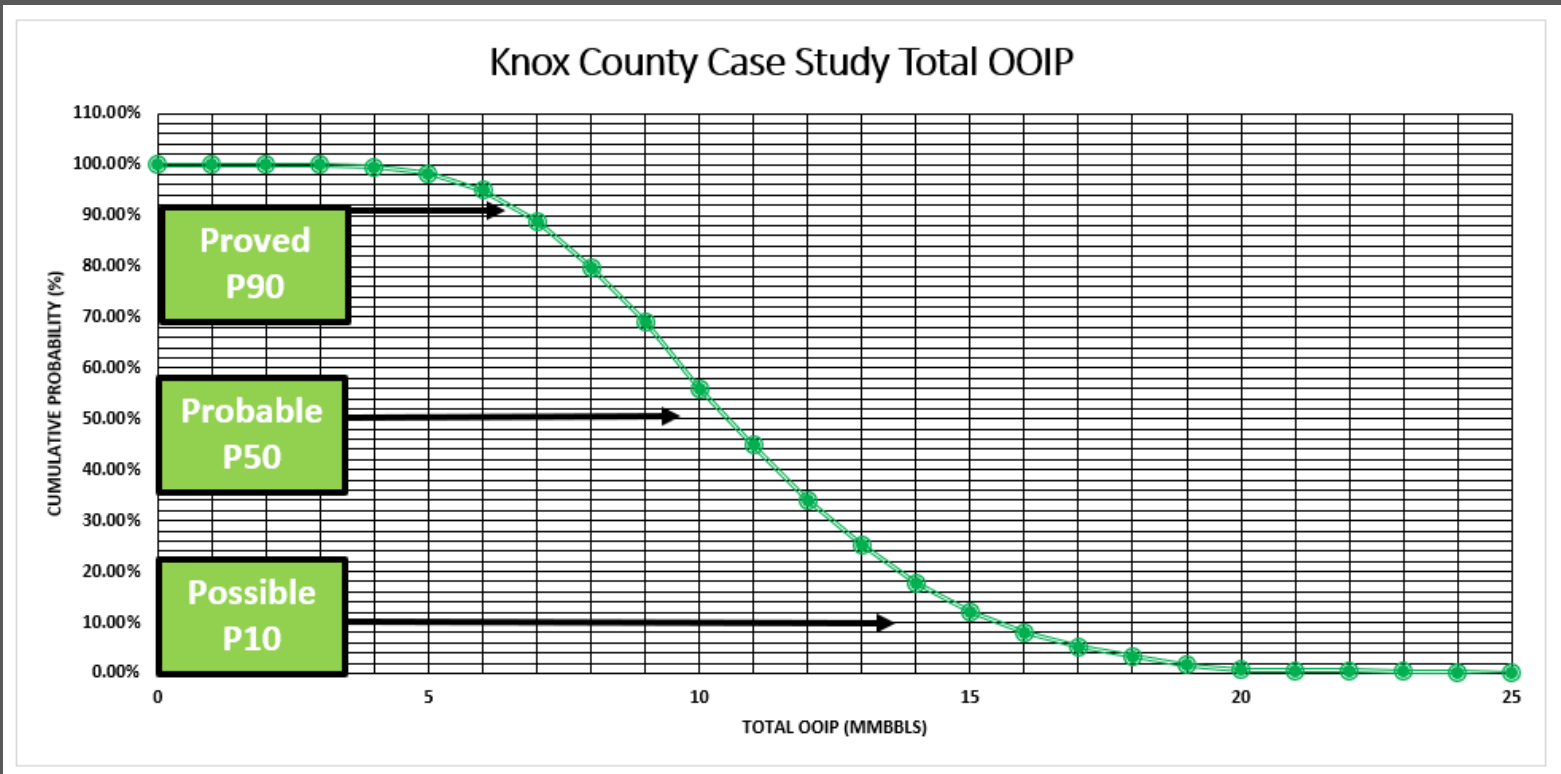
<b>Expected Res Pressure</b>	821
<b>Actual Oil Produced</b>	113,927
<b>% Recovery Factor Thus Far</b>	1%

Reservoir Drive Mechanism	Percent Ultimate Recovery	
	Gas	Oil
Strong Water	30-40	45-60
Partial Water	40-50	30-45
Gas Expansion	50-70	20-30
Solution Gas	N/A	15-25
Rock	60-80	10-60
Gravity Drainage	N/A	50-70

PARCELS	UNITS
1	151.23
2	25.72
3	2.28
4	152.321
5	80.86
6	96.029
7	6.139
8	11.701
9	143.044
10	163.204
<b>TOTAL</b>	<b>832.528</b>

- Calculated using OOIP Formula
- Thickness- Avg Height of 2 Sand Sections
  - Reservoir assumed to be Layered
  - GOR Ratio Assumed of 2 MCF/BBL
  - Low RF Due to Reservoir Depletion
- Reservoir Pressure Gradient Assumed to be .3 psi/ft

# Reserves Probability

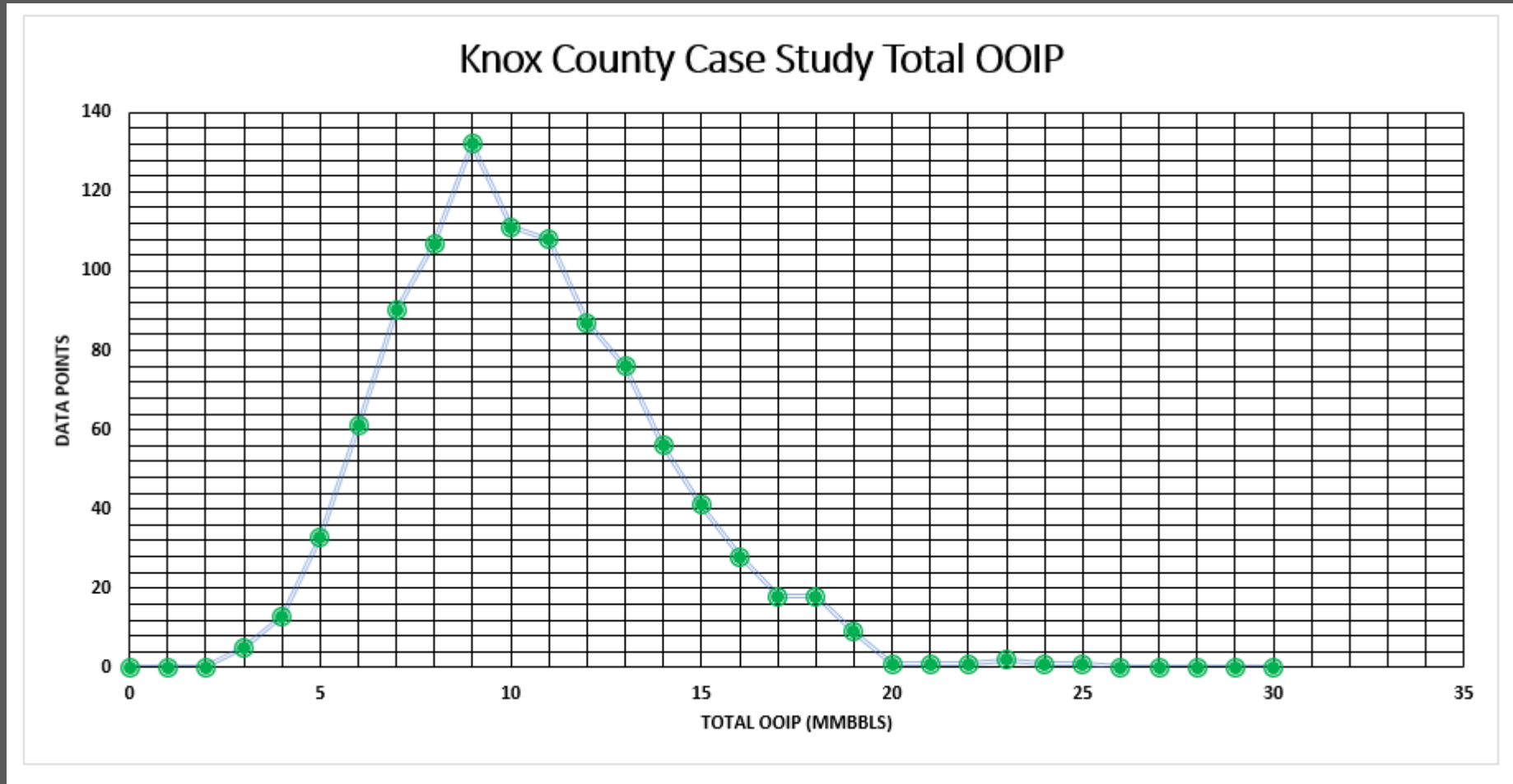


Monte Carlo Simulation V2 Last Modified By: Jay Chapin

	Input	Std Dev
A	832.53	1.0000
h	44.47	10.0000
$\phi$	0.0900	0.0200
$S_w$	0.53	0.0500
$B_o$	1.2200	0.0010
	-	-
	-	-
OOIP	9.96	
Total OOIP	9.96	

Proved	6.80 MMBBL
Probable	3.73 MMBBL
Possible	4.98 MMBBL

# Reserves Probability



# Drilling

- MD- 9,500'
- LL- 4,000'
- TVD- 2,800'



Well Schematic Last Modified By: Jay Chapin

3/14/2019

Prepared For:



Well Name:	Taggart #1H	AFE#:	KX-1-TAGG-DC-1	County, St.:	Knox, OH
API #:		Drilling Rig:		Target Formation:	Lower Clinton SS
Hole Section		Hole Size	Section of Hole	Lithology	Bit Selection
Conductor		26	Conductor	Water Table/Coal Seams	26 Hammer
Surface		17.5	Surface	Water Table/Coal Seams	17.5 Hammer
Intermediate 1		12.25	Intermediate 1	Soft/Hard Spots	12.25 Roller Cone
Production Top Hole		8.5	Production	Soft/Hard Spots	8.5 Roller Cone
Production Curve and Lateral		8.5	Production	Speed not Lith Change	8.5 PDC Bit
		0			0

Hole Section	Hole (in)	Depth (ft)	Fluid	Fluid Rate	WOB	RPM
Conductor	26	150	Air/Mist	N/A	6000-10000	15-30
Surface	17.5	450	Air/Mist	3000-3500 cfm	6000-10000	15-30
Intermediate 1	12.25	1600	Air/Mist	2000-4000 cfm	6000-10000	15-40
Production Top Hole	8.5	2400	Air/Mist	4000-6000 cfm	10000-18000	15-40
Production Curve and Lateral	8.5	9500	OBM Mud	450 GPM	18000-35000	90-110
	0	0		0	0	0

Hole Section	Hole (in)	Depth (ft)	Fluid	Weight	Rate	Density	Additives
Conductor	26	150	Air/Mist	N/A	N/A	N/A	Surfactant as necessary
Surface	17.5	450	Air/Mist	N/A	3000-3500 cfm	N/A	Surfactant as necessary
Intermediate 1	12.25	1600	Air/Mist	N/A	3000-4000 cfm	N/A	Surfactant as necessary & Stabilizer
Production Top Hole	8.5	2400	Air/Mist	N/A	4000-6000 cfm	N/A	Surfactant as necessary & Stabilizer
Production Curve and Lateral	8.5	9500	Mud	N/A	450 GPM	7 PPG (6.7-18 MW Window)	Surfactant as necessary & Stabilizer
	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Hole Section	Hole (in)	Depth (ft)	Fluid	Logging Tools
Surface	17.5	450	Air/Mist	
Intermediate 1	12.25	1600	Air/Mist	LWD
Production	8.5	9500	Air/Mist/OBM Mud	Full Mudlog, 50' Samples, LWD
	0	0		

Completions Tools	
Tool	Amount
Smart Sieves	3

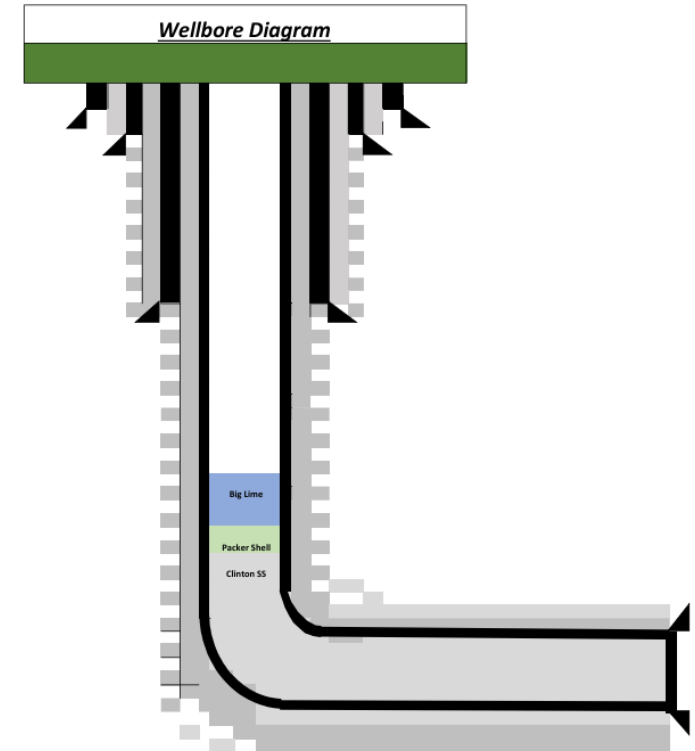
Casing Details						
Strings	OD	FT	Weight	Grade	Conn	Burst
Conductor	20"	150	94	J-55	BTC	520
Surface	13 3/8"	450	54.5	J-55	BTC	1130
Intermediate 1	9 5/8"	1600	40	J-55	BTC	2570
Production	5 1/2"	9500	20	P-110	BTC	11080
Tubing	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A

String	Blend	Density	Yield	Sls	Excess	TDC	Mix Water (BBLs)
Conductor	Class A	15.6	1.19	380	15%	Surface	133
Surface	Class A	15.6	1.19	411	15%	Surface	175
Intermediate 1	Class A	15.6	1.19	611	15%	Surface	276
Production	Class A	15.6	1.19	2168	15%	Surface	830
	0	0	0	0	0%	0	0

Components	Casing (in)	Flange	Wellhead	BOP
Conductor	20	20" x 13 3/8" - 10K	Weir Oil and Gas	N/A
Surface	13.375	20" x 13 3/8" - 10K	Weir Oil and Gas	20" Rotating Head
Intermediate 1	9.625	13 5/8" x 9 5/8" - 10K	Weir Oil and Gas	13 5/8" 10M Stack
Production	5.5	11" x 5 1/2" - 10K	Weir Oil and Gas	13 5/8" 10M Stack
Tubing	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A

Geological Formations	TVD Top	Thickness	Formation Evaluation
Berea Sandstone	704	N/A	None
Ohio Shale	712	N/A	Survey Shot at Int 1 Shoe for Tie In
Big Lime	1738	N/A	Gyro Until Fluid Switch
Packer Shell	2687	N/A	Survey Shot at Int 2 Shoe for Tie In
Clinton Sand	2718	N/A	Full Mudlog, 50' Samples, LWD

Directional	Actual	Proposed
KOP	0	2,400
LP	0	4,300
Inc	0.00	89.50
AZ	0.00	330.00
TD	0	9,500
Inc	0.00	90.02
AZ	0.00	330.00



