

**EVALUATION SUMMARY**

***BANDOLIER ENERGY, LLC INTERESTS***

**TOTAL PROVED PLUS PROBABLE RESERVES**

**CERTAIN PROPERTIES IN OKLAHOMA - SPYGLASS/PERSONIA  
CONCESSION**

**AS OF MAY 1, 2018**

**100% WORKING INTERESTS  
STRIP PRICE CASE**

**CG&A**

**CAWLEY, GILLESPIE & ASSOCIATES, INC.  
PETROLEUM CONSULTANTS**

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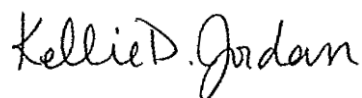
**CAWLEY, GILLESPIE & ASSOCIATES, INC.**

PETROLEUM CONSULTANTS

TEXAS REGISTERED ENGINEERING FIRM F-693



W. TODD BROOKER, P.E.  
PRESIDENT



KELLIE JORDAN  
ENGINEER

# CAWLEY, GILLESPIE & ASSOCIATES, INC.

PETROLEUM CONSULTANTS

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June 7, 2018

Mr. Robert Knappe  
Performance Petroleum Company  
P.O. Box 628  
Barnsdall, OK 74002

Re: Evaluation Summary - 100% Working Interests  
***Bandolier Energy, LLC Interests***  
Total Proved Plus Probable Reserves  
Certain Properties in Oklahoma - Spyglass/Personia  
Concession  
As of May 1, 2018

Dear Mr. Brunner:

As requested, we are submitting our estimates of total proved plus probable reserves and forecasts of economics attributable to *Bandolier Energy, LLC* interests - 100% working interests in certain oil and gas properties located in Osage County, Oklahoma. The results of this evaluation are presented in the accompanying tabulations, with a composite summary presented below:

		Proved Developed <u>Producing</u>	Proved Developed <u>Behind-Pipe</u>	Proved <u>Undeveloped</u>	Total <u>Proved</u>	<u>Probable</u>
Net Reserves						
Oil	- Mbbl	299.0	46.4	346.7	692.1	316.7
Gas	- MMcf	190.3	38.9	478.9	708.1	274.7
NGL	- Mbbl	0.0	0.0	0.0	0.0	0.0
Net Revenue						
Oil	- M\$	17,605.9	2,729.2	20,224.5	40,559.6	18,500.5
Gas	- M\$	444.6	91.0	1,120.9	1,656.5	641.5
NGL	- M\$	0.0	0.0	0.0	0.0	0.0
Other	- M\$	0.0	0.0	0.0	0.0	0.0
Severance Taxes	- M\$	1,280.7	200.1	1,514.5	2,995.2	1,358.1
Ad Valorem Taxes	- M\$	0.0	0.0	0.0	0.0	0.0
Operating Expenses	- M\$	4,947.3	1,197.6	5,844.9	11,989.8	4,097.4
Workover Expenses	- M\$	0.0	0.0	0.0	0.0	0.0
3 <sup>rd</sup> Party COPAS	- M\$	0.0	0.0	0.0	0.0	0.0
Other Deductions	- M\$	0.0	0.0	0.0	0.0	0.0
Investments	- M\$	0.0	80.0	2,265.9	2,345.9	1,132.9
Net Operating Income (BFTT)	- M\$	11,822.6	1,342.5	11,720.1	24,885.2	12,553.6
<b>Discounted @ 10%</b>	<b>- M\$</b>	<b>7,053.6</b>	<b>965.0</b>	<b>5,759.0</b>	<b>13,777.5</b>	<b>6,529.0</b>

The discounted cash flow value shown above should not be construed to represent an estimate of the fair market value by Cawley, Gillespie & Associates, Inc. (“CG&A”).

### **Presentation**

This report is divided into five reserve categories: Total Proved (“TP”), Proved Developed Producing (“PDP”), Proved Developed Behind-Pipe (“PDBP”), Proved Undeveloped (“PUD”) and Probable (“PROB”). Every reserve category contains a Table I which presents composite reserve estimates and economic forecasts for the particular reserve category. Following the Table I is a summary plot, which is a composite rate-time history forecast curve for the particular reserve category. Within the PDP, PDBP, PUD and PROB following the Summary Plot, is a Table II “oneline” summary that presents estimates of ultimate recovery, gross and net reserves, ownership, revenue, expenses, investments, net income and discounted cash flow for the individual properties that make up the corresponding Table I. Within the PDP section, table II is followed by sequentially numbered individual figures that represent the detailed reserves and economics for each property listed in the Table II. The data presented in the summary tables is explained in page 1 of the Appendix. The methods employed in estimating reserves are described in page 2 of the Appendix.

### **Hydrocarbon Pricing**

As requested for the Strip Pricing scenario, oil and gas prices were adjusted to the following index prices:

<u>Year</u>	<u>WTI Oil Price \$/BBL</u>	<u>HH Gas Price \$/MMBTU</u>
2018	66.38	2.86
2019	61.62	2.75
2020	56.43	2.71
2021	53.90	2.78
2022	55.65	3.00
2023	60.00	3.00

Beginning January 1, 2024 oil and gas prices were held constant thereafter at \$60.00 per BBL and \$3.00 per MMBtu, respectively. Adjustments to oil and gas prices were made based upon data provided by your office. These adjustments include transportation charges, BTU content, crude quality and gravity corrections.

### **Expenses and Taxes**

Lease operating expenses and investments were forecast as furnished by your office and were not escalated. Oil and gas severance tax values were determined by applying normal state severance tax rates.

### **Miscellaneous**

An on-site field inspection of the properties has not been performed nor has the mechanical operation or condition of the wells and their related facilities been examined, nor have the wells been tested by Cawley, Gillespie & Associates, Inc. Possible environmental liability related to the properties has not been investigated nor considered. The cost of plugging and the salvage value of equipment at abandonment have not been included except as noted above.

The proved reserve classifications used herein conform to the criteria of the *Society of Petroleum Engineers (SPE)* as defined in pages 3—5 of the Appendix. The reserves and economics are predicated on regulatory agency classifications, rules, policies, laws, taxes and royalties in effect on the effective date, except as noted herein. The possible effects of changes in legislation or other Federal or State restrictive actions have not been considered. All reserve estimates represent our best judgment based on data available at the time of preparation, and assumptions as to future economic and regulatory conditions. It should be realized that the reserves actually recovered, the revenue derived therefrom and the actual cost incurred could be more or less than the estimated amounts.

The reserve estimates and forecasts were based upon interpretations of data furnished by your office and available from our files. Ownership information and economic factors such as liquid and gas prices, price differentials, expenses, investments and tax rates were derived from LOS data as furnished by your office and were accepted as furnished. To some extent, information from public records was used to check and/or supplement these data. The basic engineering and geological data were utilized subject to third party reservations and qualifications. Nothing has come to our attention, however, that would cause us to believe that we are not justified in relying on such data.


This report was prepared for the exclusive use of *Bandolier Energy, LLC*. Third parties should not rely on it without the written consent of the above and Cawley, Gillespie & Associates, Inc. Our work papers and related data are available for inspection and review by authorized, interested parties.

Yours very truly,

**CAWLEY, GILLESPIE & ASSOCIATES, INC.**  
**TEXAS REGISTERED ENGINEERING FIRM F-693**



W. TODD BROOKER, P.E.  
PRESIDENT



KELLIE JORDAN  
ENGINEER

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**As of May 1, 2018**

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*Note: Tables I are Grand Total Summaries of Reserves and Economics.  
Summary Plots are Grand Total Rate-Time History-Forecast Curves based on the corresponding Table I.  
Tables II are “Lease” Summaries of Economics for wells/leases in corresponding Tables I.  
Individual Figures are detailed rate-time history-forecast curves for each property in Table II.*

Table I- TP  
 Composite Reserve Estimates and Economic Forecasts  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Total Proved Reserves  
 As of May 1, 2018

(1) End Mo-Year	(2) Gross Oil Production MBBLS	(3) Gross Gas Production MMCF	(4) Gross NGL Production MGals	(5) Net Oil Production MBBLS	(6) Net Gas Sales MMCF	(7) Net NGL Production MBBLS	(8) Avg Oil Price \$/BBL	(9) Avg Gas Price \$/MCF	(10) Avg NGL Price \$/Gal		
12-2018	77.9	58.1	.0	60.730	45.333	.000	-1.250	65.130	0.800	2.288	.000
12-2019	99.4	101.2	.0	77.497	78.900	.000	-1.250	60.370	0.800	2.200	.000
12-2020	74.6	77.9	.0	58.210	60.743	.000	-1.250	55.180	0.800	2.168	.000
12-2021	54.0	57.9	.0	42.112	45.124	.000	-1.250	52.650	0.800	2.224	.000
12-2022	43.8	47.2	.0	34.170	36.839	.000	-1.250	54.400	0.800	2.400	.000
12-2023	37.3	40.3	.0	29.124	31.469	.000	-1.250	58.750	0.800	2.400	.000
12-2024	32.9	35.5	.0	25.636	27.721	.000	-1.250	58.750	0.800	2.400	.000
12-2025	29.4	31.7	.0	22.898	24.763	.000	-1.250	58.750	0.800	2.400	.000
12-2026	26.7	28.9	.0	20.813	22.503	.000	-1.250	58.750	0.800	2.400	.000
12-2027	24.5	26.5	.0	19.129	20.675	.000	-1.250	58.750	0.800	2.400	.000
12-2028	22.8	24.6	.0	17.783	19.211	.000	-1.250	58.750	0.800	2.400	.000
12-2029	21.2	22.9	.0	16.558	17.879	.000	-1.250	58.750	0.800	2.400	.000
12-2030	19.9	21.5	.0	15.553	16.785	.000	-1.250	58.750	0.800	2.400	.000
12-2031	18.8	20.3	.0	14.680	15.836	.000	-1.250	58.750	0.800	2.400	.000
12-2032	17.9	19.3	.0	13.952	15.042	.000	-1.250	58.750	0.800	2.400	.000
12-2033	16.8	18.3	.0	13.101	14.255	.000	-1.250	58.750	0.800	2.400	.000
12-2034	15.6	17.4	.0	12.142	13.578	.000	-1.250	58.750	0.800	2.400	.000
12-2035	14.9	16.6	.0	11.618	12.957	.000	-1.250	58.750	0.800	2.400	.000
12-2036	14.3	15.9	.0	11.174	12.415	.000	-1.250	58.750	0.800	2.400	.000
S Tot	662.7	682.1	.0	516.880	532.028	.000		58.556		2.319	.000
After	224.6	225.7	.0	175.2	176.049	.000		58.750		2.400	.000
Total	887.3	907.8	.0	692.084	708.077	.000		58.605		2.339	.000
Cum Ult	21.1	18.3	.0								.000
	908.4	926.0	.0								.000
(11) End Mo-Year	(12) Oil Revenue M\$	(13) Gas Revenue M\$	(14) NGL Revenue M\$	(15) Hedge Revenue M\$	(16) Other Revenue M\$	(17) Total Revenue M\$	(18) Production Taxes M\$	(19) Ad Valorem Taxes M\$	(20) \$/BOE6		
12-2018	3,955.367	103.722	.000	0.000	0.000	4,059.089	287.992	.000	2.017		
12-2019	4,678.488	173.579	.000	0.000	0.000	4,852.068	344.254	.000	3.056		
12-2020	3,212.045	131.692	.000	0.000	0.000	3,343.736	237.238	.000	4.583		
12-2021	2,217.206	100.355	.000	0.000	0.000	2,317.561	164.431	.000	6.310		
12-2022	1,858.844	88.414	.000	0.000	0.000	1,947.258	138.158	.000	7.770		
12-2023	1,711.044	75.526	.000	0.000	0.000	1,786.571	126.757	.000	9.113		
12-2024	1,506.096	66.531	.000	0.000	0.000	1,572.627	111.578	.000	10.352		
12-2025	1,345.237	59.431	.000	0.000	0.000	1,404.668	99.661	.000	11.589		
12-2026	1,222.749	54.008	.000	0.000	0.000	1,276.757	90.586	.000	12.751		
12-2027	1,123.825	49.619	.000	0.000	0.000	1,173.444	83.256	.000	13.874		
12-2028	1,044.741	46.106	.000	0.000	0.000	1,090.848	77.396	.000	14.925		
12-2029	972.805	42.910	.000	0.000	0.000	1,015.715	72.065	.000	16.030		
12-2030	913.725	40.284	.000	0.000	0.000	954.009	67.687	.000	17.068		
12-2031	862.454	38.006	.000	0.000	0.000	900.459	63.888	.000	18.084		
12-2032	819.653	36.101	.000	0.000	0.000	855.754	60.716	.000	19.030		
12-2033	769.694	34.211	.000	0.000	0.000	803.905	57.037	.000	19.748		
12-2034	713.319	32.587	.000	0.000	0.000	745.906	52.922	.000	19.827		
12-2035	682.565	31.096	.000	0.000	0.000	713.661	50.634	.000	20.729		
12-2036	656.500	29.797	.000	0.000	0.000	686.297	48.693	.000	21.565		
S Tot	30,266.355	1,233.976	.000	0.000	0.000	31,500.332	2,234.949	.000	9.328		
After	10,293.272	422.517	.000	0.000	0.000	10,715.789	760.285	.000	31.001		
Total	40,559.628	1,656.493	.000	0.000	0.000	42,216.121	2,995.234	.000	14.800		
(21) End Mo-Year	(22) Operating Expense M\$	(23) Gross Count	(24) Net	(25) Workover Expense M\$	(26) 3rd Party COPAS M\$	(27) Other Deductions M\$	(28) Investment M\$	(29) Future Net Cash Flow M\$	(30) Cumulative Cash Flow M\$	(31) Cum.Cash Flow Disc.@ 10.0% M\$	
12-2018	137.741	20	20.0	0.000	0.000	0.000	1,666.123	1,967.233	1,967.233	1,892.761	
12-2019	276.975	23	23.0	0.000	0.000	0.000	679.767	3,551.071	5,518.304	5,088.317	
12-2020	313.200	23	23.0	0.000	0.000	0.000	.000	2,793.298	8,311.602	7,347.952	
12-2021	313.200	23	23.0	0.000	0.000	0.000	.000	1,839.930	10,151.532	8,693.087	
12-2022	313.200	23	23.0	0.000	0.000	0.000	.000	1,495.900	11,647.432	9,682.548	
12-2023	313.200	23	23.0	0.000	0.000	0.000	.000	1,346.613	12,994.045	10,488.618	
12-2024	313.200	23	23.0	0.000	0.000	0.000	.000	1,147.849	14,141.894	11,110.425	
12-2025	313.200	23	23.0	0.000	0.000	0.000	.000	991.807	15,133.701	11,596.656	
12-2026	313.200	23	23.0	0.000	0.000	0.000	.000	872.971	16,006.672	11,984.043	
12-2027	313.200	23	23.0	0.000	0.000	0.000	.000	776.988	16,783.660	12,296.149	
12-2028	313.200	23	23.0	0.000	0.000	0.000	.000	700.252	17,483.912	12,550.744	
12-2029	313.200	23	23.0	0.000	0.000	0.000	.000	630.450	18,114.362	12,758.198	
12-2030	313.200	23	23.0	0.000	0.000	0.000	.000	573.122	18,687.485	12,928.914	
12-2031	313.200	23	23.0	0.000	0.000	0.000	.000	523.372	19,210.857	13,070.038	
12-2032	313.200	23	23.0	0.000	0.000	0.000	.000	481.838	19,692.695	13,187.642	
12-2033	305.637	23	23.0	0.000	0.000	0.000	.000	441.231	20,133.926	13,285.112	
12-2034	285.600	21	21.0	0.000	0.000	0.000	.000	407.384	20,541.309	13,366.575	
12-2035	285.600	21	21.0	0.000	0.000	0.000	.000	377.427	20,918.736	13,434.897	
12-2036	285.600	21	21.0	0.000	0.000	0.000	.000	352.004	21,270.740	13,492.577	
S Tot	5,648.753			0.000	0.000	0.000	2,345.890	21,270.740	21,270.740	13,492.577	
After	6,341.081			0.000	0.000	0.000	.000	3,614.423	24,885.163	13,777.548	
Total	11,989.833			0.000	0.000	0.000	2,345.890	24,885.163	24,885.163	13,777.548	
<b>Strip Pricing (5-01-18)</b>										<b>Percent</b>	<b>Cum. Disc.</b>
Year	WTI Cushing Oil \$/STB	Henry Hub Gas \$/MMBTU									
2018	66.38	2.86							5.00	17,512.937	
2019	61.62	2.75							8.00	15,029.119	
2020	56.43	2.71							10.00	13,777.548	
2021	53.90	2.78							12.00	12,744.571	
2022	55.65	3.00							15.00	11,488.322	
2023	60.00	3.00							20.00	9,914.172	
Thereafter	Flat	Flat									
Cap	60.00	3.00									
<b>8 Months in first year</b>									<b>50.001 Year Life (05/2068)</b>		