# Drilling

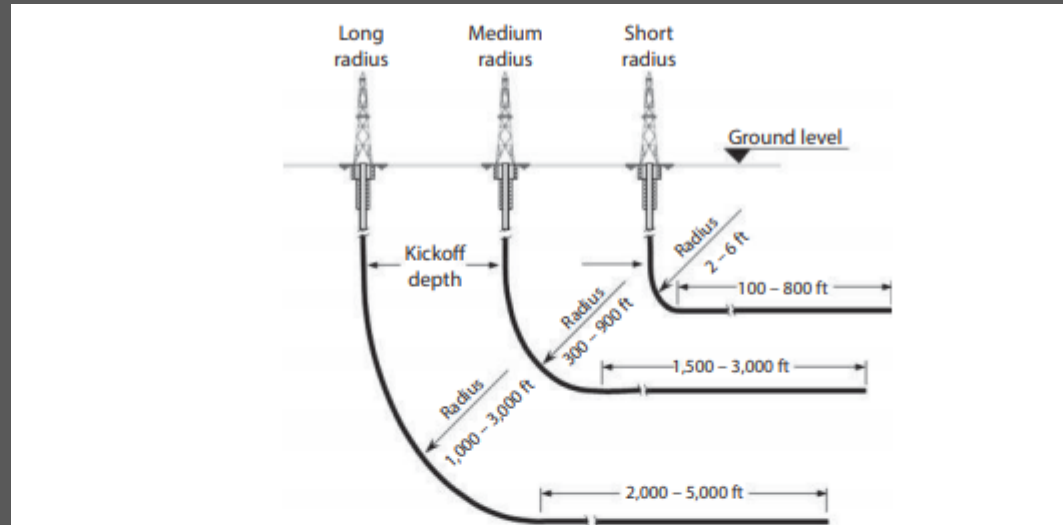


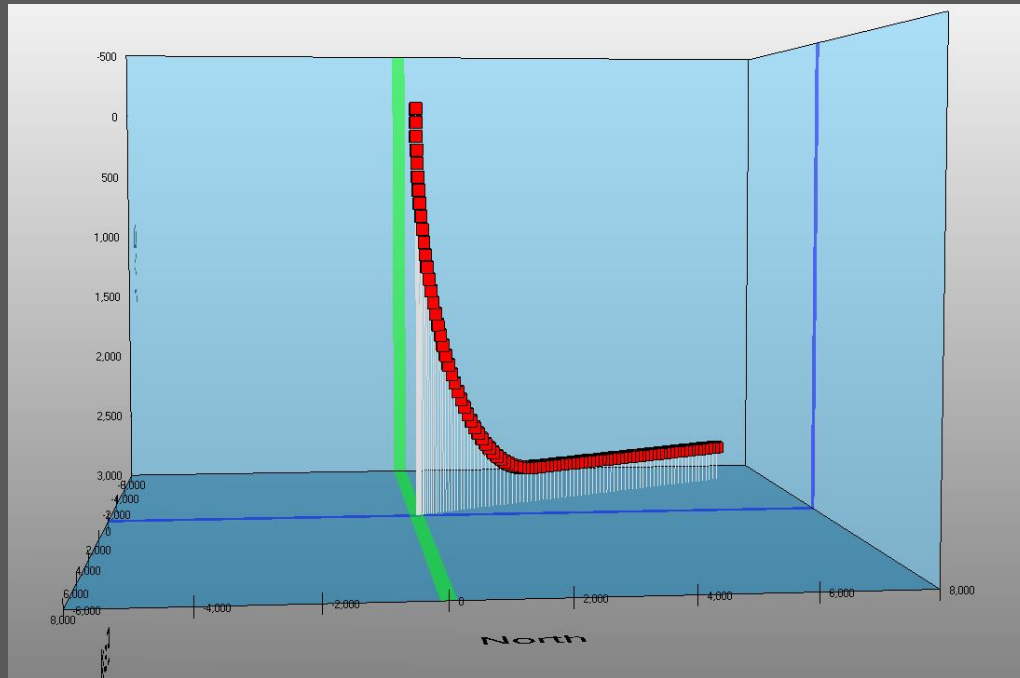
Figure 10.15 Radius profiles for horizontal wells.

Table 10.1 Classification of horizontal wells.

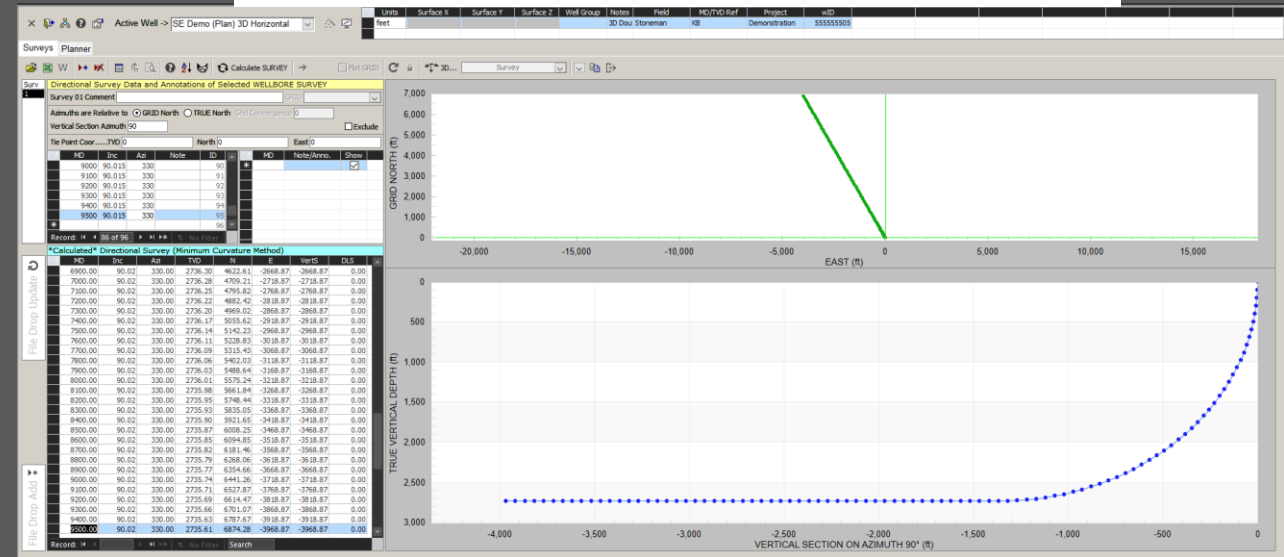
Radius Type	Buildup Rate	Radius
Ultra short radius	60-200° per 100ft	100-200ft
Short radius	60-150° per 100ft	250-350ft
Medium radius	8-30° per 100ft	500-1000ft
Long radius	2-6° per 100ft	1000-3000ft



# Proposed Drill Survey



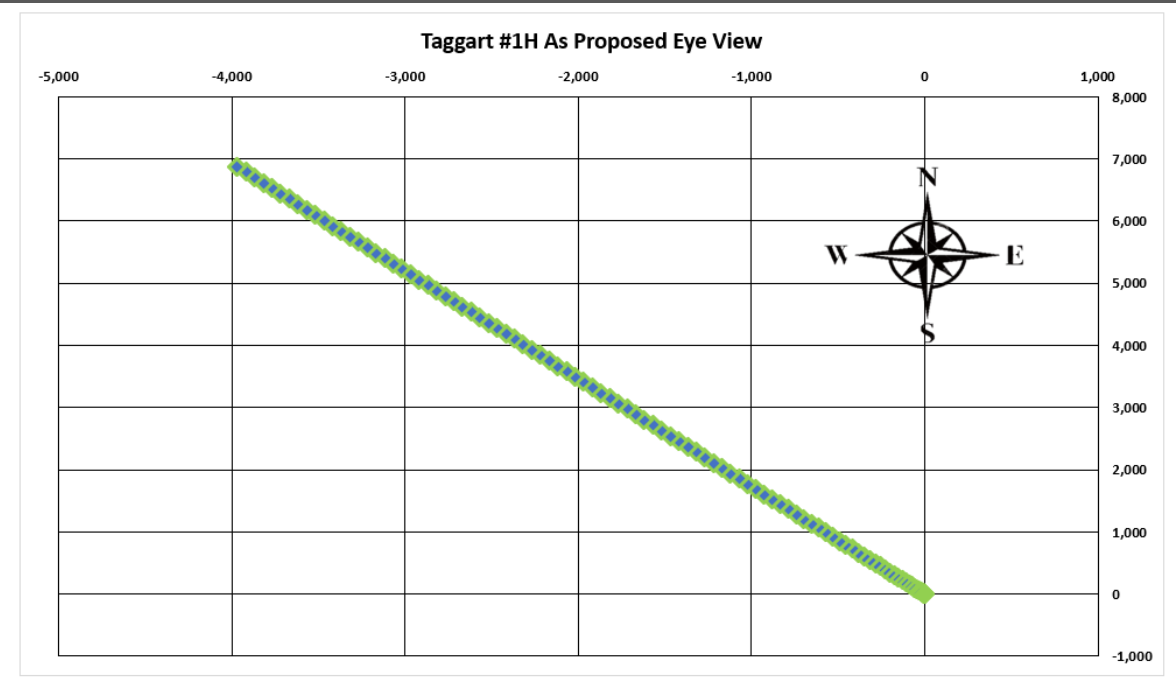
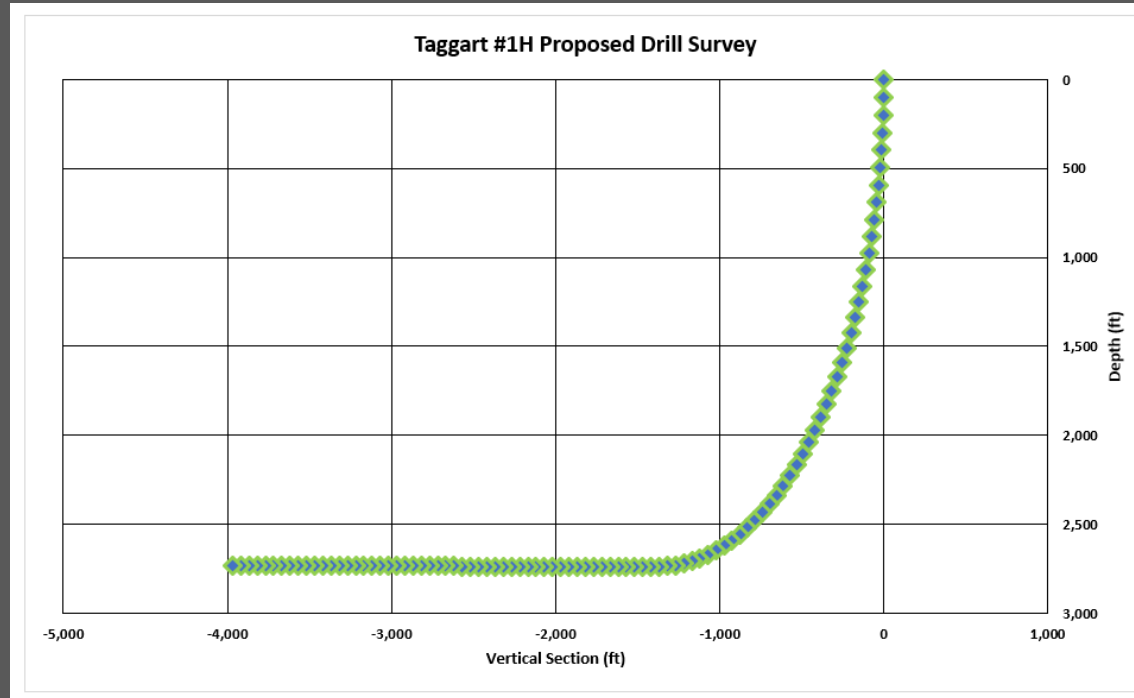
Dip Angle	0.5	Build Rate Deg/100 FT	2.09338
Inclination Angle	89.5	Initial Inc KOP	100