THESE DATA ARE PART OF A CG&A REPORT AND ARE SUBJECT TO THE CONDITIONS IN THE TEXT OF THE REPORT.  
 TEXAS REGISTERED ENGINEERING FIRM F-693.

PHD

6/6/2018

16:35:18  
 Summary

Cawley, Gillespie & Associates, Inc.

Summary Plot- TP  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Total Proved Reserves

Gross Production

	Start Date 05/2018					04/2018 Cumulatives	50.00 Year Life (05/2068)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>		Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	8,809.	57.8	0.00	3.1	158.	Oil - mbbls	21.1	887.3	908.4	692.084	40,559.628	2,995.234	11,989.833	24,885.163	13,777.548
Gas - mcf/mo	823.	N.A.	0.00	4.9	66.	Gas - mmcf	18.3	907.8	926.0	708.077	1,656.493	,000	2,345.890		



◆ ⊗ \* -- Annual Averages      Perfs: 0 - 0      Status:  
 First Production 00/ 0      First Data 12/2016 Last Data 04/2018  
 06 / 08 / 2018      14 : 48 : 25      21      API:



Table I- PDP  
 Composite Reserve Estimates and Economic Forecasts  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Proved Developed Producing Reserves  
 As of May 1, 2018

(1) End Mo-Year	(2) Gross Oil Production MBBLS	(3) Gross Gas Production MMCF	(4) Gross NGL Production MGals	(5) Net Oil Production MBBLS	(6) Net Gas Sales MMCF	(7) Net NGL Production MBBLS	(8) Avg Oil Price \$/BBL	(9) Avg Gas Price \$/MCF	(10) Avg NGL Price \$/Gal		
12-2018	47.5	25.8	.0	37.061	20.117	.000	-1.250	65.130	0.800	2.288	.000
12-2019	39.8	27.1	.0	31.040	21.155	.000	-1.250	60.370	0.800	2.200	.000
12-2020	28.0	19.3	.0	21.824	15.048	.000	-1.250	55.180	0.800	2.168	.000
12-2021	22.1	15.2	.0	17.251	11.857	.000	-1.250	52.650	0.800	2.224	.000
12-2022	18.6	12.7	.0	14.490	9.893	.000	-1.250	54.400	0.800	2.400	.000
12-2023	16.1	10.9	.0	12.593	8.532	.000	-1.250	58.750	0.800	2.400	.000
12-2024	14.4	9.7	.0	11.226	7.548	.000	-1.250	58.750	0.800	2.400	.000
12-2025	13.0	8.7	.0	10.116	6.751	.000	-1.250	58.750	0.800	2.400	.000
12-2026	11.9	7.9	.0	9.255	6.134	.000	-1.250	58.750	0.800	2.400	.000
12-2027	11.0	7.2	.0	8.548	5.629	.000	-1.250	58.750	0.800	2.400	.000
12-2028	10.2	6.7	.0	7.977	5.221	.000	-1.250	58.750	0.800	2.400	.000
12-2029	9.6	6.2	.0	7.451	4.849	.000	-1.250	58.750	0.800	2.400	.000
12-2030	9.0	5.8	.0	7.016	4.541	.000	-1.250	58.750	0.800	2.400	.000
12-2031	8.5	5.5	.0	6.635	4.274	.000	-1.250	58.750	0.800	2.400	.000
12-2032	8.1	5.2	.0	6.316	4.050	.000	-1.250	58.750	0.800	2.400	.000
12-2033	7.5	4.9	.0	5.866	3.830	.000	-1.250	58.750	0.800	2.400	.000
12-2034	6.7	4.7	.0	5.244	3.642	.000	-1.250	58.750	0.800	2.400	.000
12-2035	6.4	4.5	.0	5.022	3.473	.000	-1.250	58.750	0.800	2.400	.000
12-2036	6.2	4.3	.0	4.834	3.326	.000	-1.250	58.750	0.800	2.400	.000
S Tot	294.6	192.1	.0	229.765	149.869	.000		58.927		2.320	.000
After	88.7	51.8	.0	69.2	40.419	.000		58.750		2.400	.000
Total	383.3	244.0	.0	298.985	190.288	.000		58.886		2.337	.000
Cum Ult	21.1	18.3	.0								
	404.4	262.2	.0								
(11) End Mo-Year	(12) Oil Revenue M\$	(13) Gas Revenue M\$	(14) NGL Revenue M\$	(15) Hedge Revenue M\$	(16) Other Revenue M\$	(17) Total Revenue M\$	(18) Production Taxes M\$	(19) Ad Valorem Taxes M\$	(20) \$/BOE6		
12-2018	2,413.796	46.028	.000	0.000	0.000	2,459.824	174.525	.000	2.435		
12-2019	1,873.864	46.541	.000	0.000	0.000	1,920.405	136.253	.000	4.270		
12-2020	1,204.273	32.624	.000	0.000	0.000	1,236.897	87.758	.000	6.066		
12-2021	908.240	26.371	.000	0.000	0.000	934.611	66.311	.000	7.677		
12-2022	788.231	23.742	.000	0.000	0.000	811.973	57.609	.000	9.146		
12-2023	739.851	20.478	.000	0.000	0.000	760.329	53.945	.000	10.531		
12-2024	659.517	18.115	.000	0.000	0.000	677.632	48.078	.000	11.823		
12-2025	594.307	16.204	.000	0.000	0.000	610.510	43.316	.000	13.130		
12-2026	543.708	14.721	.000	0.000	0.000	558.430	39.621	.000	14.362		
12-2027	502.195	13.509	.000	0.000	0.000	515.703	36.589	.000	15.560		
12-2028	468.662	12.530	.000	0.000	0.000	481.192	34.141	.000	16.683		
12-2029	437.738	11.637	.000	0.000	0.000	449.374	31.883	.000	17.872		
12-2030	412.174	10.899	.000	0.000	0.000	423.072	30.017	.000	18.990		
12-2031	389.827	10.257	.000	0.000	0.000	400.084	28.386	.000	20.088		
12-2032	371.087	9.719	.000	0.000	0.000	380.806	27.018	.000	21.112		
12-2033	344.648	9.192	.000	0.000	0.000	353.840	25.105	.000	21.529		
12-2034	308.073	8.742	.000	0.000	0.000	316.815	22.478	.000	20.510		
12-2035	295.061	8.335	.000	0.000	0.000	303.396	21.526	.000	21.424		
12-2036	284.002	7.982	.000	0.000	0.000	291.984	20.716	.000	22.270		
S Tot	13,539.254	347.624	.000	0.000	0.000	13,886.878	985.274	.000	10.461		
After	4,066.692	97.006	.000	0.000	0.000	4,163.698	295.414	.000	30.050		
Total	17,605.946	444.630	.000	0.000	0.000	18,050.576	1,280.688	.000	14.960		
(21) End Mo-Year	(22) Operating Expense M\$	(23) Gross Count	(24) Net	(25) Workover Expense M\$	(26) 3rd Party COPAS M\$	(27) Other Deductions M\$	(28) Investment M\$	(29) Future Net Cash Flow M\$	(30) Cumulative Cash Flow M\$	(31) Cum.Cash Flow Disc.@ 10.0% M\$	
12-2018	98.400	11	11.0	0.000	0.000	0.000	.000	2,186.900	2,186.900	2,124.108	
12-2019	147.600	11	11.0	0.000	0.000	0.000	.000	1,636.552	3,823.452	3,586.999	
12-2020	147.600	11	11.0	0.000	0.000	0.000	.000	1,001.539	4,824.991	4,396.137	
12-2021	147.600	11	11.0	0.000	0.000	0.000	.000	720.700	5,545.691	4,922.816	
12-2022	147.600	11	11.0	0.000	0.000	0.000	.000	606.764	6,152.455	5,324.077	
12-2023	147.600	11	11.0	0.000	0.000	0.000	.000	558.784	6,711.238	5,658.518	
12-2024	147.600	11	11.0	0.000	0.000	0.000	.000	481.954	7,193.192	5,919.578	
12-2025	147.600	11	11.0	0.000	0.000	0.000	.000	419.594	7,612.786	6,125.271	
12-2026	147.600	11	11.0	0.000	0.000	0.000	.000	371.209	7,983.995	6,289.991	
12-2027	147.600	11	11.0	0.000	0.000	0.000	.000	331.514	8,315.510	6,423.152	
12-2028	147.600	11	11.0	0.000	0.000	0.000	.000	299.452	8,614.962	6,532.023	
12-2029	147.600	11	11.0	0.000	0.000	0.000	.000	269.891	8,884.853	6,620.831	
12-2030	147.600	11	11.0	0.000	0.000	0.000	.000	245.455	9,130.308	6,693.945	
12-2031	147.600	11	11.0	0.000	0.000	0.000	.000	224.098	9,354.406	6,754.371	
12-2032	147.600	11	11.0	0.000	0.000	0.000	.000	206.187	9,560.594	6,804.695	
12-2033	140.037	11	11.0	0.000	0.000	0.000	.000	188.698	9,749.292	6,846.380	
12-2034	120.000	9	9.0	0.000	0.000	0.000	.000	174.337	9,923.629	6,881.242	
12-2035	120.000	9	9.0	0.000	0.000	0.000	.000	161.870	10,085.499	6,910.543	
12-2036	120.000	9	9.0	0.000	0.000	0.000	.000	151.268	10,236.767	6,935.330	
S Tot	2,664.837			0.000	0.000	0.000	.000	10,236.767	6,935.330		
After	2,282.471			0.000	0.000	0.000	.000	1,585.813	11,822.580	7,053.598	
Total	4,947.308			0.000	0.000	0.000	.000	11,822.580	11,822.580	7,053.598	
Strip Pricing (5-01-18)									Percent	Cum. Disc.	
Year	WTI Cushing Oil \$/STB	Henry Hub Gas \$/MMBTU									
2018	66.38	2.86							5.00	8,638.895	
2019	61.62	2.75							8.00	7,583.992	
2020	56.43	2.71							10.00	7,053.598	
2021	53.90	2.78							12.00	6,615.837	
2022	55.65	3.00							20.00	6,082.920	
2023	60.00	3.00								5,413.333	
Thereafter Cap	60.00	3.00									
8 Months in first year								50.001	Year Life (05/2068)		

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 TEXAS REGISTERED ENGINEERING FIRM F-693.