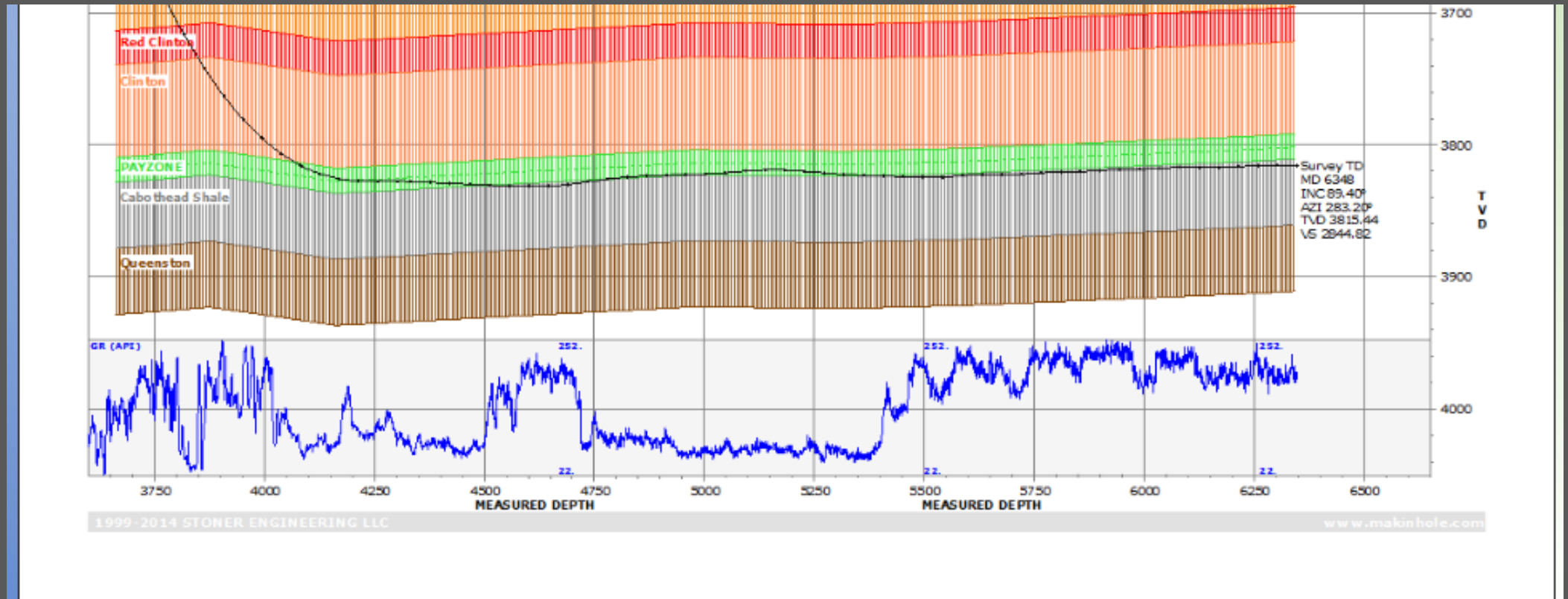
3-D View and Graph Using SES Software



# Proposed Drill Survey

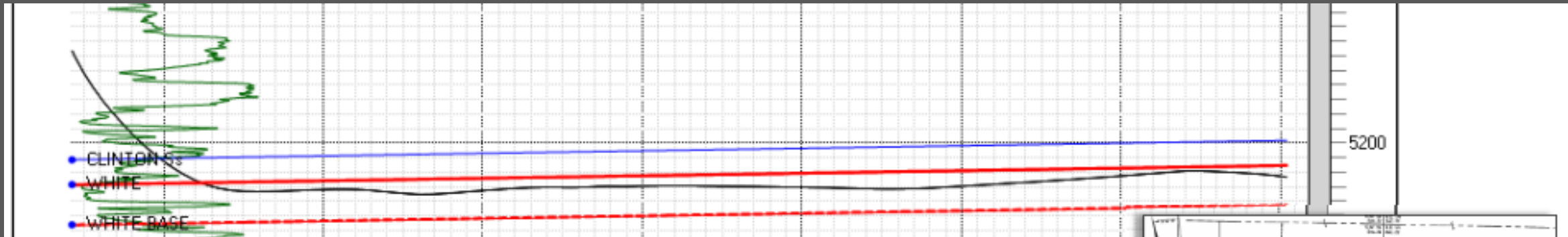


# Drilling Cautions



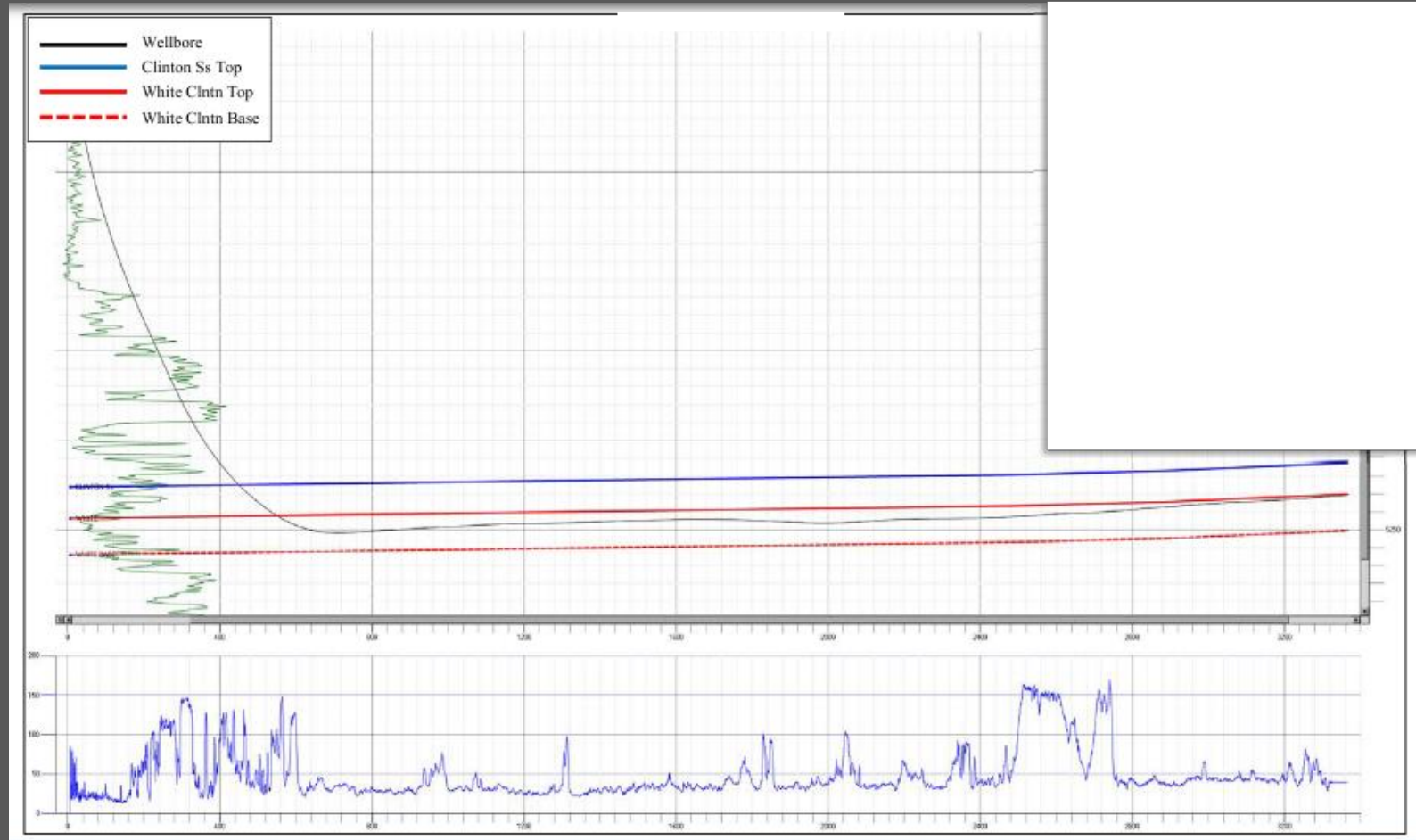
Actual Clinton Geosteer; Courtesy of OOGA Workshop

# Drilling Cautions



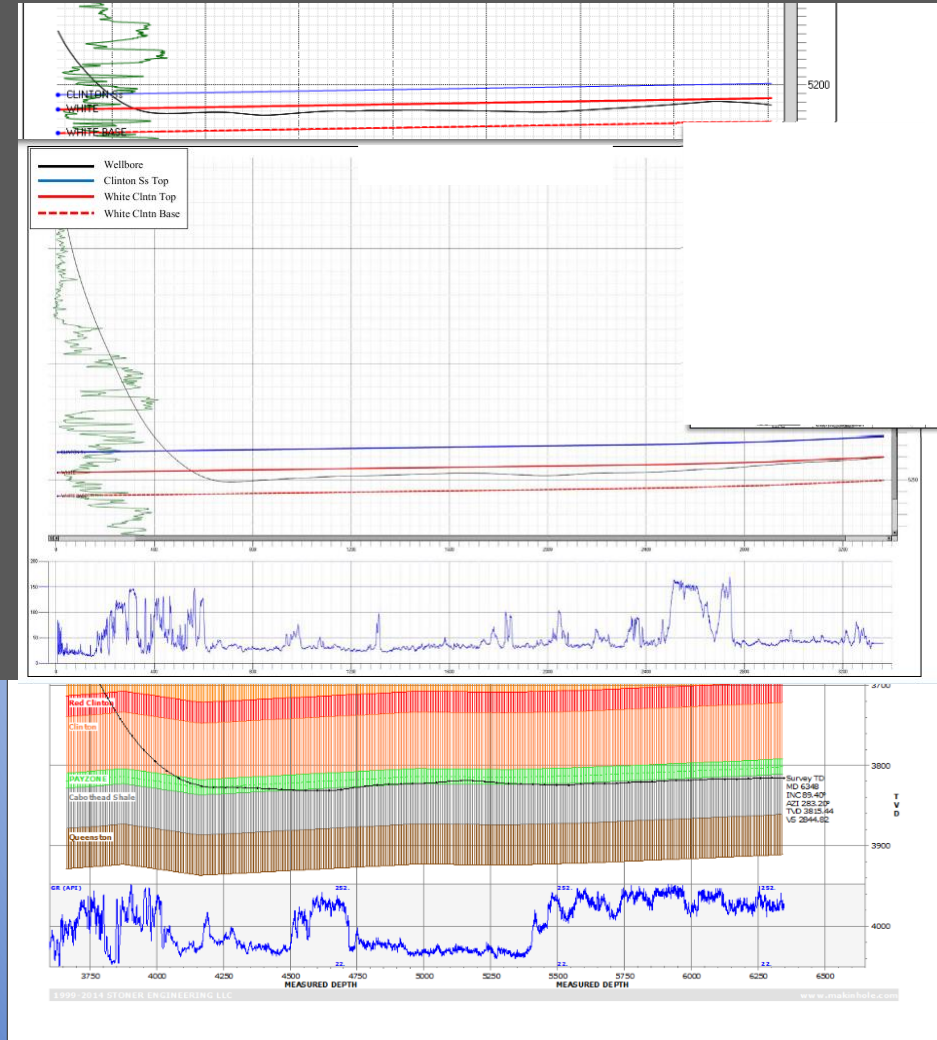
Actual Clinton Geosteer; Courtesy of OOGA Workshop

# Drilling Cautions



# Drilling Cautions

- **Clinton is Extremely Abrasive**
  - **Low ROPs**
  - **High Bit Management**
- **Low MWs- Depleted Rock; Low Formation Damage**
- **Clayiness and Water Saturations- Makes "Staying in Zone" Critical**
- **Abrasive Rock Makes Sliding & Curve Building a Challenge**
  - **Would Use RSS**
- **Air to KOP; TOOH for Bit Change and Fluid Change**
- **Use 5 1/2" Production Casing- Higher Capacities & SFs for Completions**



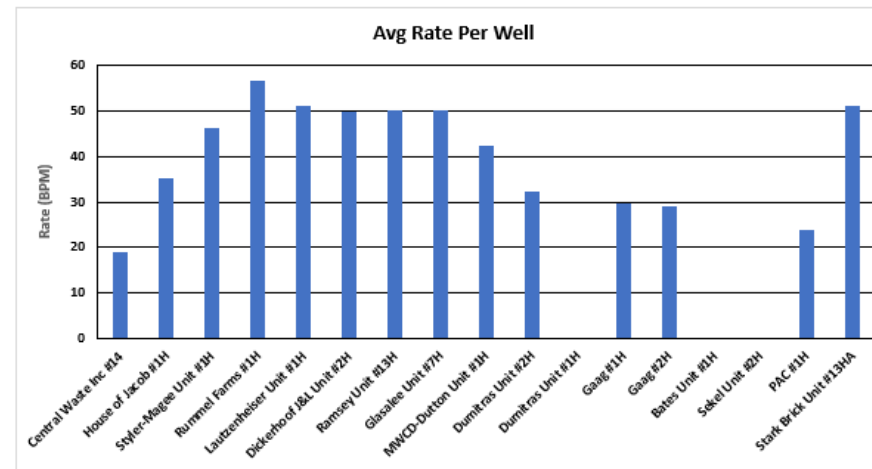
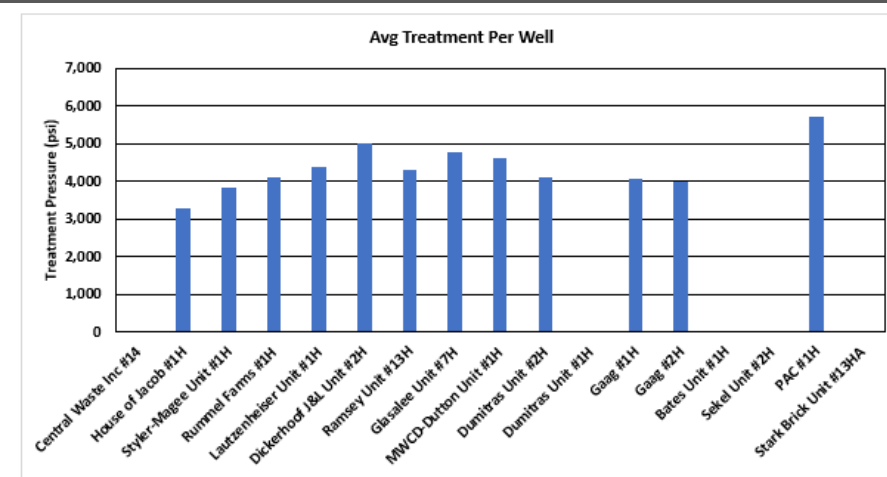
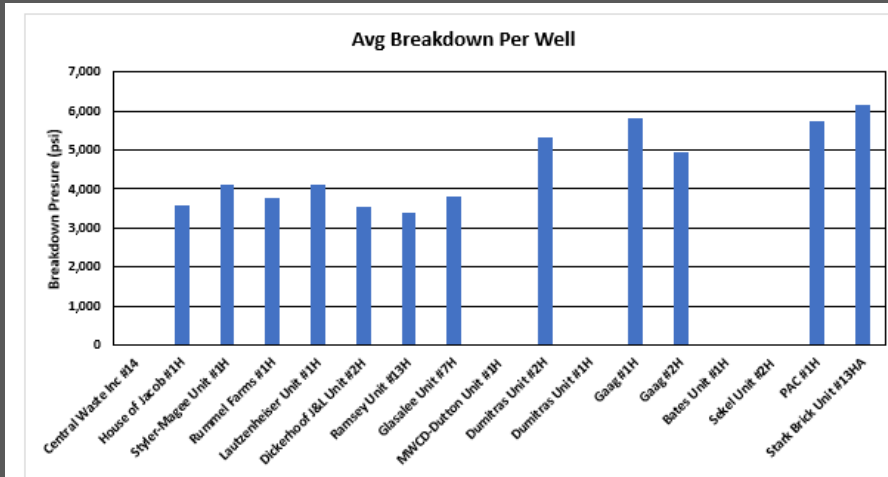
Actual Clinton Geosteers; Courtesy of OOGA Workshop



# Completions

Well Name	OP	TD	Perf Type	Stim Type	# of Stages	Comp LL	Total Perfs	Shts/Stage	Clusters	Cluster Length	SS	Water	Sand	N2	Acid	AVG BRK	AVG Treat	AVG Rate
		ft				ft					ft	BBLs	Sks	SCF	Gals	PSI	PSI	BBLs
Central Waste Inc #14	Enervest	6505	Plug & Perf	Gel Sand	3	1088	72	24		2	500	4048	1975		1300			19
House of Jacob #1H	NGO	6759	Plug & Perf	N2 Foam	13	1875		1 & 2		75	150	9315	1339	21482400	13000	3585	3293	35.2
Styler-Magee Unit #1H	Enervest	6679	Sliding Sleeve	Slickwater	9	933	13	1			133 & 90	23480	0		500	4105	3852	46.2
Rummel Farms #1H	Enervest	7542	Sliding Sleeve	Slickwater	14	1803	14	1			142	42106	0			3771	4136	56.5
Lautzenheiser Unit #1H	Enervest	7476	Sliding Sleeve	Slickwater	15	1874	15	1			140	46465	0			4112	4399	51.2
Dickerhoof J&L Unit #2H	Enervest	7584	Sliding Sleeve	Slickwater	16	1999	16	1			135	47304	0			3544	5014	49.9
Ramsey Unit #13H	Enervest	7405	Sliding Sleeve	Slickwater	16	2080	16	1			140	47617	0			3404	4311	50.1
Glasalee Unit #7H	Enervest	7595	Sliding Sleeve	Slickwater/Sand	16	2048	16	1			142	41450	3840			3826	4788	50.2
MWCD-Dutton Unit #1H	Enervest	8277	Sliding Sleeve	Slickwater/Sand	19	2484	16	1			145	37463	5412				4622	42.2
Dumitras Unit #2H	US	6291	Plug & Perf	Gel Sand	19	1830	950	50			100	14933	4121		11000	5324	4104	32.3
Dumitras Unit #1H	US	6300	Plug & Perf	Gel Sand	20	1960	1000	50			100							
Gaag #1H	US	5888	Plug & Perf	Gel Sand	17	1630	830	50			100	10951	3671		9500	5830	4093	29.6
Gaag #2H	US	5929	Plug & Perf	Gel Sand	15							9547	3394		8000	4962	3997	29
Bates Unit #1H	US	6532	Plug & Perf	Gel Sand	24	2360	1200	50			100		5281		14100			
Sekel Unit #2H	US	6376	Plug & Perf	Gel Sand	15	1380	750	50			100		2865		9150			
PAC #1H	PAC	7474	Plug & Perf	Slickwater	11							12031	0		4500	5754	5723	23.9
Stark Brick Unit #13HA	Enervest	8278	Plug & Perf	Slickwater/Sand	23	2798	552	24	4	30	120	48859	8696		22500	6137		51.2