PHD

6/6/2018 16:35:21  
 Summary

Cawley, Gillespie & Associates, Inc.

**Summary Plot- PDP**  
**Bandolier Energy, LLC Interests**  
**Certain Properties in Oklahoma - Spyglass/Personia Concession**  
**Proved Developed Producing Reserves**

*Gross Production*

	As of 05/2018					04/2018 Cumulatives	50.00 Year Life (05/2068)		Current Interest %	NetOilProd. NetGasSales mmbbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>		Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	8,412.	83.6	0.00	3.0	55.	Oil - mbbls	21.1	383.3	404.4	298.985	17,605.946	1,280.688	4,947.308	11,822.580	7,053.598
Gas - mcf/mo	823.	N.A.	0.00	4.9	9.	Gas - mmcf	18.3	244.0	262.2	190.288	444.630	.000	0.000		



◆ ⊗ \* -- Annual Averages      Perfs: 0 - 0      Status:  
 First Production 00/ 0      First Data 12/2016 Last Data 04/2018  
 06 / 08 / 2018      14 : 48 : 26      21      API:

Cawley, Gillespie & Associates, Inc.

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**SUMMARY**

Table II- PDP  
 Lease Reserve Summary  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Proved Developed Producing Reserves  
 As of May 1, 2018

OPERATOR				Current	WellCnt	Ultimate	Gross	Net	Oil Revenue	Prod Tax	Expenses	Future Net	Cash Flow	
LEASE NAME				Interest	Life	Recovery	Reserves	Reserves	Gas Revenue	Adv. Tax	Investments	Cash Flow	Disc. @ 10.0	
Table	Class	Major	Well No.	Start Date	ASN	%	MBBL / MMCF		MS / MS	MS / MS	MS / MS	MS	MS	
(MISSISSIPPI CHAT) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
1	PDP	Oil				78.0000 NI 100.0000 WI	1 28.6	10.1 78.3	9.2 60.6	7.2 47.3	418.5 110.4	37.5 0.0	274.4 0.0	217.0 118.6
(MISSISSIPPI) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
2	PDP	Oil				78.0000 NI 100.0000 WI	0 0.0	0.2 0.0	Non-Commercial					
(MISSISSIPPI CHAT) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
3	PDP	Oil				78.0000 NI 100.0000 WI	1 20.7	30.8 0.0	26.9 0.0	21.0 0.0	1,223.0 0.0	86.8 0.0	286.1 0.0	850.2 474.0
(RED FORK) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
4	PDP	Oil				78.0000 NI 100.0000 WI	1 47.2	51.8 47.0	46.1 46.4	35.9 36.2	2,108.9 84.8	155.6 0.0	651.6 0.0	1,386.5 757.7
(BURGESS) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
5	PDP	Oil				78.0000 NI 100.0000 WI	1 30.5	27.9 36.6	25.7 36.6	20.0 28.6	1,180.4 66.6	88.5 0.0	420.5 0.0	738.0 501.2
(BURGESS / CHAT) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
6	PDP	Oil				78.0000 NI 100.0000 WI	1 50.0	127.9 36.1	125.4 36.1	97.8 28.2	5,788.7 65.8	415.4 0.0	689.9 0.0	4,749.2 2,612.8
(MISSISSIPPI CHAT) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
7	PDP	Oil				78.0000 NI 100.0000 WI	1 36.3	36.0 0.0	35.5 0.0	27.7 0.0	1,632.4 0.0	115.8 0.0	500.5 0.0	1,016.1 666.4
8	PDP	Oil				78.0000 NI 100.0000 WI	1 15.4	10.4 0.0	10.3 0.0	8.0 0.0	468.1 0.0	33.2 0.0	212.7 0.0	222.2 166.8
(MISSISSIPPI CHAT/BUR) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
9	PDP	Oil				78.0000 NI 100.0000 WI	1 47.3	53.8 0.0	51.1 0.0	39.9 0.0	2,345.2 0.0	166.4 0.0	653.1 0.0	1,525.7 875.0
(MISSISSIPPI CHAT) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
10	PDP	Oil				78.0000 NI 100.0000 WI	1 15.4	13.1 0.0	11.7 0.0	9.1 0.0	536.7 0.0	38.1 0.0	212.1 0.0	286.5 223.0
(SKINNER) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
11	PDP	Oil				78.0000 NI 100.0000 WI	1 36.3	28.8 64.2	28.5 64.2	22.3 50.0	1,310.0 116.9	101.2 0.0	497.8 0.0	827.8 542.8
(MISSISSIPPI CHAT) -- OSAGE COUNTY, OKLAHOMA														
PERFORMANCE PETROLEUM														
12	PDP	Oil				78.0000 NI 100.0000 WI	1 40.0	13.7 0.0	13.0 0.0	10.1 0.0	594.0 0.0	42.1 0.0	548.5 0.0	3.3 115.2

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 TEXAS REGISTERED ENGINEERING FIRM F-693.

Scenario: .000 : 6/6/2018 : 4:35:21 PM

Table II- PDP (cont.)  
 Lease Reserve Summary  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Proved Developed Producing Reserves  
 As of May 1, 2018

OPERATOR				Current	WellCnt	Ultimate	Gross	Net	Oil Revenue	Prod Tax	Expenses	Future Net	Cash Flow
LEASE NAME				Interest	Life	Recovery	Reserves	Reserves	Gas Revenue	Adv. Tax	Investments	Cash Flow	Disc. @ 10.0
Table	Class	Major	Well No.	%			MBBL / MMCF		M\$ / M\$	M\$ / M\$	M\$ / M\$	M\$	M\$
					ASN								
<b>GRAND TOTAL</b>					11	404.4	383.3	299.0	17,605.9	1,280.7	4,947.3	11,822.6	7,053.6
						262.2	244.0	190.3	444.6	0.0	0.0		

THESE DATA ARE PART OF A CG&A REPORT AND ARE SUBJECT TO THE CONDITIONS IN THE TEXT OF THE REPORT.  
 TEXAS REGISTERED ENGINEERING FIRM F-693.

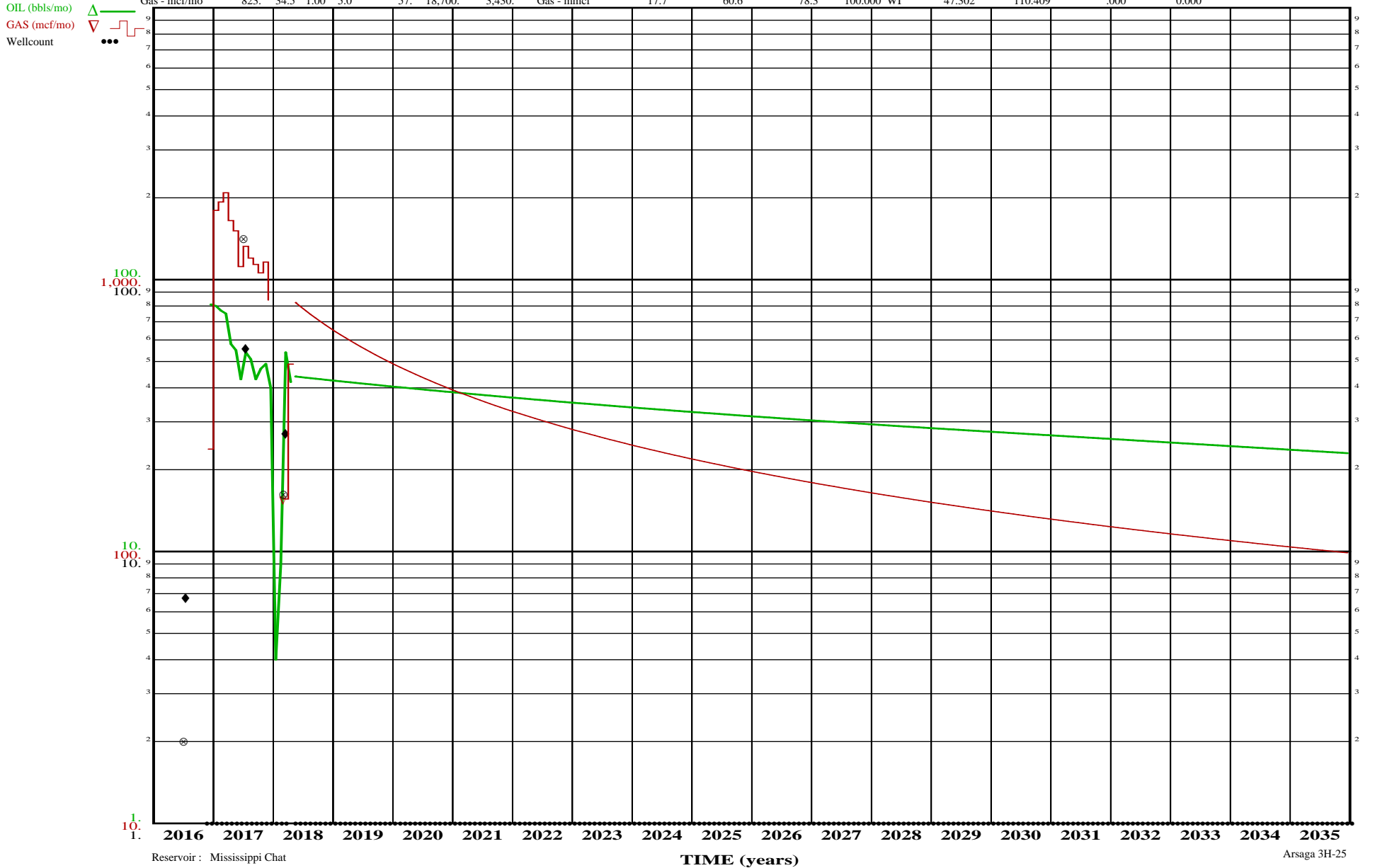
Scenario: .000 : 6/6/2018 : 4:35:21 PM

Performance Petroleum -- Arsaga 3H-25  
 (Mississippi Chat) FIELD  
 Osage COUNTY, OKLAHOMA

Reserve Category : PDP

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	28.58 Year Life (11/2046)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	44.	5.4	1.30	3.0	17.	18,700.	3,430.	0.9	17.7	9.2	10.0	78.000 NI	7.166	418.452	37.523	274.362	216.976	118.632
Gas - mcf/mo	823.	34.5	1.00	5.0	57.							100.000 W1	47.302	110.409	.000	0.000		



Reservoir : Mississippi Chat

TIME (years)

Arsaga 3H-25

◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
 First Production 00/ 0      First Data 12/2016 Last Data 04/2018  
 06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

OK OIL  
 KC H:\cga8216\PhD\pdp.out  
 (DEFAULT) ASN 312

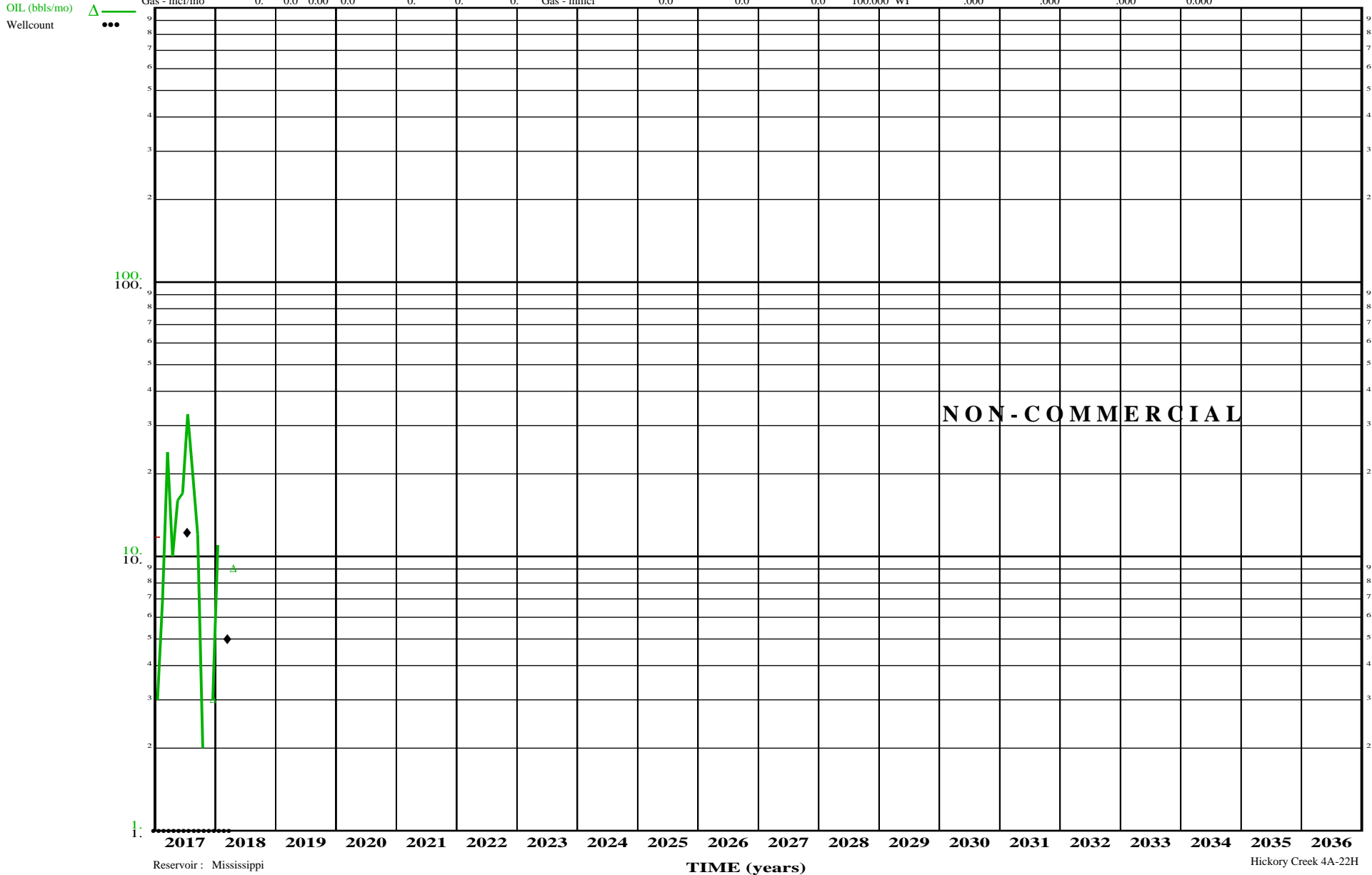
Performance Petroleum -- Hickory Creek 4A-22H  
(Mississippi) FIELD

Reserve Category : PDP

Osage COUNTY, OKLAHOMA

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	0.0 Year Life (05/2018)		Current Interest %	NetOilProd. NetGasSales mmbbl/mmcft	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	0.	5.7	1.30	0.0	0.	0.	0.	0.2	0.0	0.2	78.000 NI	.000	.000	0.000	0.000	.000	.000	
Gas - mcf/mo	0.	0.0	0.00	0.0	0.	0.	0.	0.0	0.0	0.0	100.000 W1	.000	.000	0.000	0.000	.000	.000	



Reservoir : Mississippi

TIME (years)

Hickory Creek 4A-22H

◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
First Production 00/ 0      First Data 01/2017 Last Data 04/2018  
06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

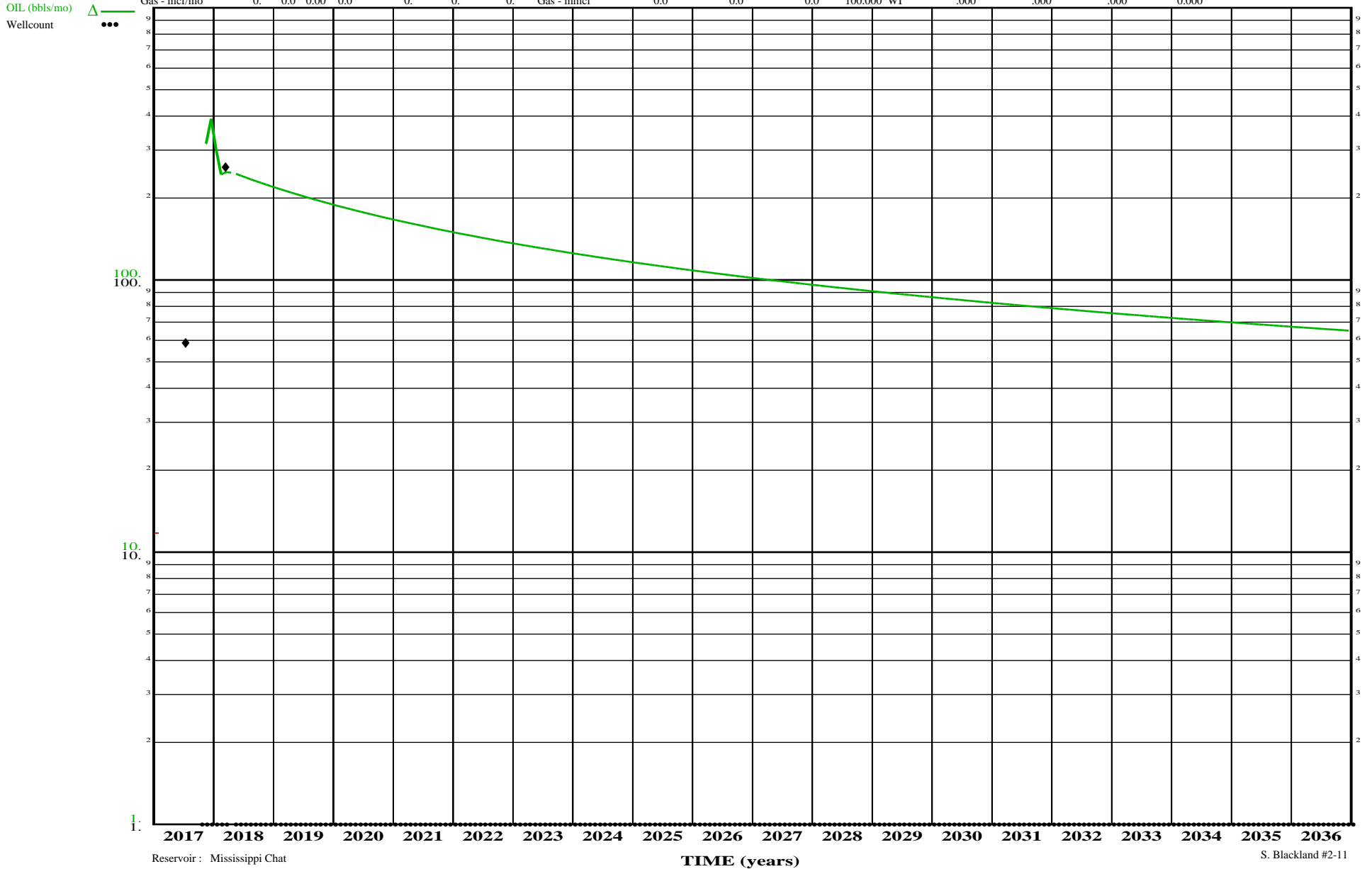
OK OIL  
KC H:\cga8216\PhD\pdp.out  
(DEFAULT) ASN 314

*Performance Petroleum -- S. Blackland #2-11  
(Mississippi Chat) FIELD  
Osage COUNTY, OKLAHOMA*

Reserve Category : PDP

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	20.73 Year Life (01/2039)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	245.	17.5	1.30	3.1	61.	0.	0.	3.9	26.9	30.8	78.000	NI	20.960	1,223.027	86,774	286.090	850.163	474,049
Gas - mcf/mo	0.	0.0	0.00	0.0	0.	0.	0.	0.0	0.0	0.0	100.000	W1	.000	.000	.000	0.000		



Reservoir : Mississippi Chat

TIME (years)

S. Blackland #2-11

◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
First Production 00/ 0      First Data 11/2017 Last Data 04/2018  
06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

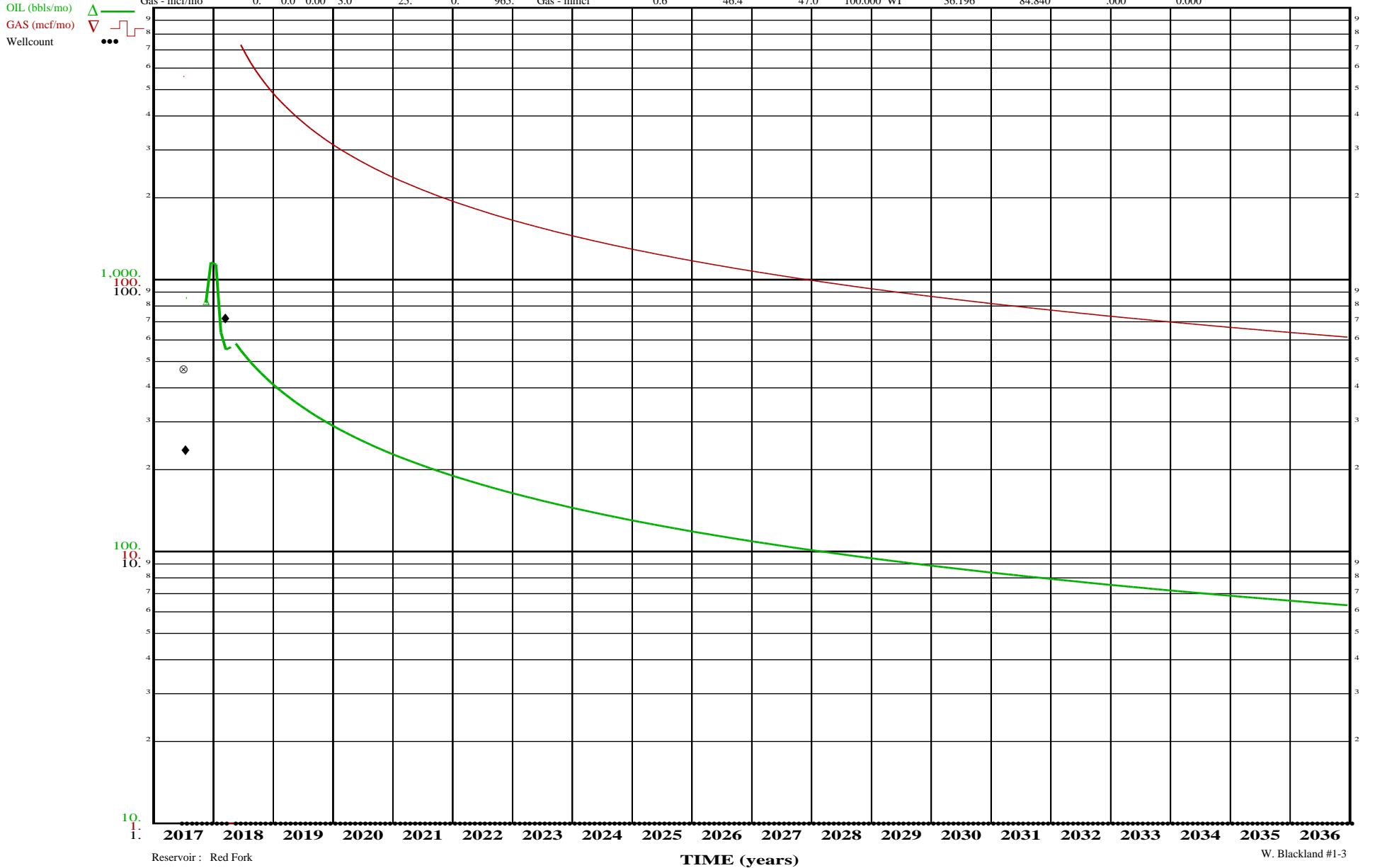
OK OIL  
KC H:\cga8216\PhD\pdp.out  
(DEFAULT) ASN 320

Performance Petroleum -- W. Blackland #1-3  
(Red Fork) FIELD  
Osage COUNTY, OKLAHOMA

Reserve Category : PDP

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	47.23 Year Life (07/2065)		Current Interest %	NetOilProd. NetGasSales mmbbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	581.	51.4	1.30	3.0	26.	0.	965.	5.7	46.1	51.8	78.000	NI	35.943	2,108.920	155.647	651.628	1,386.484	757.725
Gas - mcf/mo	0.	0.0	0.00	3.0	25.	0.	965.	0.6	46.4	47.0	100.000	W1	36.196	84.840	.000	0.000		



Reservoir : Red Fork

TIME (years)

W. Blackland #1-3

◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
First Production 00/ 0      First Data 07/2017 Last Data 04/2018  
06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

OK OIL  
KC H:\cga8216\PhD \pdp.out  
(DEFAULT) ASN 321



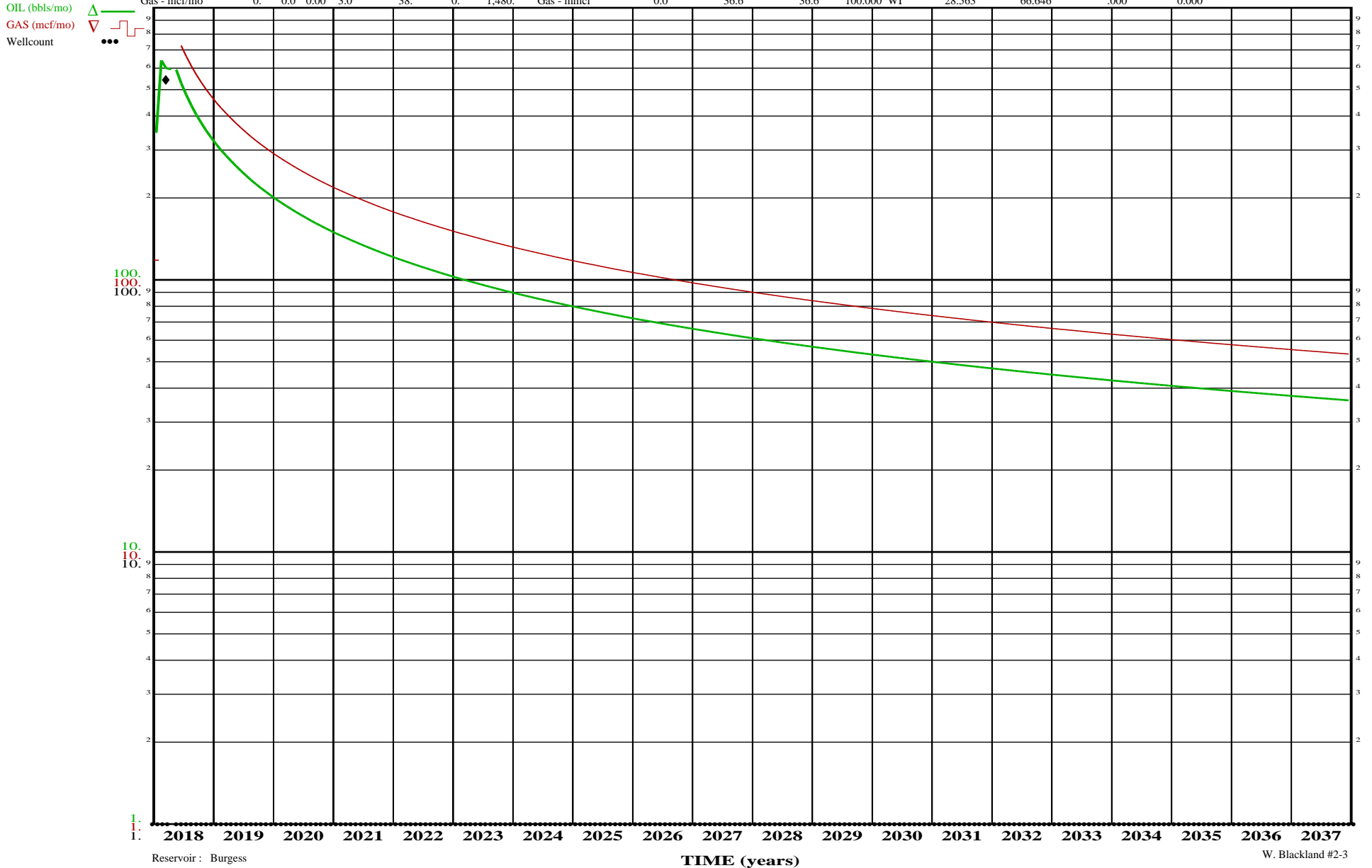
Performance Petroleum -- W. Blackland #2-3  
(Burgess) FIELD