# Completions

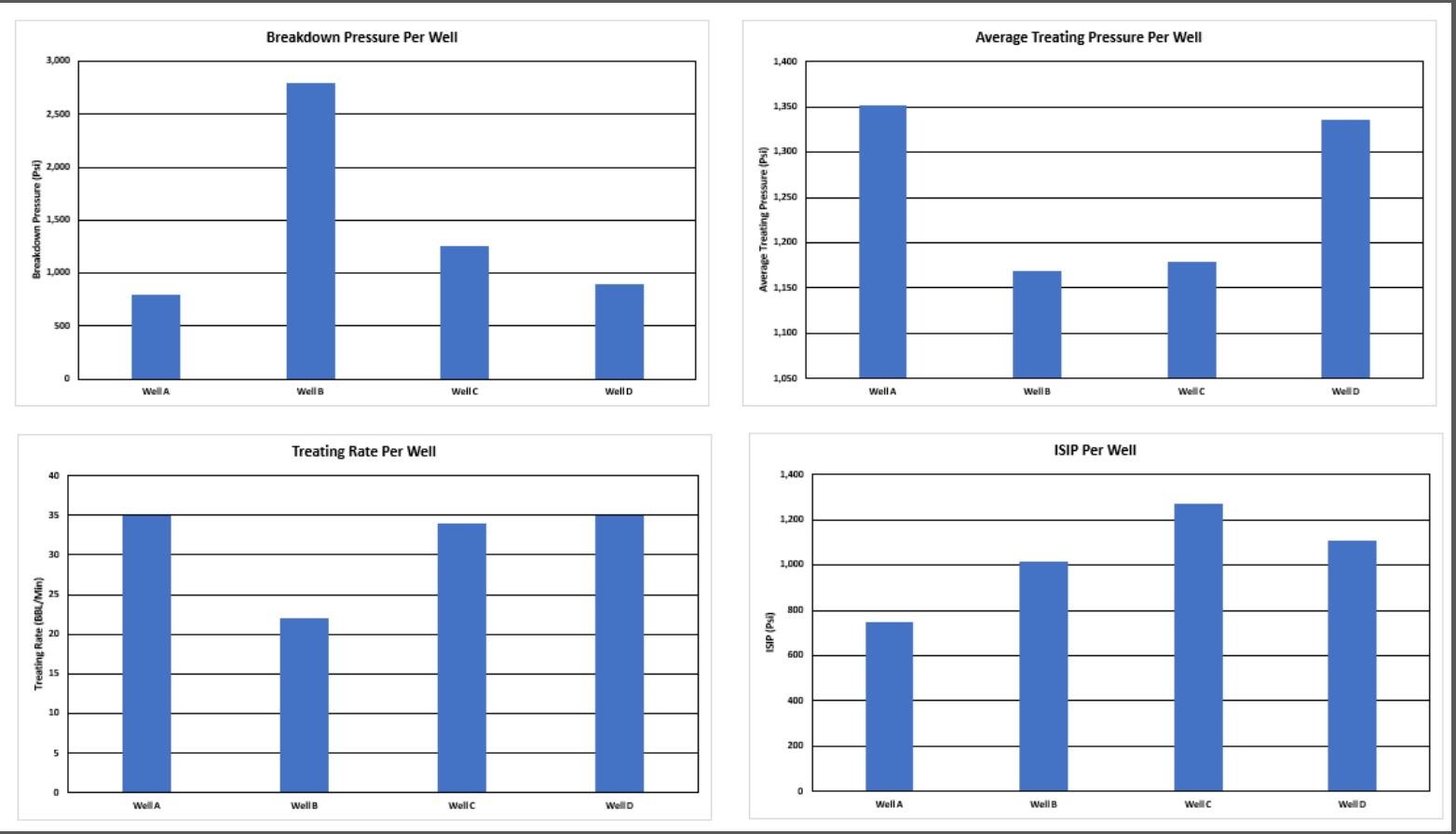


# Completions

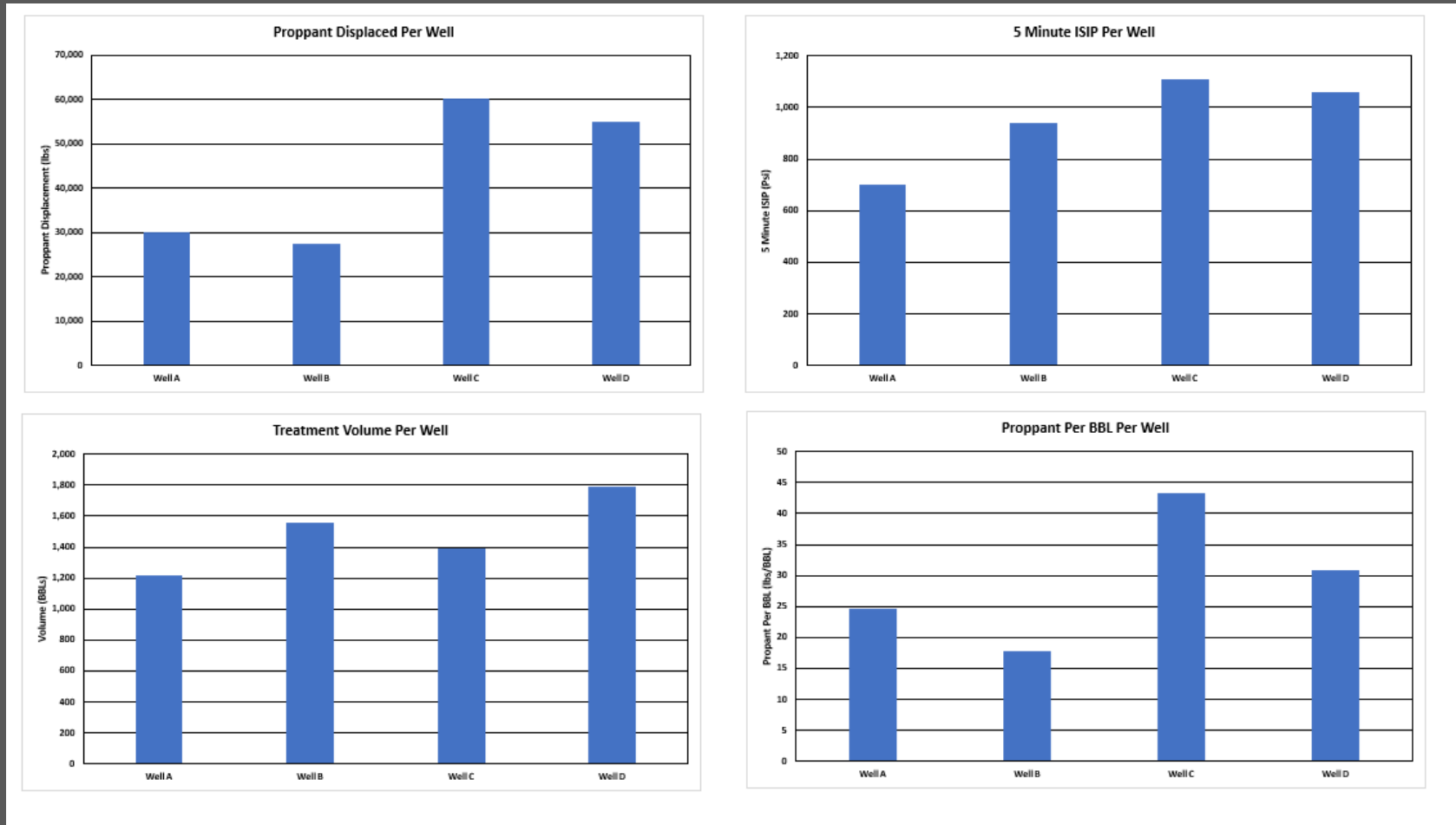
Frac Comparison	Well A	Well B	Well C	Well D
10 Min SIP	664.00			1,027.00
ISIP	748.00	1,013.00	1,269.00	1,107.00
5 Min SIP	701.00	940.00	1,110.00	1,059.00
Pad	5,000.00			10,000.00
Total Vol	51,188.00	65,310.00	58,338.00	75,105.00
Disp Rate	35.00	22.00	34.00	35.00
Disp Vol	100,088.00			18,530.00
Load Hole	1,850.00			
Break	797.00	2,795.00	1,261.00	889.00
Treating Rate	35.00	22.00	34.00	35.00
Disp Psi	1,559.00			1,400.00
Psi Test	2,830.00			3,000.00
Avg Psi	1,352.00	1,169.00	1,179.00	1,335.00
Treatment	5,188.00			46,566.00
Overall Rate	35.00	22.00	34.00	35.00
Sand	30,000.00	27,619.00	60,213.00	55,000.00
Company	Producers	Reliance	Reliance	Producers
Total Vol	1,218.76	1,555.00	1,389.00	1,788.21
Proppant Per BBL	24.62	17.76	43.35	30.76



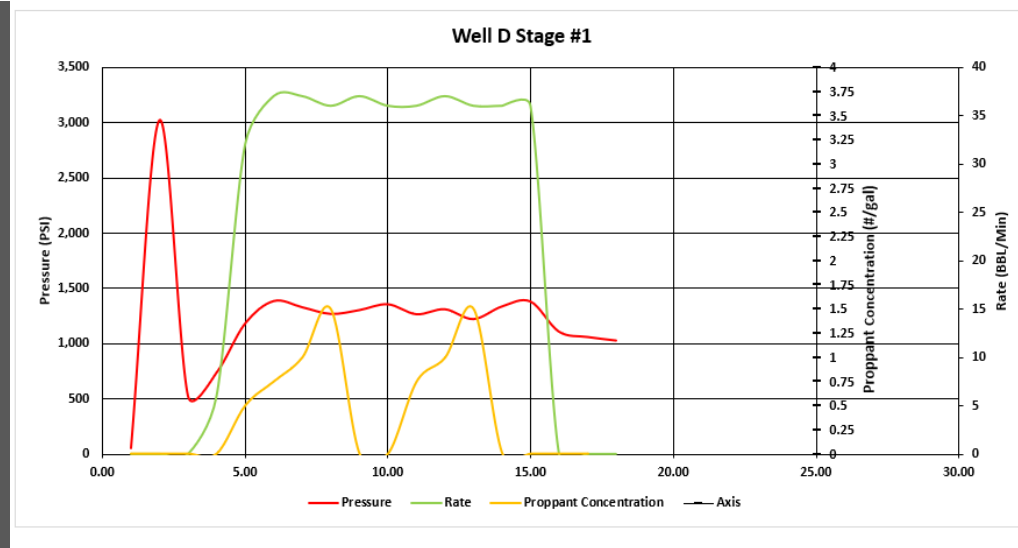
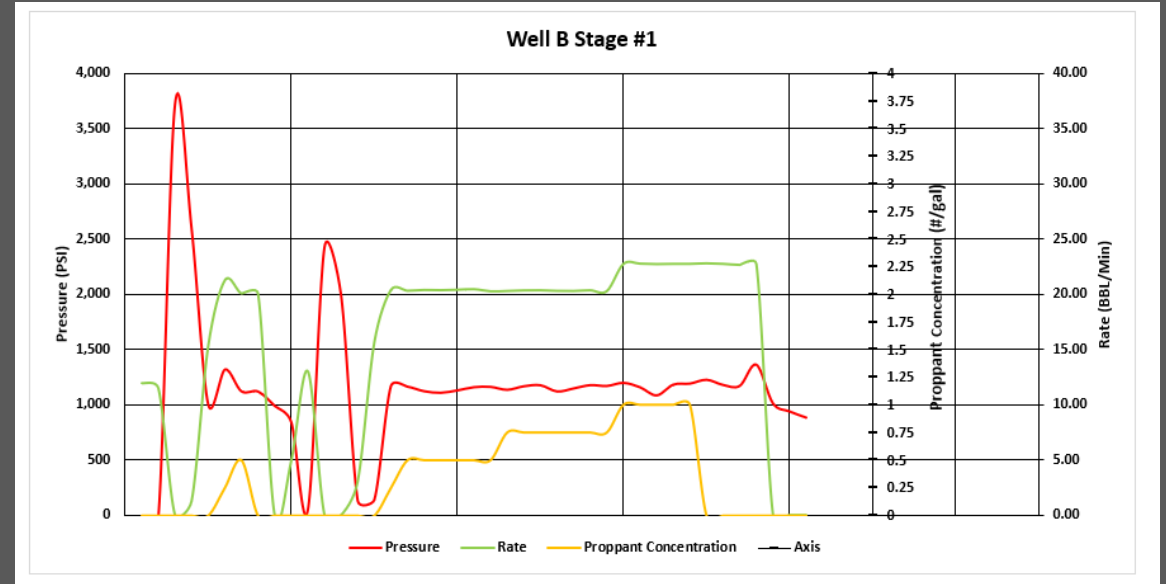
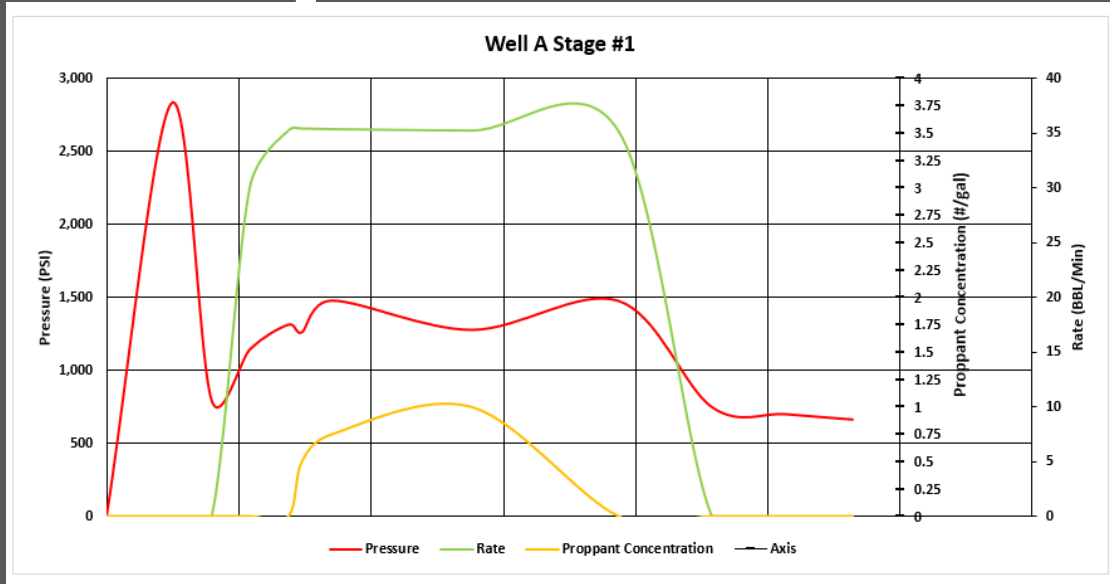
# Completions





# Completions



# Completions



# Completions

  
**Completion Procedure**  
**Knox, OH**  
**API #:**  
**AFE#: KX-1-TAGG-DC-1**  
**Lower Clinton SS Test**  
**35 Stage Slickwater Completion at 75 BPM.**  
**3/19/2019**  
**Prepared For:**  
  
**Approved By:**  

_____ Maurice Chapin President	_____ Mike Chapin VP
_____ Jay Chapin Consulting Engineer	_____ Robin Mckee Secretary

\_\_\_\_\_  
 Jay Chapin  
 Jncpetro LLC.