Reserve Category : PDP

Osage COUNTY, OKLAHOMA

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls	04/2018 Cumulatives	30.48 Year Life (10/2048)		Current Interest %	NetOilProd. NetGasSales mbbbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	591.	79.2	1.30	3.0	26.	0.	1,480.	Oil - mbbls	2.2	25.7	27.9	78.000 NI	20.034	1,180.417	88.479	420.536	738.047	501.233
Gas - mcf/mo	0.	0.0	0.00	3.0	38.	0.	1,480.	Gas - mmcf	0.0	36.6	36.6	100.000 W1	28.563	66.646	.000	0.000		



Reservoir : Burgess

TIME (years)

W. Blackland #2-3

◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
 First Production 00/ 0      First Data 01/2018 Last Data 04/2018  
 06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

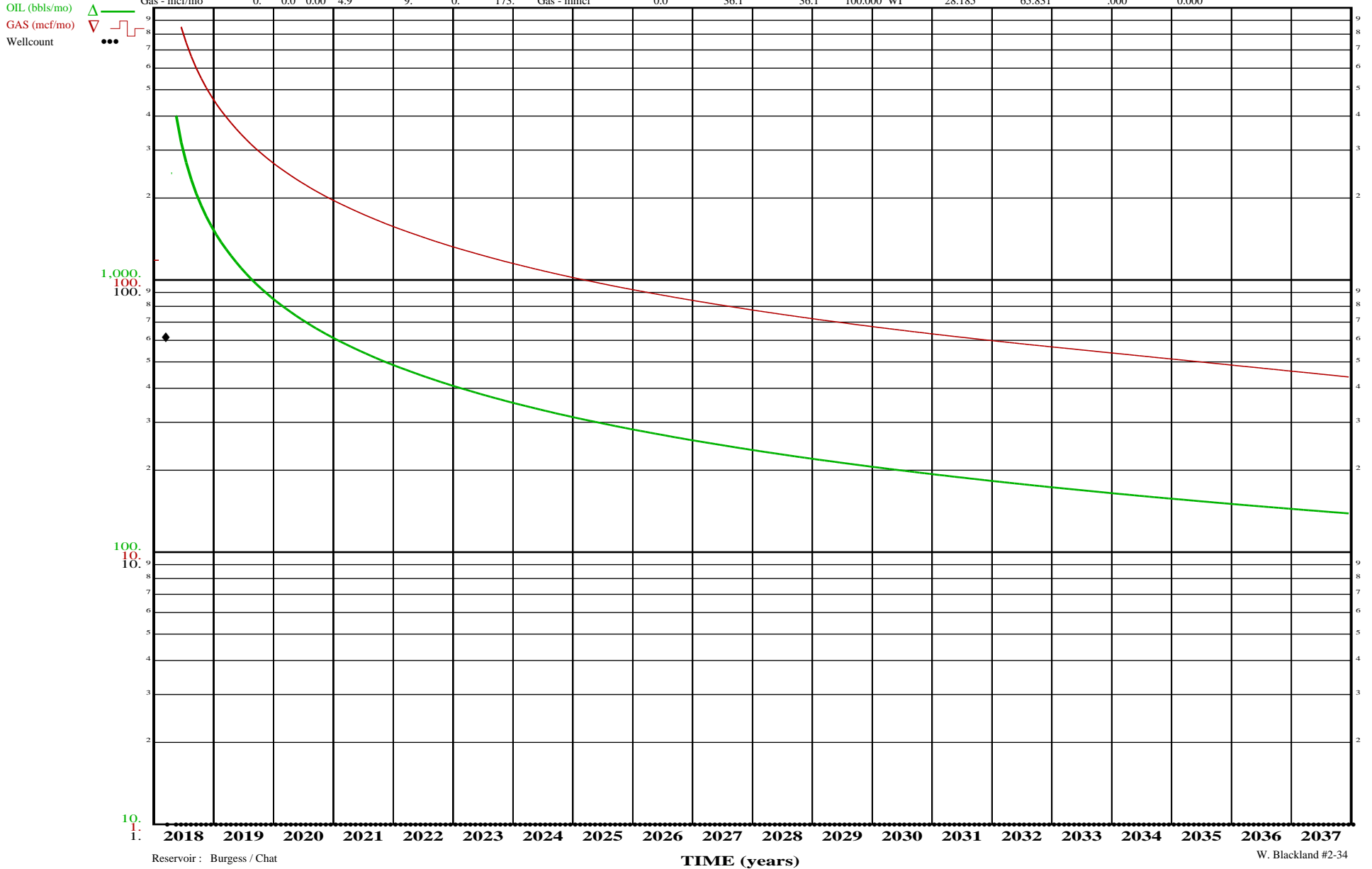
OK OIL  
 KC H:\cga8216\PhD \pdp.out  
 (DEFAULT) ASN 329

Performance Petroleum -- W. Blackland #2-34  
(Burgess / Chat) FIELD  
Osage COUNTY, OKLAHOMA

Reserve Category : PDP

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	50.00 Year Life (05/2068)		Current Interest %	NetOilProd. NetGasSales mmbbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	4,001.	97.4	1.30	3.0	55.	0.	173.	2.5	125.4	127.9	78.000	NI	97.826	5,788.698	415.379	689.929	4,749.221	2,612.824
Gas - mcf/mo	0.	0.0	0.00	4.9	9.	0.	173.	0.0	36.1	36.1	100.000	W1	28.185	65.831	.000	0.000		



◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
First Production 00/ 0      First Data 04/2018 Last Data 04/2018  
06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

OK OIL  
KC H:\cga8216\PhD \pdp.out  
(DEFAULT) ASN 339

Performance Petroleum -- W. Blackland #3-3

(Mississippi Chat) FIELD

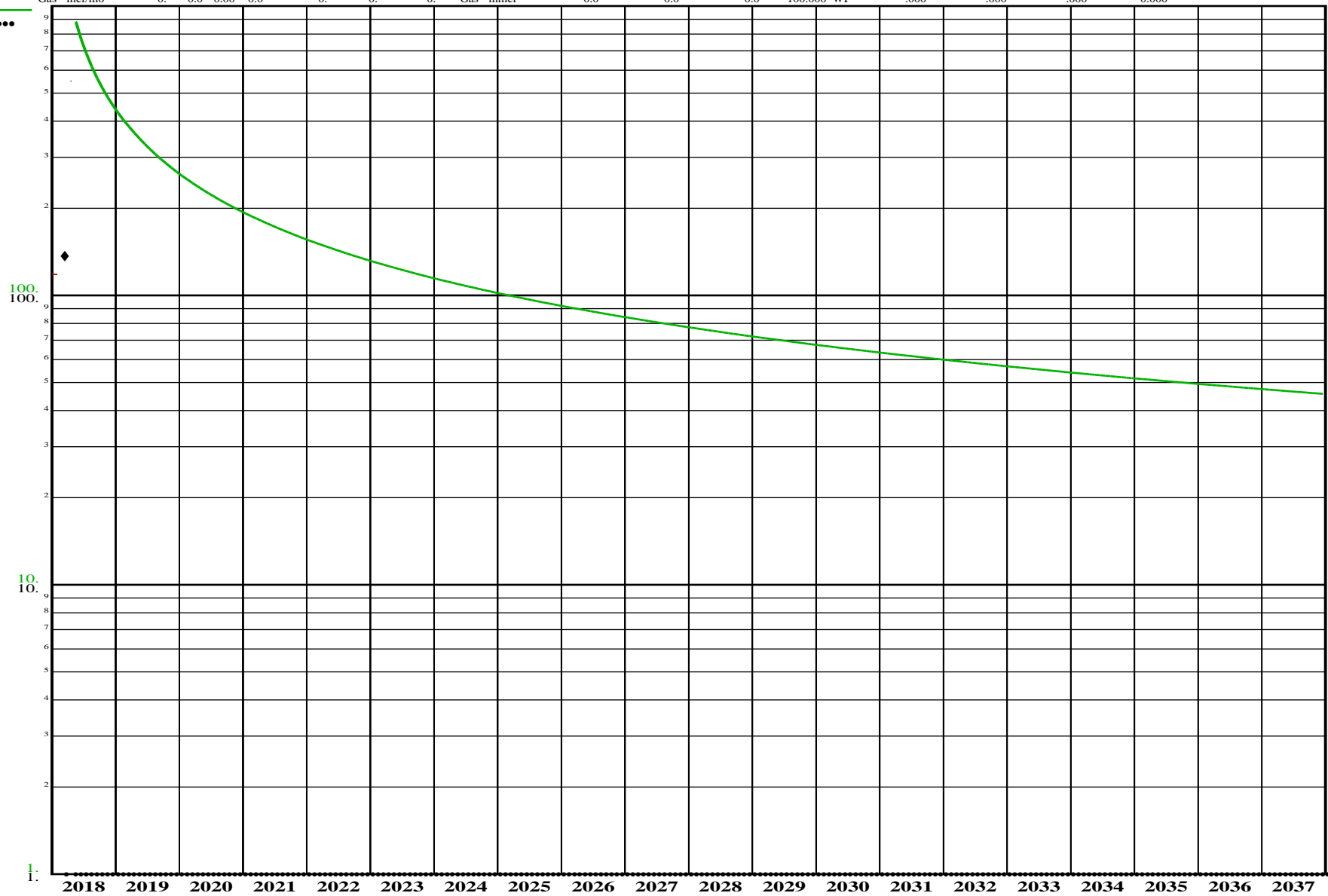
Osage COUNTY, OKLAHOMA

As of 05/2018

Reserve Category : PDP

	As of 05/2018					GOR - scf/bbl		Oil - mbbls	04/2018 Cumulatives	36.27 Year Life (08/2054)		Current Interest %	NetOilProd. NetGasSales mbbbl/mmcf	OilRevenue GasRevenue MS	Prod. Tax Adv. Tax MS	Expenses Investments MS	FutureNet CashFlow MS	CashFlow Disc.@10.0% MS
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	881.	86.3	1.30	3.0	27.	0.	0.	0.6	35.5	36.0	78.000 NI	27.671	1,632.428	115.821	500.459	1,016.148	666.368	
Gas - mcf/mo	0.	0.0	0.00	0.0	0.	0.	0.	0.0	0.0	0.0	100.000 W1	.000	.000	.000	0.000			

OIL (bbls/mo) Δ  
Wellcount ●●●



Reservoir : Mississippi Chat

TIME (years)

W. Blackland #3-3

◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
 First Production 00/ 0      First Data 04/2018 Last Data 04/2018  
 06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

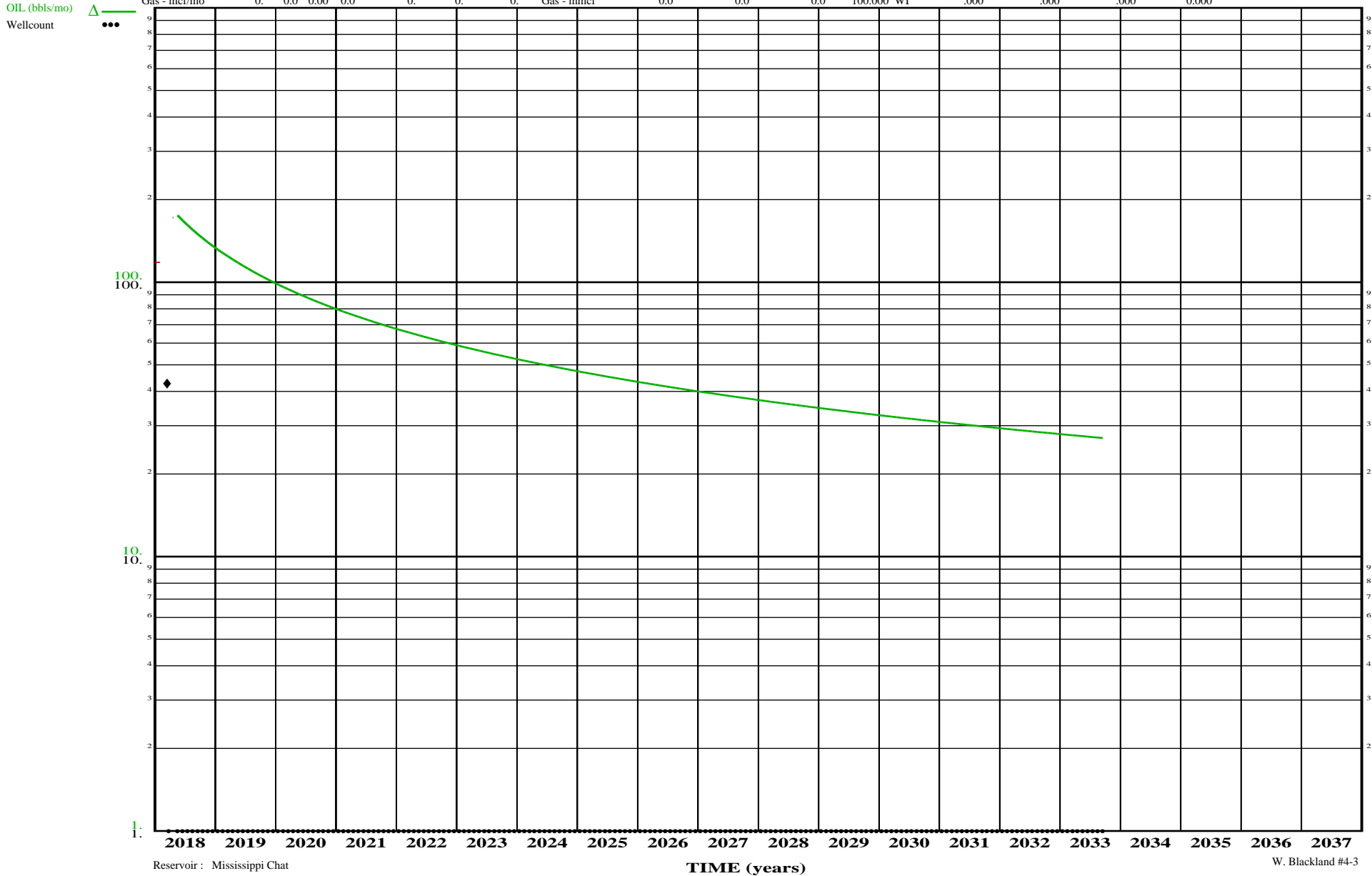
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 (DEFAULT) ASN 330

Performance Petroleum -- W. Blackland #4-3  
 (Mississippi Chat) FIELD  
 Osage COUNTY, OKLAHOMA

Reserve Category : PDP

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	15.42 Year Life (10/2033)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	175.	41.3	1.30	4.5	27.			0.2	10.3	10.4	78.000	NI	8.000	468.140	33.215	212.720	222.206	166.821
Gas - mcf/mo	0.	0.0	0.00	0.0	0.	0.	0.	0.0	0.0	0.0	100.000	W1	.000	.000	.000	0.000		



Reservoir : Mississippi Chat

TIME (years)

W. Blackland #4-3

◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
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 06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

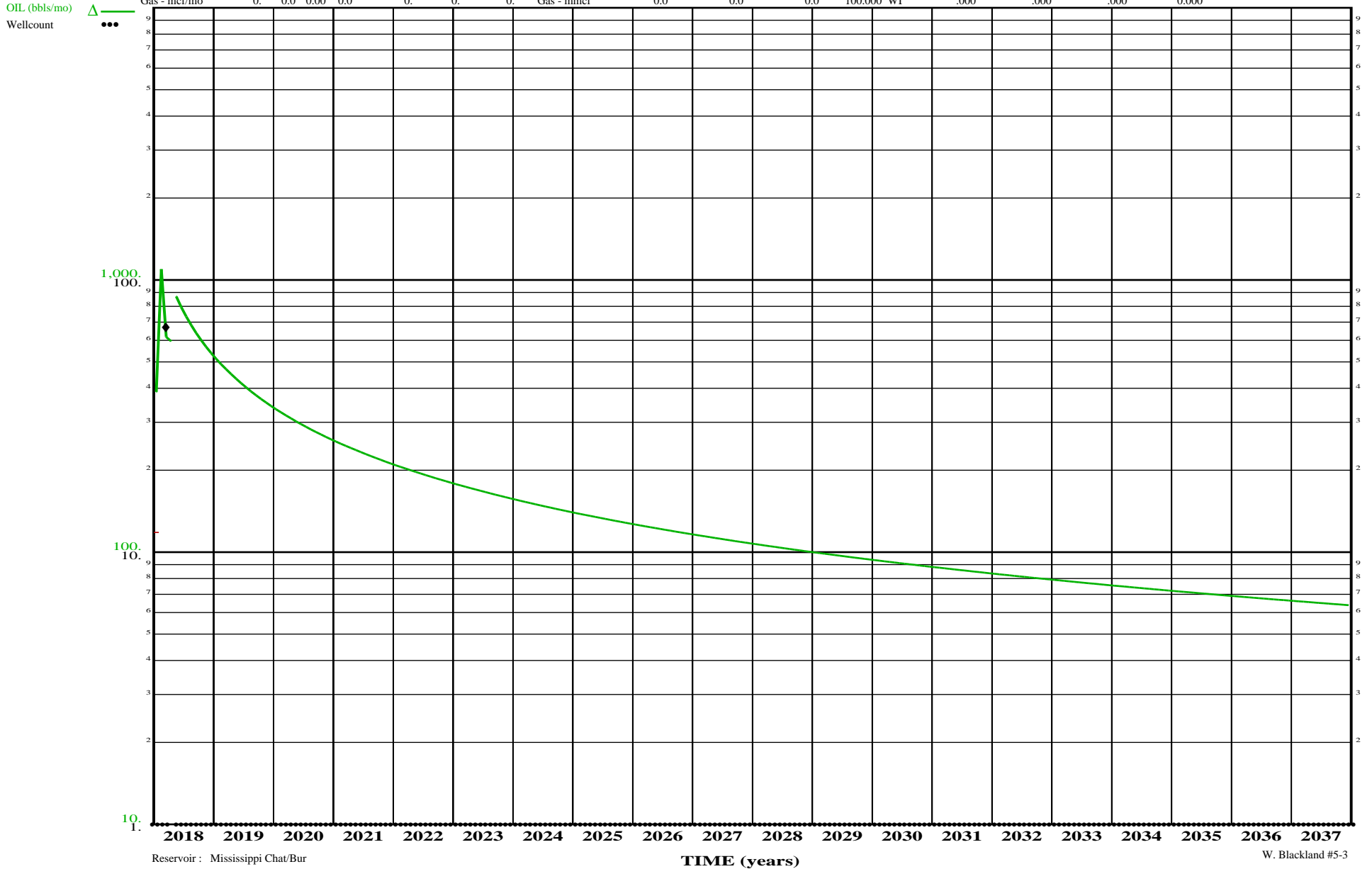
OK OIL  
 KC H:\cga8216\PhD \pdp.out  
 (DEFAULT) ASN 332

Performance Petroleum -- W. Blackland #5-3  
 (Mississippi Chat/Bur) FIELD  
 Osage COUNTY, OKLAHOMA

Reserve Category : PDP

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	47.33 Year Life (09/2065)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	869.	70.0	1.30	3.1	27.	0.	0.	2.7	51.1	53.8	78.000	NI	39.875	2,345.208	166.392	653.075	1,525.740	875.001
Gas - mcf/mo	0.	0.0	0.00	0.0	0.	0.	0.	0.0	0.0	0.0	100.000	W1	.000	.000	.000	0.000		



◆ ⊗ \* -- Annual Averages    Perfs: 0. - 0.    Status:  
 First Production 00/ 0    First Data 01/2018 Last Data 04/2018  
 06 / 08 / 2018    14 : 48 : 27    21    API:

Cawley, Gillespie & Associates, Inc.

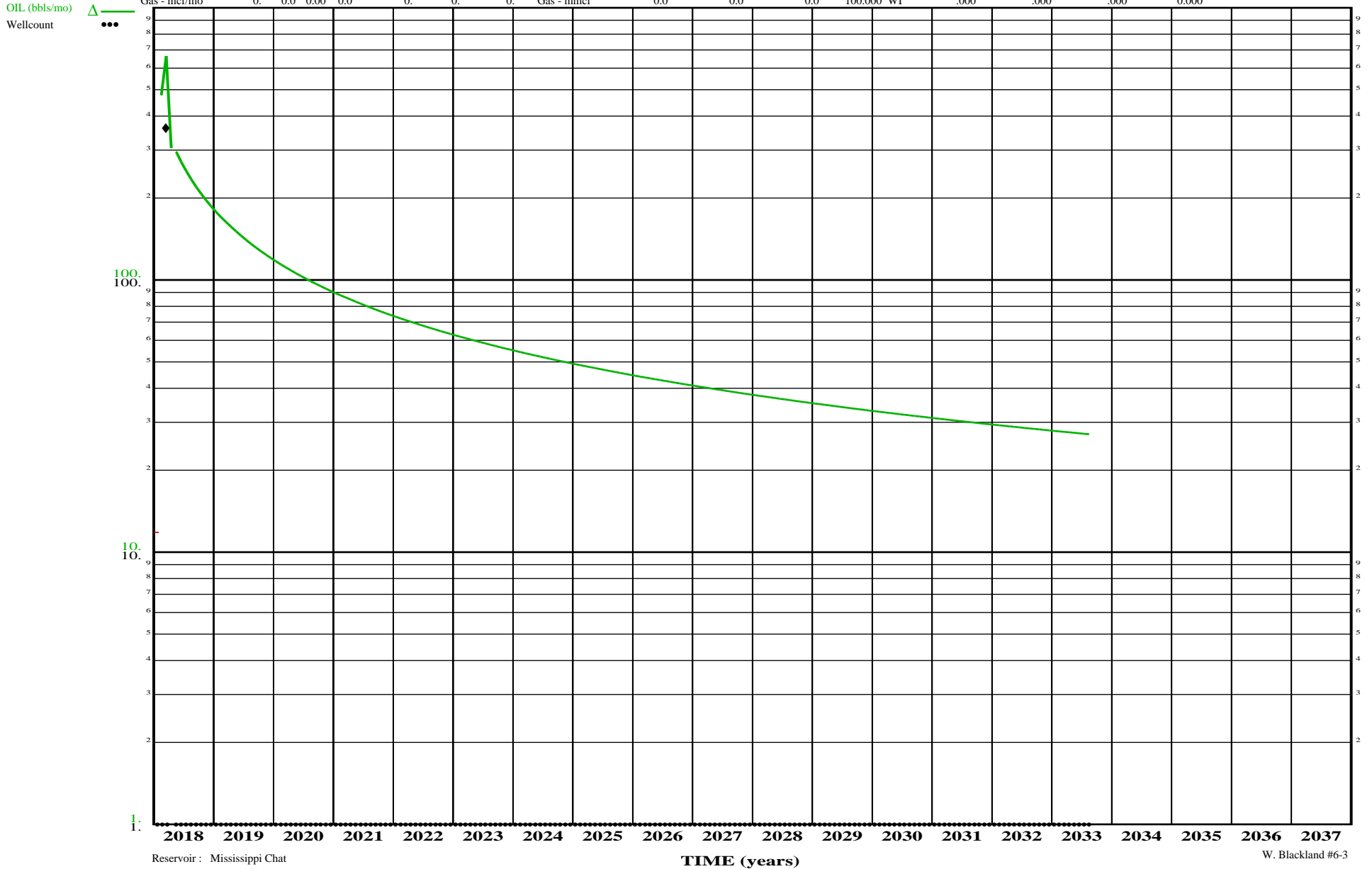
OK OIL  
 KC H:\cga8216\PhD \pdp.out  
 (DEFAULT) ASN 331

Performance Petroleum -- W. Blackland #6-3  
 (Mississippi Chat) FIELD  
 Osage COUNTY, OKLAHOMA

Reserve Category : PDP

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	15.38 Year Life (09/2033)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	295.	68.0	1.30	4.8	27.	0.	0.	1.4	11.7	13.1	78.000 NI	9.124	536.685	38,078	212.117	286.490	222.975	
Gas - mcf/mo	0.	0.0	0.00	0.0	0.	0.	0.	0.0	0.0	0.0	100.000 W1	.000	.000	.000	0.000			



◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
 First Production 00/ 0      First Data 02/2018 Last Data 04/2018  
 06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