Completion Calculations Last Modified By: Jay Chapin 3/19/2019

Pipe Friction Pressure	
Length	9497ft
Fluid Density	8.34ppg
Flow Rate	75
Fluid Viscosity	1cp
Inside Diameter	4.67in
Absolute Roughness	0.00196in
Reynolds #	2,132,325
Relative Roughness	2.06E-07
Fanning Friction Factor	0.00256
Pipe Friction Pressure	5,862psi
FR Efficiency	0.80
Actual Pipe Friction Pressure	1,172.35

Hydrostatic Pressure	
TVD	2736ft
Fluid Density	8.34ppg
BHTP	2,864psi
Hydrostatic Pressure	1,186psi
Hydrostatic Pressure Gradient	0.434psi
ISIP	1,677psi
FFG	1.047psi

Net Pressure	
Closure Pressure	2863.727735 From DFIT
Net Pressure	0psi

Surface Treating Pressure	
Calculated Surface Treating Pressure	3,817.39
DFIT Surface Treating Pressure	3,817.39 From DFIT
D Surface Treating Pressure	-

Horsepower	
HP Needed	7,017HP
HP of 1 Truck	2250
# of Trucks	4
Standby HP	7,017HP
# of Trucks	4
Total Trucks	8

Slurry Differences	
Average Slurry Density	9.32ppg
Hydrostatic Head Slurry	1,325psi
Hydrostatic Head Freshwater	1,186psi
Surface Pressure Difference	139psi

Perforation Friction Pressure	
Discharge Coefficient	0.8
Perforation diameter	0.41
Number of perforations	36
Perf Efficiency	0.7
Perforation Friction Pressure	968psi
Rate per Perf	2.08

Assume 8-.85

**HALLIBURTON**



**FRAC PLUG ASSEMBLY, OBSIDIAN, 5 1/2 INCH, PINNED SLIPS**  
**101848503**

Pressure Rating	Temperature Rating	Slip Type	Button Type	Pump Down Groove	Pinned Slips	Capnet Ret	Overall Length	BAF Number
8,000 psi	200°F	Composite w/Buttons	White Ceramic	Yes	Yes	No	36.36 (in.)	101848503
10,000 psi	200°F							

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<b>Prop Details</b>	Pound/ft	533.33	Total 20/40 Mesh	1,960,000.00
	Pound/Stage	80,000.00	Prop Type	WHITE
	Pound/Cluster	761.90	Percent 20/40 Mesh	0.2
	Prop Type	WHITE	Stage 20/40 Mesh	16,000.00
	Percent 20/40 Mesh	0.1	Total 20/40 Mesh	560,000.00
	Stage 20/40 Mesh	8,000.00	Pumpdown	201.20903
	Total 20/40 Mesh	280,000.00	Flush	201.20903
	Prop Type	WHITE	Flush + Safety Factor	251.20903
	Percent 20/40 Mesh	0.7	Total Prop %	1
	Stage 20/40 Mesh	56,000.00	Total Prop	2,800,000.00

<b>Perf Details</b>	Gun Type	3-1/8 in Titan Hero PerFrac Gun	Shots/ft	6
	Phasing	60	Shots/Cluster	12
		Shots/Stage	36	

# Completions



Proposed Frac Summary Last Modified By: Jay Chapin

3/19/2019

Proposed Perf Summary						
Stages	Top	Bottom	EH	Perf/Stage	Phasing	Clusters
SLEEVES	9,464.15	9,497.25	N/A	N/A	N/A	3
STG 1	9,314.15	9,439.15	0.41	36	60	3
STG 2	9,164.15	9,289.15	0.41	36	60	3
STG 3	9,014.15	9,139.15	0.41	36	60	3
STG 4	8,864.15	8,989.15	0.41	36	60	3
STG 5	8,714.15	8,839.15	0.41	36	60	3
STG 6	8,564.15	8,689.15	0.41	36	60	3
STG 7	8,414.15	8,539.15	0.41	36	60	3
STG 8	8,264.15	8,389.15	0.41	36	60	3
STG 9	8,114.15	8,239.15	0.41	36	60	3
STG 10	7,964.15	8,089.15	0.41	36	60	3
STG 11	7,814.15	7,939.15	0.41	36	60	3
STG 12	7,664.15	7,789.15	0.41	36	60	3
STG 13	7,514.15	7,639.15	0.41	36	60	3
STG 14	7,364.15	7,489.15	0.41	36	60	3
STG 15	7,214.15	7,339.15	0.41	36	60	3
STG 16	7,064.15	7,189.15	0.41	36	60	3
STG 17	6,914.15	7,039.15	0.41	36	60	3
STG 18	6,764.15	6,889.15	0.41	36	60	3
STG 19	6,614.15	6,739.15	0.41	36	60	3
STG 20	6,464.15	6,589.15	0.41	36	60	3
STG 21	6,314.15	6,439.15	0.41	36	60	3
STG 22	6,164.15	6,289.15	0.41	36	60	3
STG 23	6,014.15	6,139.15	0.41	36	60	3
STG 24	5,864.15	5,989.15	0.41	36	60	3
STG 25	5,714.15	5,839.15	0.41	36	60	3
STG 26	5,564.15	5,689.15	0.41	36	60	3
STG 27	5,414.15	5,539.15	0.41	36	60	3
STG 28	5,264.15	5,389.15	0.41	36	60	3
STG 29	5,114.15	5,239.15	0.41	36	60	3
STG 30	4,964.15	5,089.15	0.41	36	60	3
STG 31	4,814.15	4,939.15	0.41	36	60	3
STG 32	4,664.15	4,789.15	0.41	36	60	3
STG 33	4,514.15	4,639.15	0.41	36	60	3
STG 34	4,364.15	4,489.15	0.41	36	60	3
<b>Frac'd LL</b>	<b>5,133.10</b>	<b>Total Shots</b>	<b>1224</b>	<b>Total Clusters</b>	<b>105</b>	

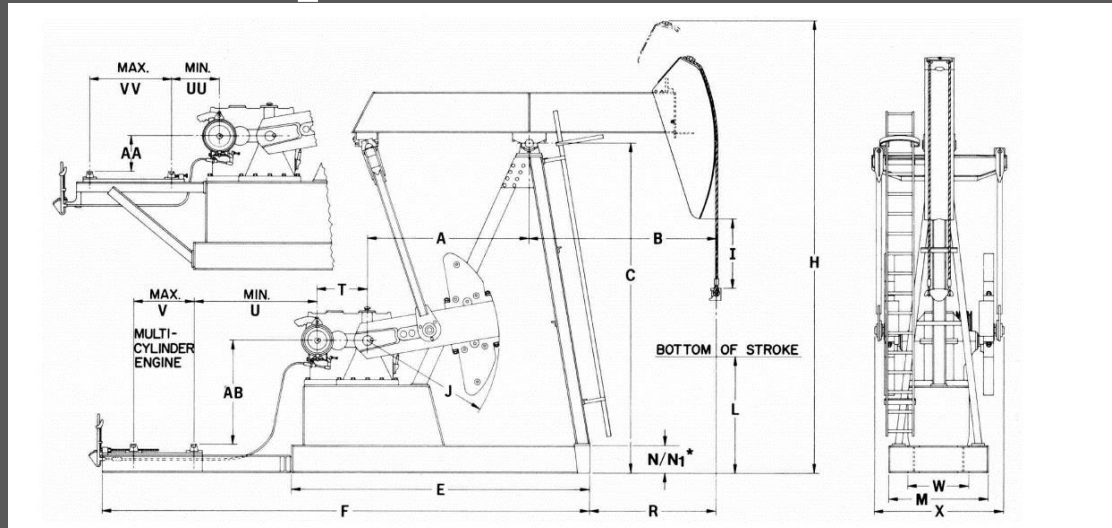
Proposed Frac Stage Amount Summary														
Stages	20/40 Mesh	20/40 Mesh	20/40 Mesh	Total Sand	Water Clean BBLs	FR (GAL)	BIO (GAL)	SI (GAL)	CS (Gal)	SF (Gal)	IC (GAL)	KAL-13 (GAL)	Total Chem (BBLs)	Water Slurry (BBLs)
SLEEVES	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 1	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 2	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 3	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 4	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 5	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 6	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 7	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 8	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 9	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 10	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 11	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 12	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 13	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 14	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 15	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 16	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 17	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 18	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 19	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 20	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 21	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 22	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 23	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 24	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 25	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 26	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 27	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 28	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 29	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 30	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 31	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 32	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 33	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
STG 34	8,000.00	56,000.00	16,000.00	80,000.00	1,755.81	61.69	15.42	15.42	15.42	15.42	15.00	3.00	3.37	1,759.18
<b>Total</b>	<b>272,000.00</b>	<b>1,904,000.00</b>	<b>544,000.00</b>	<b>2,720,000.00</b>	<b>59,697.61</b>	<b>2,097.57</b>	<b>524.39</b>	<b>524.39</b>	<b>524.39</b>	<b>524.39</b>	<b>510.00</b>	<b>102.00</b>	<b>114.46</b>	<b>59,812.07</b>



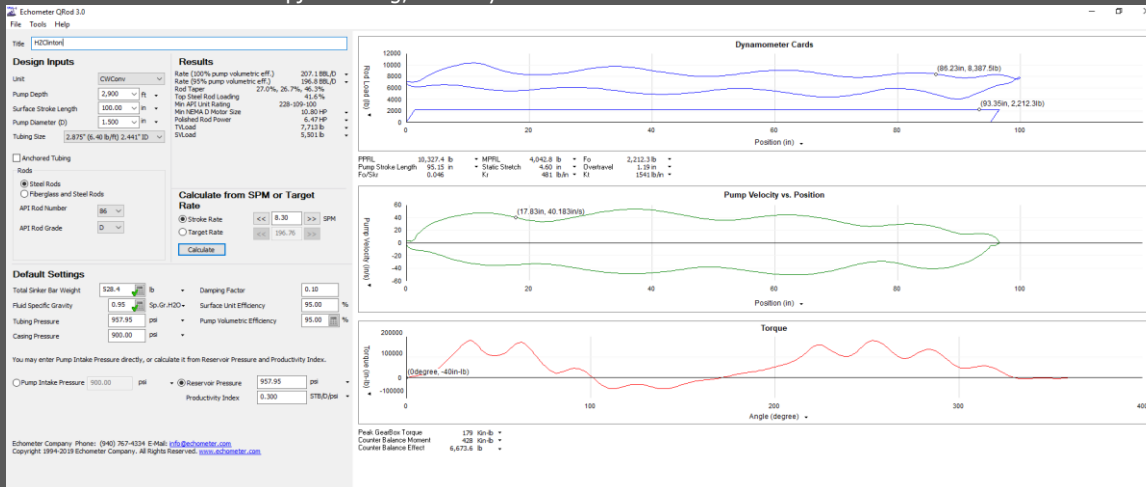
# Completions



# Completions



Pumpjack Config; Courtesy of Lufkin



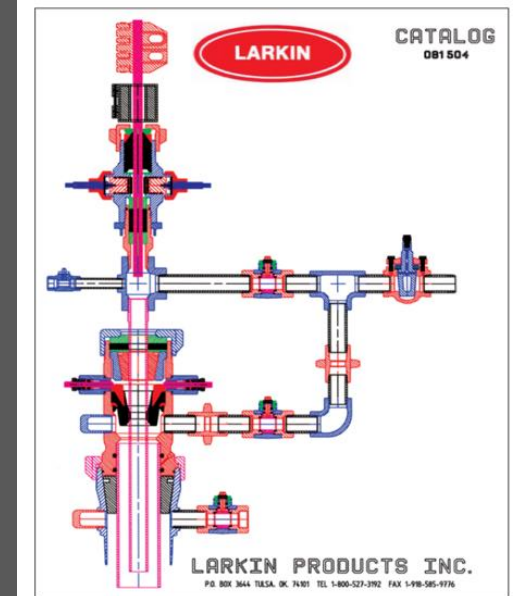
Qrod Design; Courtesy of Jay Chapin

Drillout Chemicals			
Chemical Name	Units	QTY	Comments
Corrosion Inhibitor	GPT	1.00	
Biocide	GPT	0.25	
Scale Inhibitor	GPT	0.25	
KWM (Coil Only)		10 PPG	

- Drillout BHA**
1. 4-1/2" Milled Tooth Bit
  2. Bit Sub
  3. Motor
  4. Dual Flapper Valve
  5. Crossover or Coil Tubing Connector

Production Tree Components to Be Install	
Description	Supplied By:
86 Polish Rod	WH Manufacturer
86 Stuffing Box	WH Manufacturer
86 Manual Rod BOP	WH Manufacturer
7 1/16" to 2 9/16" 10K Adapter	WH Manufacturer
Casing & Tubing 2" Flow Pipe; Check Valves & BPRs	Miller Supply

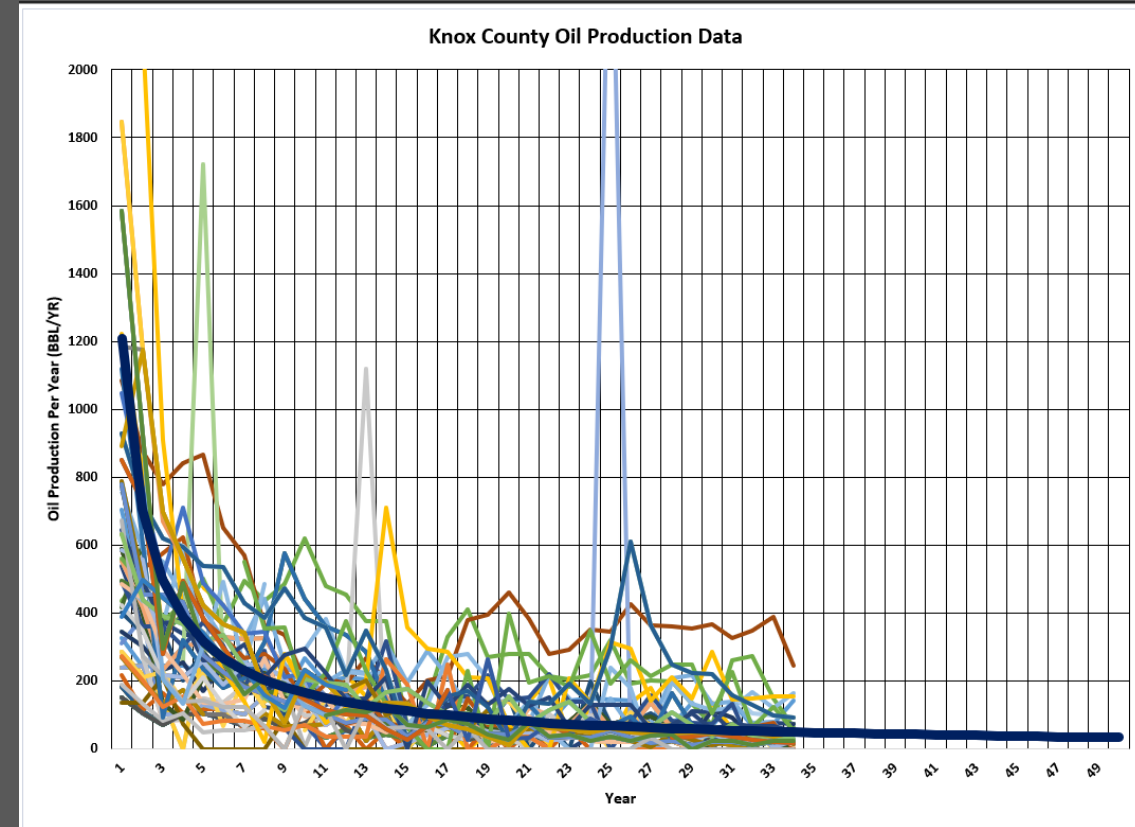
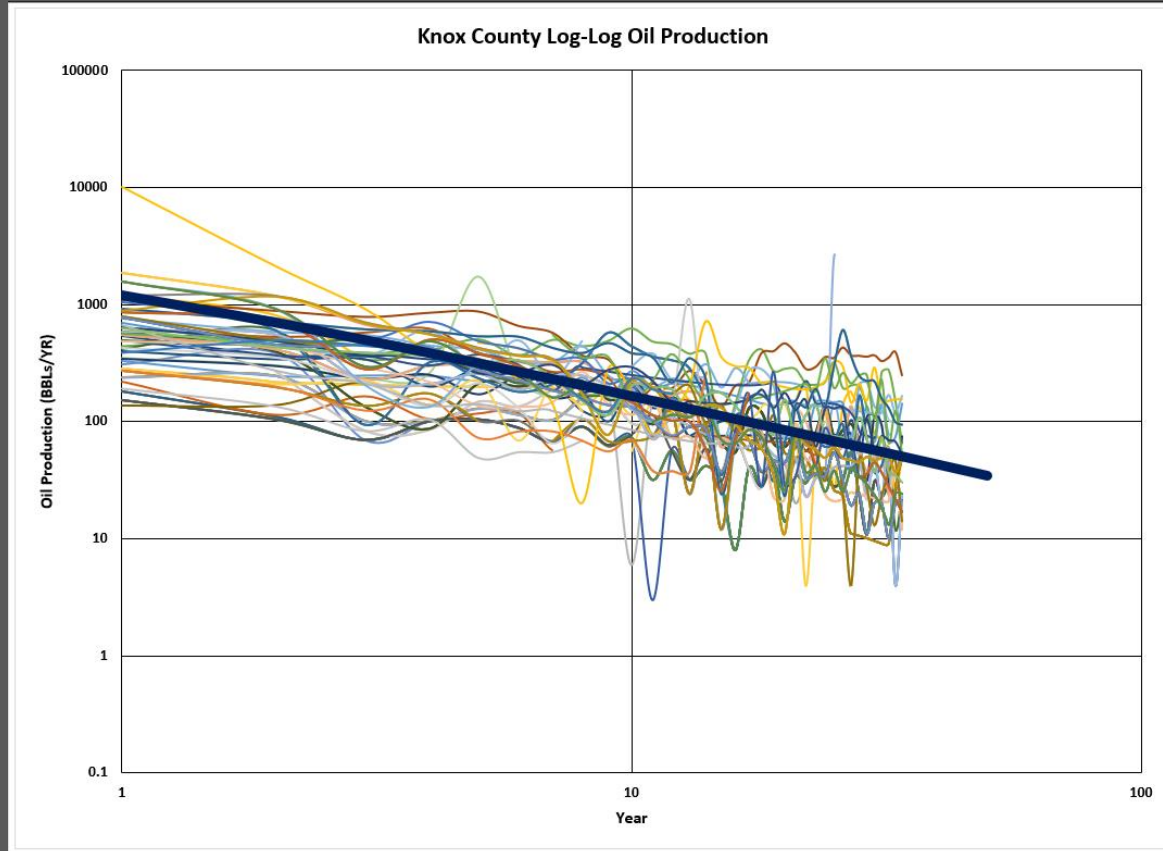
Production Components to Be Install	
Description	Supplied By:
2 7/8" L-80 4.7# Tubing 2900'	Miller Supply
Rod Insert Pump- 100" Stroke Length, 1.5" Pump Diameter	Miller Supply
86 Grade D Rods- 2900'	Miller Supply
C-228-109-100 Pumping Unit	Miller Supply
Vertical Separator, Meter Run, & Tank Battery (4 210s)	TBD