OK OIL  
 KC H:\cga8216\PhD \pdp.out  
 (DEFAULT) ASN 333

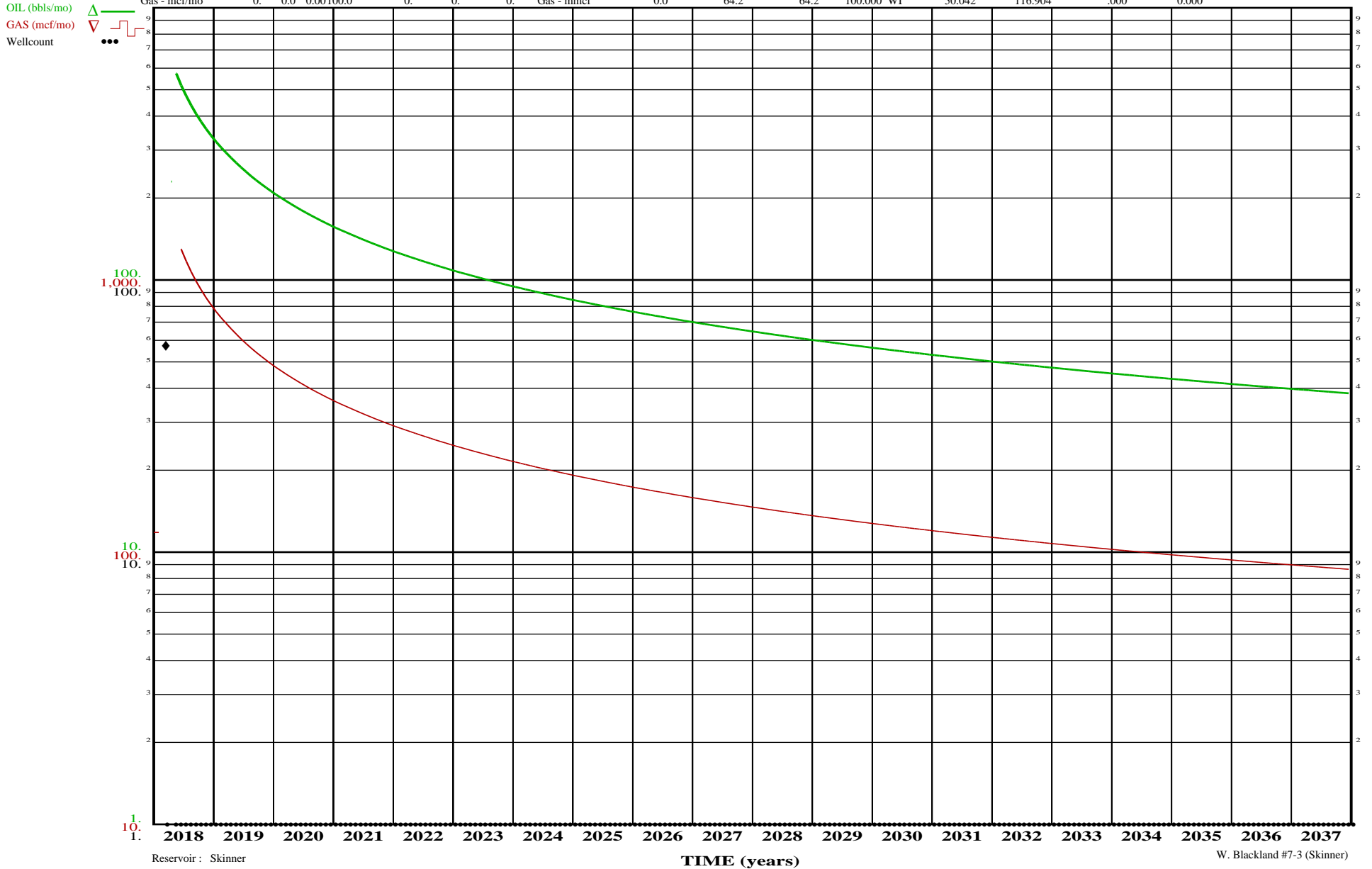
Performance Petroleum -- W. Blackland #7-3 (Skinner)  
(Skinner) FIELD

Reserve Category : PDP

Osage COUNTY, OKLAHOMA

As of 05/2018

	As of 05/2018				GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	36.34 Year Life (09/2054)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial			Final	Remaining Reserves							
Oil - bbls/mo	573.	74.7	1.30	100.0	0.		Oil - mbbls	0.2	28.5	28.8	78.000 NI	22.255	1,310.016	101.240	497.841	827.839	542.805
Gas - mcf/mo	0.	0.0	0.00	100.0	0.		Gas - mmcf	0.0	64.2	64.2	100.000 W1	50.042	116.904	,000	0.000		



Reservoir : Skinner

TIME (years)

W. Blackland #7-3 (Skinner)

◆ ⊗ \* -- Annual Averages    Perfs: 0 - 0    Status:  
 First Production 00/ 0    First Data 04/2018 Last Data 04/2018  
 06 / 08 / 2018    14 : 48 : 27    21    API:

Cawley, Gillespie & Associates, Inc.

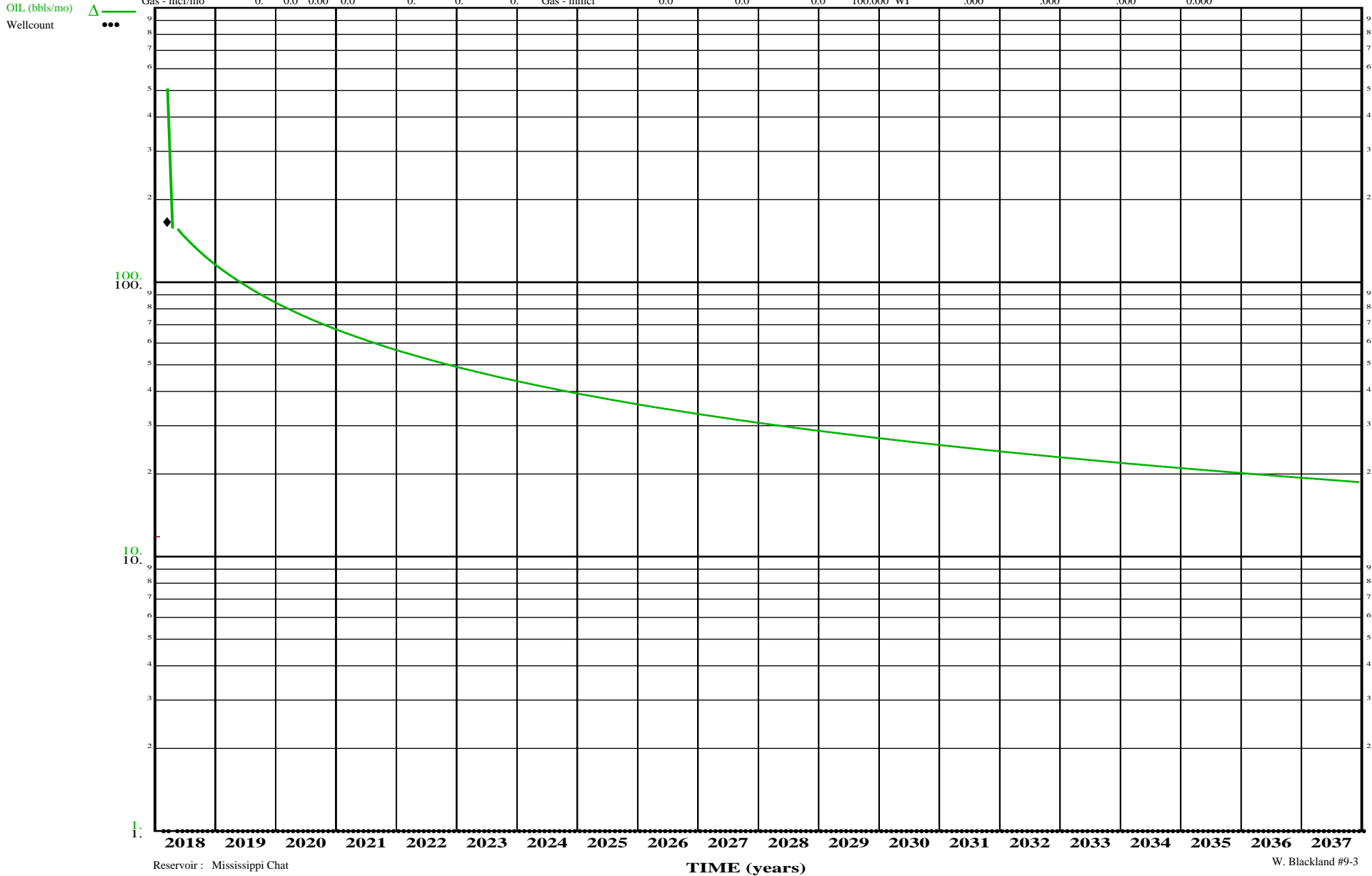
OK OIL  
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 (DEFAULT) ASN 334

Performance Petroleum -- W. Blackland #9-3  
 (Mississippi Chat) FIELD  
 Osage COUNTY, OKLAHOMA

Reserve Category : PDP

As of 05/2018

	As of 05/2018					GOR - scf/bbl		Oil - mbbls Gas - mmcf	04/2018 Cumulatives	39.99 Year Life (04/2058)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>	Initial	Final			Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	156.	45.1	1.30	88.2	0.			0.7	13.0	13.7	78.000 NI	10.131	593.954	42.141	548.550	3.263	115.165	
Gas - mcf/mo	0.	0.0	0.00	0.0				0.0	0.0	0.0	100.000 W1	.000	.000	.000	0.000			



Reservoir : Mississippi Chat

TIME (years)

W. Blackland #9-3

◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
 First Production 00/ 0      First Data 03/2018 Last Data 04/2018  
 06 / 08 / 2018      14 : 48 : 27      21      API:

Cawley, Gillespie & Associates, Inc.

OK OIL  
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 (DEFAULT) ASN 336



**Table I- PDBP**  
 Composite Reserve Estimates and Economic Forecasts  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Proved Developed Behind-Pipe Reserves  
 As of May 1, 2018

(1) End Mo-Year	(2) Gross Oil Production MMBLS	(3) Gross Gas Production MMCF	(4) Gross NGL Production MGals	(5) Net Oil Production MMBLS	(6) Net Gas Sales MMCF	(7) Net NGL Production MMBLS	(8) Avg Oil Price \$/BBL	(9) Avg Gas Price \$/MCF	(10) Avg NGL Price \$/Gal	
12-2018	6.9	4.9	.0	5.413	3.792	.000	-1.250	65.130	0.800	2.288
12-2019	7.1	5.6	.0	5.554	4.377	.000	-1.250	60.370	0.800	2.200
12-2020	4.5	3.8	.0	3.541	2.967	.000	-1.250	55.180	0.800	2.168
12-2021	3.4	3.0	.0	2.671	2.308	.000	-1.250	52.650	0.800	2.224
12-2022	2.8	2.5	.0	2.180	1.922	.000	-1.250	54.400	0.800	2.400
12-2023	2.4	2.1	.0	1.857	1.662	.000	-1.250	58.750	0.800	2.400
12-2024	2.1	1.9	.0	1.631	1.477	.000	-1.250	58.750	0.800	2.400
12-2025	1.9	1.7	.0	1.453	1.328	.000	-1.250	58.750	0.800	2.400
12-2026	1.7	1.6	.0	1.317	1.214	.000	-1.250	58.750	0.800	2.400
12-2027	1.5	1.4	.0	1.207	1.121	.000	-1.250	58.750	0.800	2.400
12-2028	1.4	1.3	.0	1.119	1.046	.000	-1.250	58.750	0.800	2.400
12-2029	1.3	1.3	.0	1.040	.977	.000	-1.250	58.750	0.800	2.400
12-2030	1.2	1.2	.0	.974	.920	.000	-1.250	58.750	0.800	2.400
12-2031	1.2	1.1	.0	.917	.871	.000	-1.250	58.750	0.800	2.400
12-2032	1.1	1.1	.0	.870	.829	.000	-1.250	58.750	0.800	2.400
12-2033	1.1	1.0	.0	.824	.785	.000	-1.250	58.750	0.800	2.400
12-2034	1.0	1.0	.0	.785	.746	.000	-1.250	58.750	0.800	2.400
12-2035	1.0	.9	.0	.750	.709	.000	-1.250	58.750	0.800	2.400
12-2036	.9	.9	.0	.720	.675	.000	-1.250	58.750	0.800	2.400
S Tot	44.6	38.1	.0	34.824	29.724	.000		58.897		2.319
After	14.8	11.8	.0	11.5	9.191	.000		58.750		2.400
Total	59.4	49.9	.0	46.367	38.915	.000		58.860		2.338
Cum Ult	.0	.0	.0							
Ult	59.4	49.9	.0							
(11) End Mo-Year	(12) Oil Revenue M\$	(13) Gas Revenue M\$	(14) NGL Revenue M\$	(15) Hedge Revenue M\$	(16) Other Revenue M\$	(17) Total Revenue M\$	(18) Production Taxes M\$	(19) Ad Valorem Taxes M\$	(20) \$/BOE6	
12-2018	352.549	8.675	.000	0.000	0.000	361.224	25.629	.000	2.387	
12-2019	335.283	9.630	.000	0.000	0.000	344.913	24.472	.000	4.393	
12-2020	195.372	6.433	.000	0.000	0.000	201.805	14.318	.000	6.840	
12-2021	140.639	5.133	.000	0.000	0.000	145.771	10.342	.000	9.032	
12-2022	118.601	4.612	.000	0.000	0.000	123.213	8.742	.000	11.038	
12-2023	109.122	3.988	.000	0.000	0.000	113.110	8.025	.000	12.931	
12-2024	95.837	3.544	.000	0.000	0.000	99.381	7.051	.000	14.701	
12-2025	85.365	3.187	.000	0.000	0.000	88.552	6.283	.000	16.484	
12-2026	77.372	2.913	.000	0.000	0.000	80.285	5.696	.000	18.167	
12-2027	70.915	2.689	.000	0.000	0.000	73.604	5.222	.000	19.802	
12-2028	65.751	2.509	.000	0.000	0.000	68.260	4.843	.000	21.339	
12-2029	61.071	2.344	.000	0.000	0.000	63.415	4.499	.000	22.956	
12-2030	57.229	2.208	.000	0.000	0.000	59.437	4.217	.000	24.480	
12-2031	53.901	2.090	.000	0.000	0.000	55.990	3.973	.000	25.975	
12-2032	51.123	1.989	.000	0.000	0.000	53.112	3.768	.000	27.372	
12-2033	48.405	1.885	.000	0.000	0.000	50.290	3.568	.000	28.907	
12-2034	46.111	1.791	.000	0.000	0.000	47.902	3.399	.000	30.356	
12-2035	44.053	1.701	.000	0.000	0.000	45.754	3.246	.000	31.798	
12-2036	42.308	1.620	.000	0.000	0.000	43.928	3.117	.000	33.147	
S Tot	2,051.005	68.943	.000	0.000	0.000	2,119.947	150.410	.000	12.852	
After	678.184	22.059	.000	0.000	0.000	700.243	49.682	.000	52.493	
Total	2,729.188	91.002	.000	0.000	0.000	2,820.190	200.093	.000	22.659	
(21) End Mo-Year	(22) Operating Expense M\$	(23) Gross Count	(24) Net Count	(25) Workover Expense M\$	(26) 3rd Party COPAS M\$	(27) Other Deductions M\$	(28) Investment M\$	(29) Future Net Cash Flow M\$	(30) Cumulative Cash Flow M\$	(31) Cum.Cash Flow Disc.@ 10.0% M\$
12-2018	14.431	2	2.0	0.000	0.000	0.000	80.000	241.165	241.165	230.843
12-2019	27.600	2	2.0	0.000	0.000	0.000	.000	292.842	534.007	492.951
12-2020	27.600	2	2.0	0.000	0.000	0.000	.000	159.887	693.894	622.203
12-2021	27.600	2	2.0	0.000	0.000	0.000	.000	107.829	801.723	701.036
12-2022	27.600	2	2.0	0.000	0.000	0.000	.000	86.871	888.593	758.504
12-2023	27.600	2	2.0	0.000	0.000	0.000	.000	77.485	966.078	804.891
12-2024	27.600	2	2.0	0.000	0.000	0.000	.000	64.730	1,030.808	839.962
12-2025	27.600	2	2.0	0.000	0.000	0.000	.000	54.670	1,085.477	866.768
12-2026	27.600	2	2.0	0.000	0.000	0.000	.000	46.988	1,132.466	887.622
12-2027	27.600	2	2.0	0.000	0.000	0.000	.000	40.782	1,173.248	904.006
12-2028	27.600	2	2.0	0.000	0.000	0.000	.000	35.817	1,209.065	917.031
12-2029	27.600	2	2.0	0.000	0.000	0.000	.000	31.316	1,240.381	927.337
12-2030	27.600	2	2.0	0.000	0.000	0.000	.000	27.620	1,268.001	935.566
12-2031	27.600	2	2.0	0.000	0.000	0.000	.000	24.418	1,292.418	942.151
12-2032	27.600	2	2.0	0.000	0.000	0.000	.000	21.744	1,314.162	947.459
12-2033	27.600	2	2.0	0.000	0.000	0.000	.000	19.122	1,333.284	951.684
12-2034	27.600	2	2.0	0.000	0.000	0.000	.000	16.903	1,350.187	955.065
12-2035	27.600	2	2.0	0.000	0.000	0.000	.000	14.908	1,365.095	957.764
12-2036	27.600	2	2.0	0.000	0.000	0.000	.000	13.212	1,378.306	959.929
S Tot	511.231			0.000	0.000	0.000	80.000	1,378.306	1,378.306	959.929
After	686.371			0.000	0.000	0.000	.000	-35.810	1,342.497	964.981
Total	1,197.601			0.000	0.000	0.000	80.000	1,342.497	1,342.497	964.981
Strip Pricing (5-01-18)									Percent	Cum. Disc.
Year	WTI Cushing Oil \$/STB			Henry Hub Gas \$/MMBTU						
2018	66.38			2.86					5.00	1,136.037
2019	61.62			2.75					8.00	1,026.800
2020	56.43			2.71					10.00	964.981
2021	53.90			2.78					12.00	910.887
2022	55.65			3.00					15.00	841.685
2023	60.00			3.00					20.00	750.119
Thereafter	Flat			Flat						
Cap	60.00			3.00						