Larkin Wellhead Config; Courtesy of Larkin



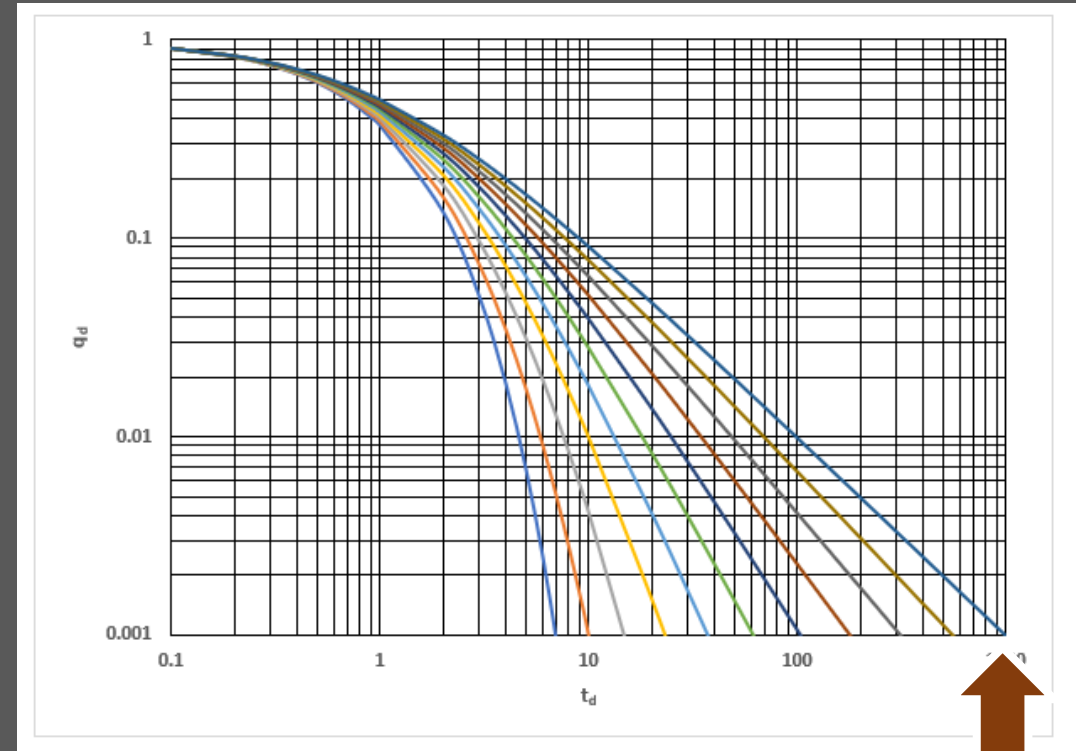
# DCA's





# DCA's

B Value	Reservoir Drive Mechanism
0	Single Phase Liquid Expansion (Oil Above Bubble Point)
0.1 - 0.4	Solution Gas Drive
0.4 - 0.5	Single Phase Gas Expansion
0.5	Effective Edge Water Drive
0.5 - 1.0	Layered Reservoirs
>1	Transient (Tight Gas, Shales) Due to Low Perm



# DCA's

Harmonic DCA Last Modified By: Jay Chapin 3/26/2019

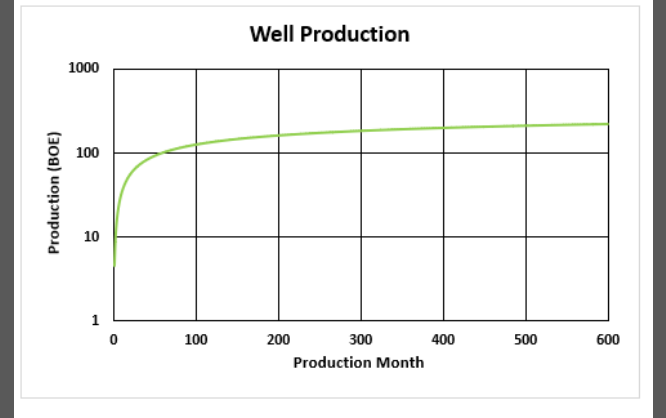
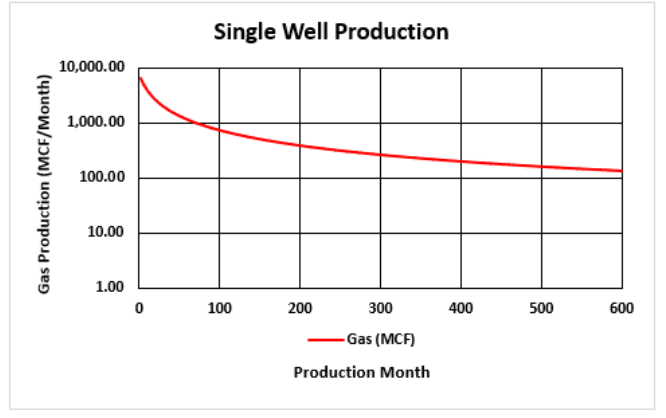
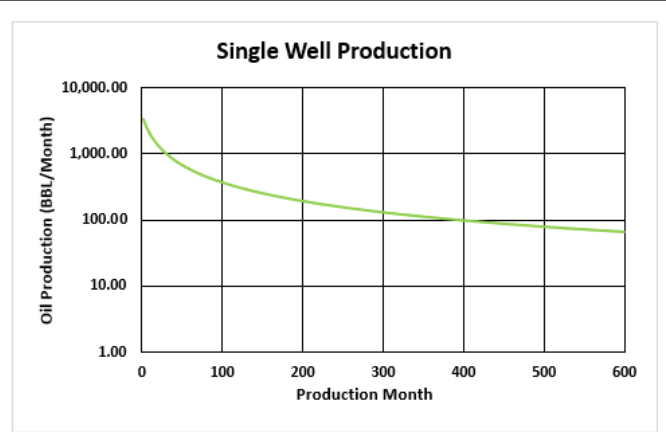
IP	120
B	1.00
Deis	0.51
Di	0.09

Gas Yield	2
NGL Yield	0
Water Yield	0.25
LL	4000
BOE	218162.54
BOE/1000	54540.64

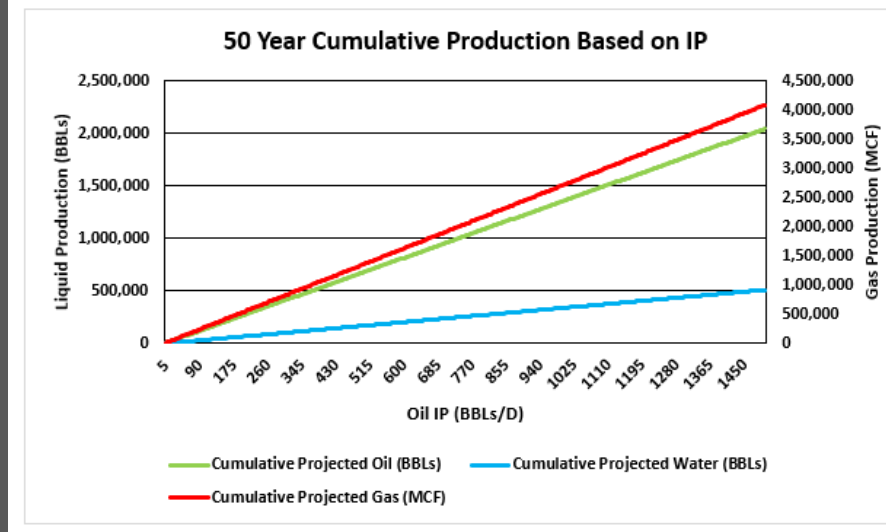
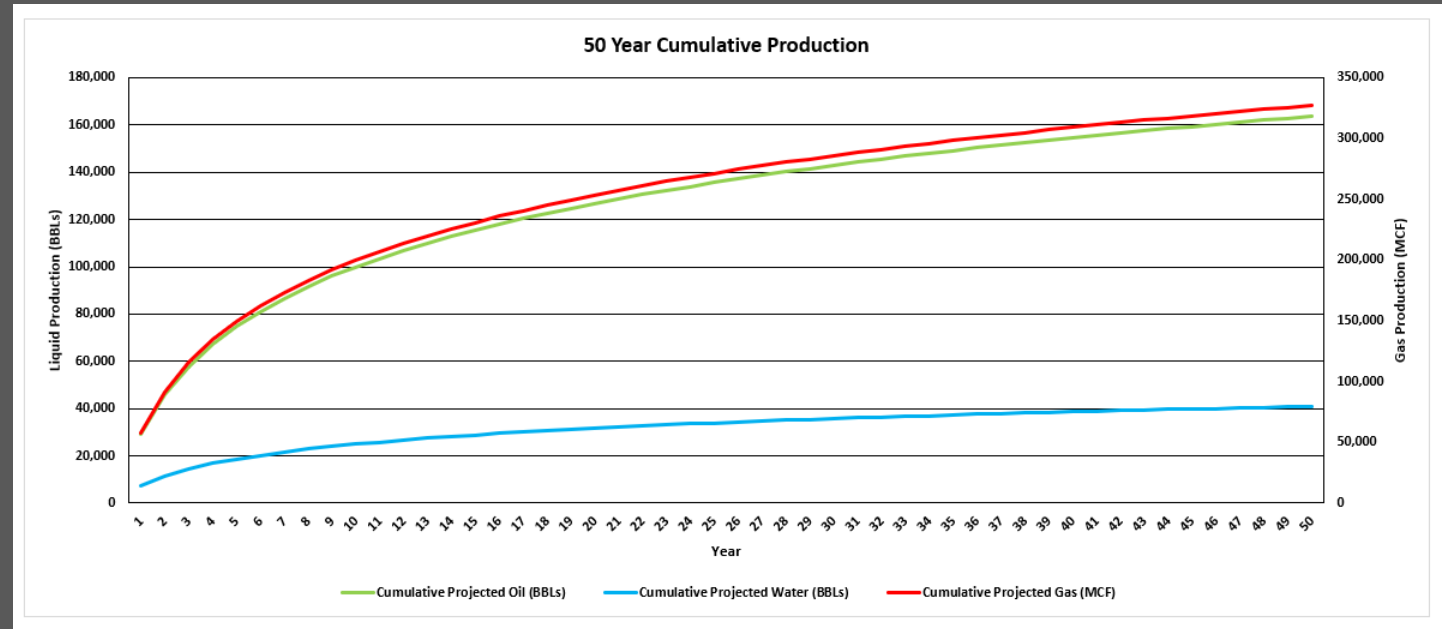
Month	Np (BBL)	Monthly (BBL/M)	D	De
1	110.30	3,354.91	0.08	-1.03
2	102.05	3,104.01	0.07	-1.11
3	94.95	2,888.04	0.07	-1.20
4	88.77	2,700.16	0.07	-1.28
5	83.35	2,535.24	0.06	-1.36
6	78.55	2,389.30	0.06	-1.45
7	74.28	2,259.25	0.05	-1.53
8	70.44	2,142.62	0.05	-1.61
9	66.99	2,037.45	0.05	-1.70
10	63.85	1,942.11	0.05	-1.78
11	61.00	1,855.30	0.04	-1.86
12	58.39	1,775.92	0.04	-1.95

Month	Gas (MCF)	NGL	Water
1	6,709.81	0.00	838.73
2	6,208.03	0.00	776.00
3	5,776.08	0.00	722.01
4	5,400.32	0.00	675.04
5	5,070.47	0.00	633.81
6	4,778.59	0.00	597.32
7	4,518.49	0.00	564.81
8	4,285.24	0.00	535.66
9	4,074.89	0.00	509.36
10	3,884.23	0.00	485.53
11	3,710.61	0.00	463.83
12	3,551.85	0.00	443.98

Cumulative Projected Production	
Oil (BBLs)	163,621.91
Gas (MCF)	327,243.81
Water (BBLs)	40,905.48



# DCA's



# AFE

- This is an expensive proposition
- High Development Costs from Completion and Flowback Services
- This isn't a 2-Hour Setup, Shoot, Frac, and Leave



AUTHORIZATION FOR EXPENDITURE							
WELL NAME: TAGGART #1-H		EST. DEPTH: 9,500		PERMIT NO:		87.5000%	
Modified By : Jay Chapin		FORMATION: Clinton		NRI:		Knox	
TOWNSHIP: Howard		GAS SYSTEM: ASPIRE		COUNTY:		Knox	
INTANGIBLES				DRY HOLE	COMPLETION	TOTAL	
LEASE COST/ INSURANCE				\$10,000	\$0	\$10,000	
PERMIT / TITLE / SURVEY				\$5,000	\$0	\$5,000	
PREPARATION OF DRILL SITE				\$5,000	\$0	\$5,000	
ROAD AND ACCESS				\$20,000	\$0	\$20,000	
PROPERTY DAMAGES				\$500	\$0	\$500	
DRILL BIT (PURCHASE/RENTAL)				\$10,000	\$0	\$10,000	
DRILLING MATERIALS AND MUD				\$10,000	\$0	\$10,000	
Drilling rig mobilization				\$15,500	\$0	\$15,500	
DRILLING - DAYWORK (2 days)	48	HR @	\$500.00	\$24,000	\$0	\$24,000	
DRILLING - FOOTAGE	9500	FT @	\$22.00	\$209,000	\$0	\$209,000	
Fuel rig				\$50,000	\$0	\$50,000	
TRUCKING (Casing)				\$6,000	\$0	\$6,000	
OPEN HOLE LOGGING				\$10,000	\$0	\$10,000	
CEMENT AI CASING STRINGS				\$35,000	\$0	\$35,000	
MUD LOGGING / GAS DETECTION				\$10,000	\$0	\$10,000	
DIRECTIONAL DRILLING	7000	FT @	\$18.50	\$115,500	\$0	\$115,500	
POWER TONGS				\$10,000	\$0	\$10,000	
TANK RENTAL				\$3,000	\$0	\$3,000	
COMPLETION RIG				\$0	\$4,500	\$4,500	
BOND LOG				\$0	\$6,500	\$6,500	
WIRELINE	35	STAGES @	\$3,000.00	\$0	\$105,000	\$105,000	
WIRELINE SERVICES	14	DAYS @	\$7,500.00	\$0	\$105,000	\$105,000	
STIMULATION / ACIDIZING	35	STAGES @	\$30,000.00	\$0	\$1,050,000	\$1,050,000	
DRILLOUT PREP	1	DAYS @	\$35,000.00	\$0	\$35,000	\$35,000	
DRILLOUT	2	DAYS @	\$35,000.00	\$0	\$70,000	\$70,000	
RECLAMATION/SITE CONSTRUCTION				\$10,000	\$0	\$10,000	
ENGINEERING & TECHNICAL SUPERVISION				\$10,000	\$10,000	\$20,000	
WATER HAULING / DISPOSAL	1200	BBLs @	\$2.50	\$1,000	\$3,000	\$4,000	
FRAC TANK RENTAL	7	TANKS @	\$15.00	20.00	\$2,100	\$4,200	
MISC. & CONTINGENCIES		@	15.00%	\$84,240	\$208,665	\$292,905	
<b>TOTAL INTANGIBLES</b>				<b>\$655,840</b>	<b>\$1,599,765</b>	<b>\$2,255,605</b>	
TANGIBLES (N=NEW, U=USED)							
N	CONDUCTOR PIPE, 20"	65	FT @	\$30.00	\$1,950	\$0	\$1,950
N	SURFACE CASING, 13-3/8"	450	FT @	\$18.50	\$8,325	\$0	\$8,325
N	INTERMEDIATE CASING, 9-5/8"	1600	FT @	\$18.50	\$29,600	\$0	\$29,600
N	PRODUCTION CASING, 5 1/2"	9,500	FT @	\$15.00	\$0	\$142,500	\$142,500
N	TUBING 2 7/8 "	2,900	FT @	\$5.00	\$0	\$14,500	\$14,500
N	RODS	2,900	FT @	\$2.50	\$0	\$7,250	\$7,250
N	PRODUCTION UNIT/INSTALL	1	P/CK @	\$20,000.00	\$0	\$20,000	\$20,000
N	TANKS/TANK ACCESSORIES	4	TANK @	\$7,500.00	\$0	\$30,000	\$30,000
N	HEATED SEPERATOR	1	SEP @	\$8,000.00	\$0	\$8,000	\$8,000
N	GAS MASTER METER	1	METR @	\$15,000.00	\$0	\$15,000	\$15,000
N	WELL HEADS / VALVES / FITTINGS	1	EA @	\$25,000.00	\$0	\$25,000	\$25,000
FLOW LINE AND FITTINGS	500	FT @	\$3.00	\$0	\$1,500	\$1,500	
AUTOMATION	1	@	\$3,500.00	\$0	\$3,500	\$3,500	
LABOR/INSTALLATION		@	\$5,000.00	\$0	\$5,000	\$5,000	
MISC. & CONTINGENCIES		@	15.00%	\$5,981	\$40,838	\$46,819	
<b>TANGIBLES</b>				<b>\$45,856</b>	<b>\$313,088</b>	<b>\$358,944</b>	
<b>TANGIBLES &amp; INTANGIBLES</b>				<b>\$701,696</b>	<b>\$1,912,853</b>	<b>\$2,614,549</b>	
<b>PLUGGING AND ABANDONMENT</b>				<b>\$15,000</b>			
<b>TOTAL ALL COSTS</b>				<b>\$716,696</b>	<b>\$1,912,853</b>	<b>\$2,629,549</b>	
APPROVED BY:				APPROVED BY:			
TITLE:				TITLE:			
DATE:				DATE:			

# Economics Assumptions

Economic Assumptions	
WI	100%
RI	12.5%
NRI	87.5%
Total Gas Shrinkage	2.0%
Total Oil Shrinkage	1.0%
BTU Factor	1.08
Severance	5.00%
Advalorem	2.50%
Gas Price	\$ 2.50
Oil Price	\$ 55.00
Basis Gas Price	\$ (0.30)
Gravity Deduction	\$ -
Variable Opex	\$ 0.25
Fixed Opex	\$ 1,500.00
WACC	10%
Corp Tax	21%
Stair Step Capex	0%
Tangible %	15%
Intangible %	85%

# Economics

Single Well Economic Model Last Modified By: Jay Chapin 3/26/2019

WI	100%	Liquid Shrinkage	99%	Basis Gas	\$ 0.30	NGL OLE/BBL		Gas Transportation Fee	\$ 0.25	Gas Pricing	\$ 2.50	Severance	5%
RI	12.5%	CAPEX	\$2,629,548.75	Gas OLE/MCF	\$ -	Water Transportation Fee	\$ 2.50	NGLs Transportation Fee		Oil Pricing	\$ 55.00	Advalorem	2.50%
NRI	87.50%	Fixed OPEX	\$ 1,500.00	Oil OLE/BBL	\$ 0.25	Oil Transportation Fee	\$ 2.00	Actual Gas Price	\$ 2.20	NGL Pricing	\$ 25.00	WACC	10%

BTU	1080	BTU Factor	1.08
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Depreciation Rate	
Yr	ACR2 7 Year
1	0.1428
2	0.2449
3	0.1749
4	0.1249
5	0.0893
6	0.0893
7	0.0893
8	0.0446

IP	120
B	1.00
Deis	0.51
Di	0.09

YR	Dep Rate	Month	Gas Production	Cond Prod	Water Prod	NGL Prod	Fixed Opex	Gas OLE/MCF	Condensate OLE/BBL	NGL OLE/BBL	Water Transportation Fee	Condensate Transportation Fee	Gas Transportation Fee	NGLs Transportation Fee	Gas Pricing
		0													\$ -
1	0.1428	1	6,709.81	3,354.91	838.73	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	2	6,208.03	3,104.01	776.00	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
2	0.2449	3	5,776.08	2,888.04	722.01	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	4	5,400.32	2,700.16	675.04	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	5	5,070.47	2,535.24	633.81	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	6	4,778.59	2,389.30	597.32	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	7	4,518.49	2,259.25	564.81	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	8	4,285.24	2,142.62	535.66	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	9	4,074.89	2,037.45	509.36	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	10	3,884.23	1,942.11	485.53	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	11	3,710.61	1,855.30	463.83	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	12	3,551.85	1,775.92	443.98	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
1	0.1428	13	3,406.11	1,703.06	425.76	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
2	0.2449	14	3,271.86	1,635.93	408.98	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38
2	0.2449	15	3,147.80	1,573.90	393.47	0.00	\$ 1,500.00	\$ -	\$ 0.25	\$ -	\$ 2.50	\$ 2.00	\$ 0.25	\$ -	\$ 2.38



# Economics- ATAX Corp

Feasibility Studies Last Modified By: Jay Chapin 3/26/2019

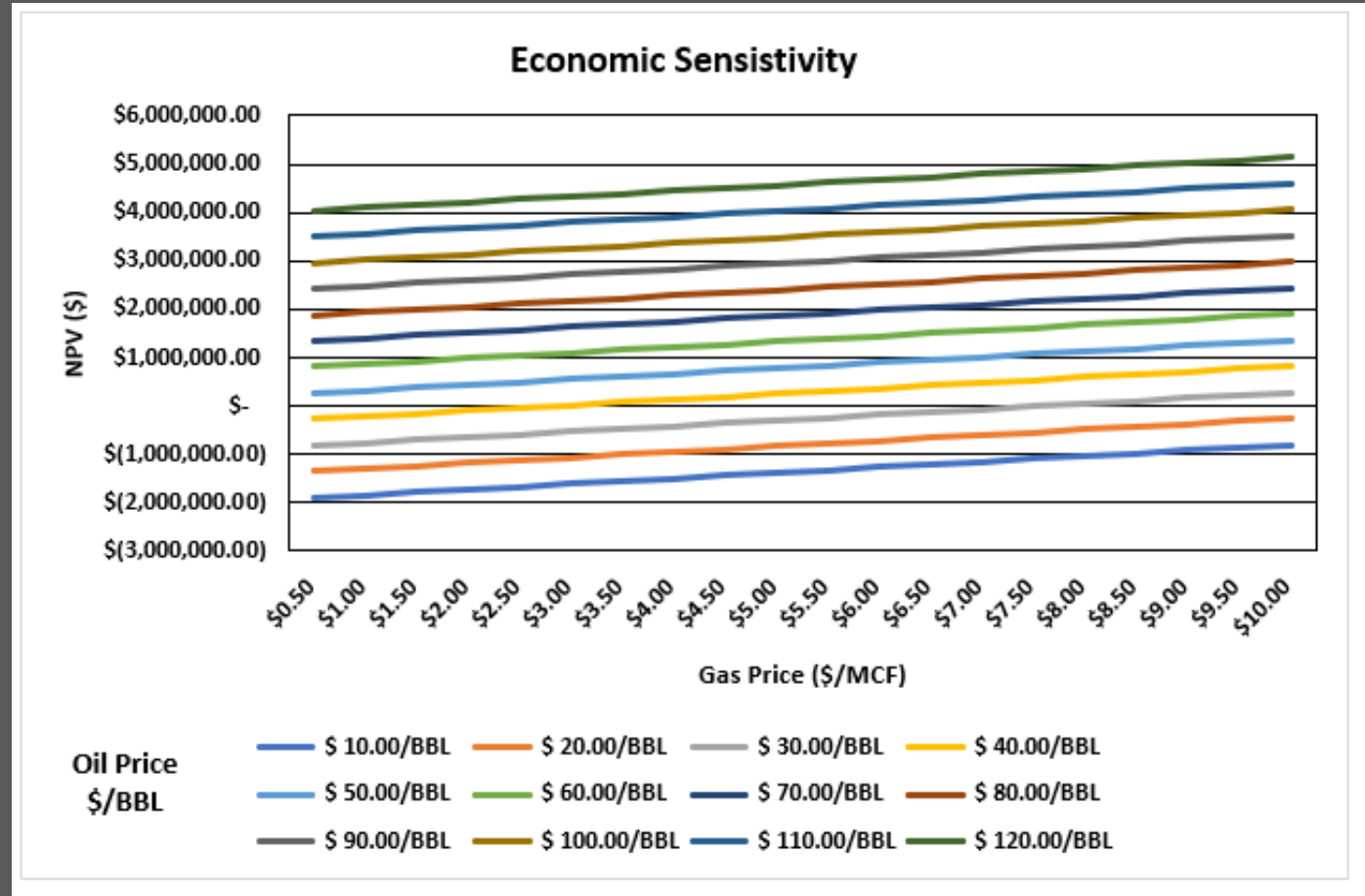
	\$ 10.00/BBL	\$ 20.00/BBL	\$ 30.00/BBL	\$ 40.00/BBL	\$ 50.00/BBL	\$ 60.00/BBL	\$ 70.00/BBL	\$ 80.00/BBL	\$ 90.00/BBL	\$ 100.00/BBL	\$ 110.00/BBL	\$ 120.00/BBL
\$ 0.50	\$ (1,891,359.20)	\$ (1,351,534.85)	\$ (811,710.50)	\$ (271,886.15)	\$ 267,938.19	\$ 807,762.54	\$ 1,347,586.89	\$ 1,887,411.23	\$ 2,427,235.58	\$ 2,967,059.93	\$ 3,506,884.28	\$ 4,046,708.62
\$ 1.00	\$ (1,833,647.07)	\$ (1,293,822.72)	\$ (753,998.37)	\$ (214,174.02)	\$ 325,650.32	\$ 865,474.67	\$ 1,405,299.02	\$ 1,945,123.37	\$ 2,484,947.71	\$ 3,024,772.06	\$ 3,564,596.41	\$ 4,104,420.75
\$ 1.50	\$ (1,775,934.94)	\$ (1,236,110.59)	\$ (696,286.24)	\$ (156,461.89)	\$ 383,362.45	\$ 923,186.80	\$ 1,463,011.15	\$ 2,002,835.50	\$ 2,542,659.84	\$ 3,082,484.19	\$ 3,622,308.54	\$ 4,162,132.88
\$ 2.00	\$ (1,718,222.81)	\$ (1,178,398.46)	\$ (638,574.11)	\$ (98,749.76)	\$ 441,074.58	\$ 980,898.93	\$ 1,520,723.28	\$ 2,060,547.63	\$ 2,600,371.97	\$ 3,140,196.32	\$ 3,680,020.67	\$ 4,219,845.01
\$ 2.50	\$ (1,660,510.68)	\$ (1,120,686.33)	\$ (580,861.98)	\$ (41,037.63)	\$ 498,786.71	\$ 1,038,611.06	\$ 1,578,435.41	\$ 2,118,259.76	\$ 2,658,084.10	\$ 3,197,908.45	\$ 3,737,732.80	\$ 4,277,557.14
\$ 3.00	\$ (1,602,798.54)	\$ (1,062,974.20)	\$ (523,149.85)	\$ 16,674.50	\$ 556,498.84	\$ 1,096,323.19	\$ 1,636,147.54	\$ 2,175,971.89	\$ 2,715,796.23	\$ 3,255,620.58	\$ 3,795,444.93	\$ 4,335,269.27
\$ 3.50	\$ (1,545,086.41)	\$ (1,005,262.07)	\$ (465,437.72)	\$ 74,386.63	\$ 614,210.97	\$ 1,154,035.32	\$ 1,693,859.67	\$ 2,233,684.02	\$ 2,773,508.36	\$ 3,313,332.71	\$ 3,853,157.06	\$ 4,392,981.41
\$ 4.00	\$ (1,487,374.28)	\$ (947,549.94)	\$ (407,725.59)	\$ 132,098.76	\$ 671,923.10	\$ 1,211,747.45	\$ 1,751,571.80	\$ 2,291,396.15	\$ 2,831,220.49	\$ 3,371,044.84	\$ 3,910,869.19	\$ 4,450,693.54
\$ 4.50	\$ (1,429,662.15)	\$ (889,837.81)	\$ (350,013.46)	\$ 189,810.89	\$ 729,635.23	\$ 1,269,459.58	\$ 1,809,283.93	\$ 2,349,108.28	\$ 2,888,932.62	\$ 3,428,756.97	\$ 3,968,581.32	\$ 4,508,405.67
\$ 5.00	\$ (1,371,950.02)	\$ (832,125.68)	\$ (292,301.33)	\$ 247,523.02	\$ 787,347.36	\$ 1,327,171.71	\$ 1,866,996.06	\$ 2,406,820.41	\$ 2,946,644.75	\$ 3,486,469.10	\$ 4,026,293.45	\$ 4,566,117.80
\$ 5.50	\$ (1,314,237.89)	\$ (774,413.55)	\$ (234,589.20)	\$ 305,235.15	\$ 845,059.50	\$ 1,384,883.84	\$ 1,924,708.19	\$ 2,464,532.54	\$ 3,004,356.88	\$ 3,544,181.23	\$ 4,084,005.58	\$ 4,623,829.93
\$ 6.00	\$ (1,256,525.76)	\$ (716,701.42)	\$ (176,877.07)	\$ 362,947.28	\$ 902,771.63	\$ 1,442,595.97	\$ 1,982,420.32	\$ 2,522,244.67	\$ 3,062,069.01	\$ 3,601,893.36	\$ 4,141,717.71	\$ 4,681,542.06
\$ 6.50	\$ (1,198,813.63)	\$ (658,989.29)	\$ (119,164.94)	\$ 420,659.41	\$ 960,483.76	\$ 1,500,308.10	\$ 2,040,132.45	\$ 2,579,956.80	\$ 3,119,781.14	\$ 3,659,605.49	\$ 4,199,429.84	\$ 4,739,254.19
\$ 7.00	\$ (1,141,101.50)	\$ (601,277.16)	\$ (61,452.81)	\$ 478,371.54	\$ 1,018,195.89	\$ 1,558,020.23	\$ 2,097,844.58	\$ 2,637,668.93	\$ 3,177,493.27	\$ 3,717,317.62	\$ 4,257,141.97	\$ 4,796,966.32
\$ 7.50	\$ (1,083,389.37)	\$ (543,565.03)	\$ (3,740.68)	\$ 536,083.67	\$ 1,075,908.02	\$ 1,615,732.36	\$ 2,155,556.71	\$ 2,695,381.06	\$ 3,235,205.41	\$ 3,775,029.75	\$ 4,314,854.10	\$ 4,854,678.45
\$ 8.00	\$ (1,025,677.24)	\$ (485,852.90)	\$ 53,971.45	\$ 593,795.80	\$ 1,133,620.15	\$ 1,673,444.49	\$ 2,213,268.84	\$ 2,753,093.19	\$ 3,292,917.54	\$ 3,832,741.88	\$ 4,372,566.23	\$ 4,912,390.58
\$ 8.50	\$ (967,965.11)	\$ (428,140.77)	\$ 111,683.58	\$ 651,507.93	\$ 1,191,332.28	\$ 1,731,156.62	\$ 2,270,980.97	\$ 2,810,805.32	\$ 3,350,629.67	\$ 3,890,454.01	\$ 4,430,278.36	\$ 4,970,102.71
\$ 9.00	\$ (910,252.98)	\$ (370,428.64)	\$ 169,395.71	\$ 709,220.06	\$ 1,249,044.41	\$ 1,788,868.75	\$ 2,328,693.10	\$ 2,868,517.45	\$ 3,408,341.80	\$ 3,948,166.14	\$ 4,487,990.49	\$ 5,027,814.84
\$ 9.50	\$ (852,540.85)	\$ (312,716.50)	\$ 227,107.84	\$ 766,932.19	\$ 1,306,756.54	\$ 1,846,580.88	\$ 2,386,405.23	\$ 2,926,229.58	\$ 3,466,053.93	\$ 4,005,878.27	\$ 4,545,702.62	\$ 5,085,526.97
\$ 10.00	\$ (794,828.72)	\$ (255,004.37)	\$ 284,819.97	\$ 824,644.32	\$ 1,364,468.67	\$ 1,904,293.01	\$ 2,444,117.36	\$ 2,983,941.71	\$ 3,523,766.06	\$ 4,063,590.40	\$ 4,603,414.75	\$ 5,143,239.10

- At \$55/BBL; \$2.50/MCF- 56 Month Payout; 22% IRR; \$768,698.89 50 Year NPV



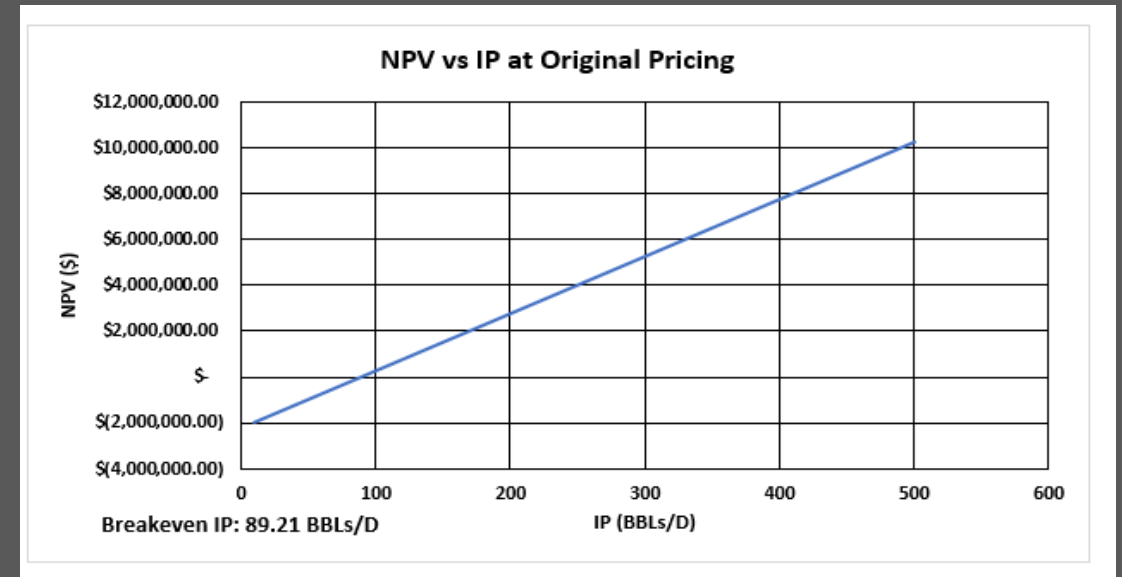
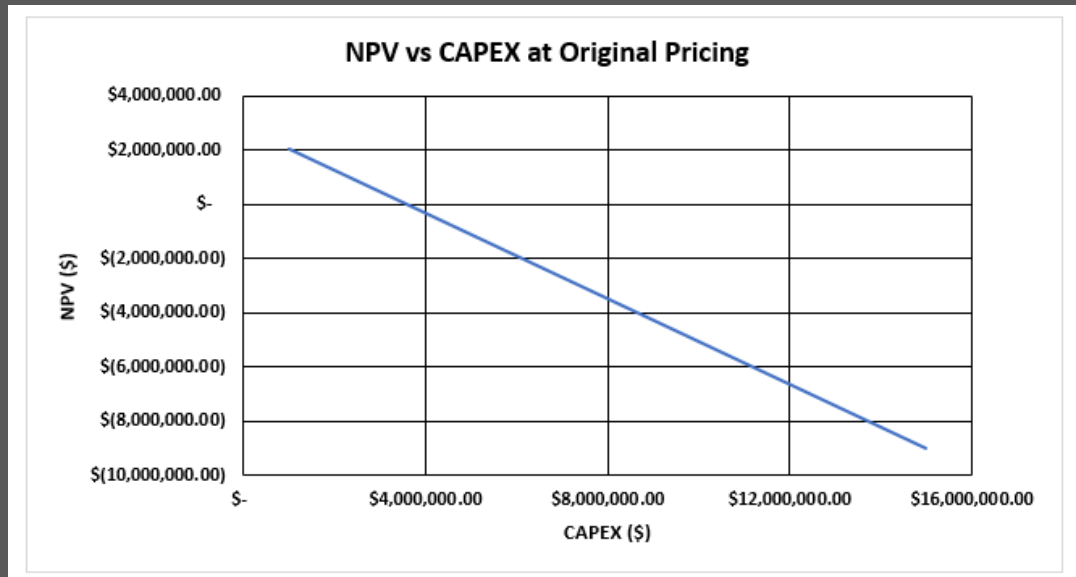
# Economics- ATAX Corp

CAPEX	NPV
\$ 1,000,000.00	\$ 2,057,602.84
\$ 1,500,000.00	\$ 1,662,124.05
\$ 2,000,000.00	\$ 1,266,645.25
\$ 2,500,000.00	\$ 871,166.45
\$ 3,000,000.00	\$ 475,687.66
\$ 3,500,000.00	\$ 80,208.86
\$ 4,000,000.00	\$ (315,269.93)
\$ 4,500,000.00	\$ (710,748.73)
\$ 5,000,000.00	\$ (1,106,227.52)
\$ 5,500,000.00	\$ (1,501,706.32)
\$ 6,000,000.00	\$ (1,897,185.11)
\$ 6,500,000.00	\$ (2,292,663.91)
\$ 7,000,000.00	\$ (2,688,142.70)
\$ 7,500,000.00	\$ (3,083,621.50)
\$ 8,000,000.00	\$ (3,479,100.29)
\$ 8,500,000.00	\$ (3,874,579.09)
\$ 9,000,000.00	\$ (4,270,057.89)
\$ 9,500,000.00	\$ (4,665,536.68)
\$ 10,000,000.00	\$ (5,061,015.48)
\$ 10,500,000.00	\$ (5,456,494.27)
\$ 11,000,000.00	\$ (5,851,973.07)
\$ 11,500,000.00	\$ (6,247,451.86)
\$ 12,000,000.00	\$ (6,642,930.66)
\$ 12,500,000.00	\$ (7,038,409.45)
\$ 13,000,000.00	\$ (7,433,888.25)
\$ 13,500,000.00	\$ (7,829,367.04)
\$ 14,000,000.00	\$ (8,224,845.84)
\$ 14,500,000.00	\$ (8,620,324.64)
\$ 15,000,000.00	\$ (9,015,803.43)



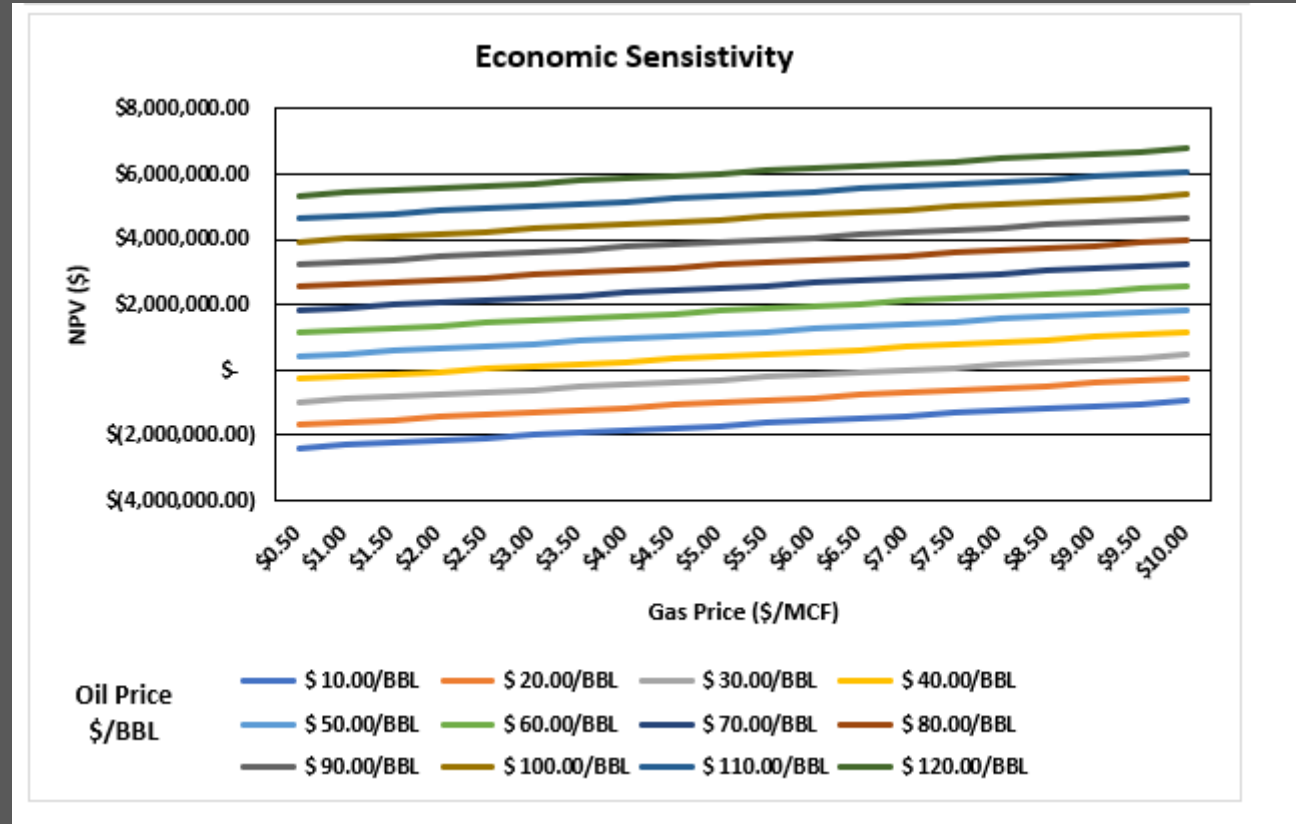


# Economics- ATAX Corp



# Economics- SOOGA LLC

Economic Assumptions	
WI	100%
RI	12.5%
NRI	87.5%
Total Gas Shrinkage	2.0%
Total Oil Shrinkage	1.0%
BTU Factor	1.08
Severance	2.50%
Advalorem	2.50%
Gas Price	\$ 2.50
Oil Price	\$ 55.00
Basis Gas Price	\$ (0.30)
Gravity Deduction	\$ -
Variable Opex	\$ 0.25
Fixed Opex	\$ 1,500.00
WACC	10%
Corp Tax	0%
Stair Step Capex	0%
Tangible %	15%
Intangible %	85%



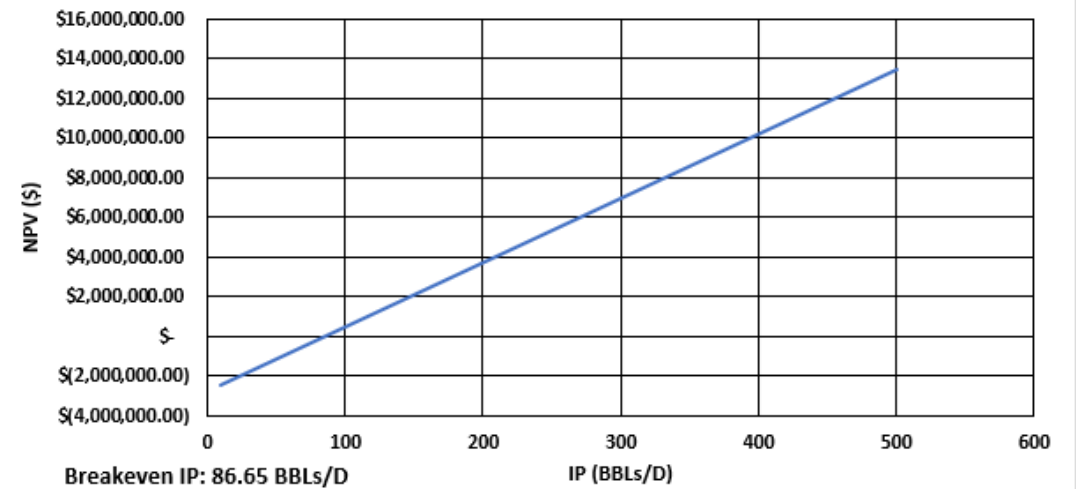
- At \$55/BBL; \$2.50/MCF- 49 Month Payout; 25% IRR; \$1,083,584.62 50 Year NPV

# Economics- SOOGA LLC

NPV vs CAPEX at Original Pricing



NPV vs IP at Original Pricing



# Recommendations

- This is an expensive proposition
- DCA Well Results are Extremely Sensitive
- Corners and Mistakes can cost major productivity
- 3D- Reservoir Network, Cannot be Cheap on Development Costs
- Would Find Area with Good Reserves (OOIP), Developed Frac Barriers and Decent Reservoir Pressure
- Unitization Spacing Can Make or Break You
- Does Develop EOR or CO2 Sequestration Opportunities- Secondary Recovery
- Unitization and Higher Costs- Smaller Operators Partner Up



Unconventional Completions; Courtesy of LinkedIn

# Special Thanks To:





*Imcpetro LLC*

**Thank You!**