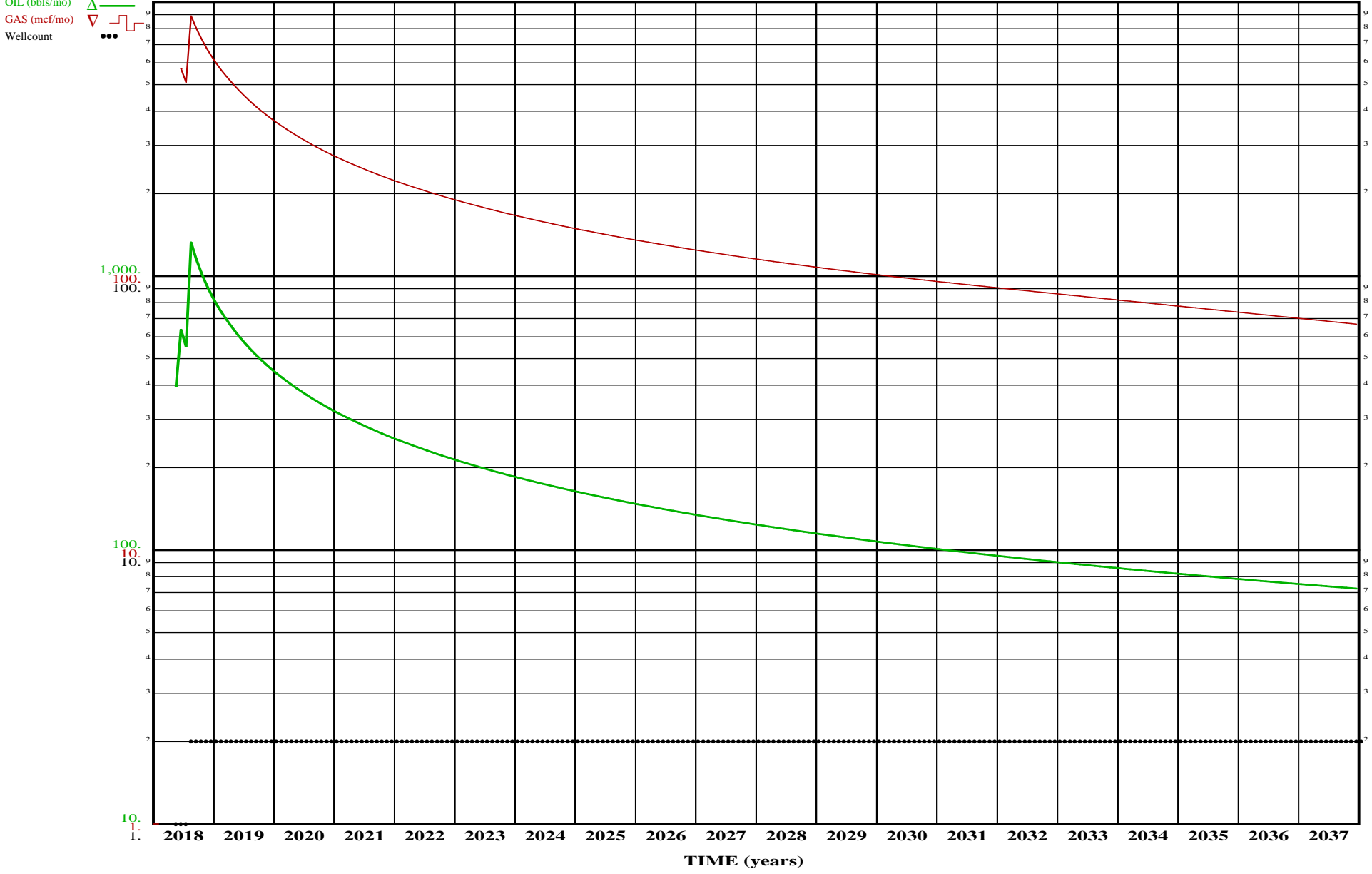
8 Months in first year    50.001 Year Life (05/2068)

THESE DATA ARE PART OF A CG&A REPORT AND ARE SUBJECT TO THE CONDITIONS IN THE TEXT OF THE REPORT.  
 TEXAS REGISTERED ENGINEERING FIRM F-693.

*Summary Plot- PDBP*  
*Bandolier Energy, LLC Interests*  
*Certain Properties in Oklahoma - Spyglass/Personia Concession*  
*Proved Developed Behind-Pipe Reserves*

*Gross Production*

	Start Date 05/2018					04/2018 Cumulatives	50.00 Year Life (05/2068)		Current Interest %	NetOilProd. NetGasSales mmbbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>		Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	396.	N.A.	0.00	3.7	13.	Oil - mbbls	0.0	59.4	59.4	46.367	2,729.188	200,093	1,197,601	1,342,497	964,981
Gas - mcf/mo	572.	74.4	0.00	5.7	8.	Gas - mmcf	0.0	49.9	49.9	38.915	91.002	.000	80,000		



◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
 First Production 00/ 0      First Data 00/ 0      Last Data 00/ 0  
 06 / 08 / 2018      14 : 48 : 28      21      API:

*Cawley, Gillespie & Associates, Inc.*

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**SUMMARY**

Table II- PDBP  
 Lease Reserve Summary  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Proved Developed Behind-Pipe Reserves  
 As of May 1, 2018

OPERATOR							Current	WellCnt	Ultimate	Gross	Net	Oil Revenue	Prod Tax	Expenses	Future Net	Cash Flow	
LEASE NAME							Interest	Life	Recovery	Reserves	Reserves	Gas Revenue	Adv. Tax	Investments	Rate of Return	Disc. @ 10.0	
Table	Class	Major	Well No.	Start Date	ASN	%			MBBL / MMCF		MS / MS	MS / MS	MS / MS	MS / %	MS / Yrs		
(MISS. CHAT) -- OSAGE COUNTY, OKLAHOMA																	
PERFORMANCE PETROLEUM																	
W. BLACKLAND #2-3 (CHAT)							78.0000	NI	1	28.4	28.4	22.1	1,305.2	96.4	689.4	542.8	444.5
1	PDBP	Oil		05/18	340	100.0000	WI	50.0	29.3	29.3	22.8	53.4	0.0	30.0	100.0	0.12	
(SKINNER) -- OSAGE COUNTY, OKLAHOMA																	
PERFORMANCE PETROLEUM																	
W. BLACKLAND #7-3 (MISS. CHAT)							78.0000	NI	1	31.1	31.1	24.2	1,424.0	103.7	508.2	799.7	520.5
2	PDBP	Oil		08/18	341	100.0000	WI	37.0	20.6	20.6	16.1	37.6	0.0	50.0	100.0	0.36	
<b>GRAND TOTAL</b>									2	59.4	59.4	46.4	2,729.2	200.1	1,197.6	1,342.5	965.0
										49.9	49.9	38.9	91.0	0.0	80.0		

THESE DATA ARE PART OF A CG&A REPORT AND ARE SUBJECT TO THE CONDITIONS IN THE TEXT OF THE REPORT.  
 TEXAS REGISTERED ENGINEERING FIRM F-693.

Scenario: .118

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Table I- PUD  
 Composite Reserve Estimates and Economic Forecasts  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Proved Undeveloped Reserves  
 As of May 1, 2018

(1) End Mo-Year	(2) Gross Oil Production MMBLS	(3) Gross Gas Production MMCF	(4) Gross NGL Production MGals	(5) Net Oil Production MMBLS	(6) Net Gas Sales MMCF	(7) Net NGL Production MMBLS	(8) Avg Oil Price \$/BBL	(9) Avg Gas Price \$/MCF	(10) Avg NGL Price \$/Gal	
12-2018	23.4	27.5	.0	18.256	21.424	.000	-1.250	65.130	0.800	2.288
12-2019	52.4	68.4	.0	40.903	53.367	.000	-1.250	60.370	0.800	2.200
12-2020	42.1	54.8	.0	32.845	42.728	.000	-1.250	55.180	0.800	2.168
12-2021	28.4	39.7	.0	22.190	30.958	.000	-1.250	52.600	0.800	2.224
12-2022	22.4	32.1	.0	17.500	25.025	.000	-1.250	54.450	0.800	2.400
12-2023	18.8	27.3	.0	14.674	21.275	.000	-1.250	58.750	0.800	2.400
12-2024	16.4	24.0	.0	12.779	18.697	.000	-1.250	58.750	0.800	2.400
12-2025	14.5	21.4	.0	11.329	16.683	.000	-1.250	58.750	0.800	2.400
12-2026	13.1	19.4	.0	10.241	15.156	.000	-1.250	58.750	0.800	2.400
12-2027	12.0	17.9	.0	9.374	13.926	.000	-1.250	58.750	0.800	2.400
12-2028	11.1	16.6	.0	8.686	12.945	.000	-1.250	58.750	0.800	2.400
12-2029	10.3	15.5	.0	8.068	12.054	.000	-1.250	58.750	0.800	2.400
12-2030	9.7	14.5	.0	7.563	11.324	.000	-1.250	58.750	0.800	2.400
12-2031	9.1	13.7	.0	7.127	10.691	.000	-1.250	58.750	0.800	2.400
12-2032	8.7	13.0	.0	6.765	10.164	.000	-1.250	58.750	0.800	2.400
12-2033	8.2	12.4	.0	6.411	9.639	.000	-1.250	58.750	0.800	2.400
12-2034	7.8	11.8	.0	6.113	9.189	.000	-1.250	58.750	0.800	2.400
12-2035	7.5	11.3	.0	5.846	8.775	.000	-1.250	58.750	0.800	2.400
12-2036	7.2	10.8	.0	5.620	8.414	.000	-1.250	58.750	0.800	2.400
S Tot	323.5	451.8	.0	252.291	352.435	.000		58.171		2.319
After	121.1	162.1	.0	94.4	126.438	.000		58.750		2.400
Total	444.5	613.9	.0	346.732	478.873	.000		58.329		2.341
Cum Ult	.0	.0	.0							
Ult	444.5	613.9	.0							
(11) End Mo-Year	(12) Oil Revenue M\$	(13) Gas Revenue M\$	(14) NGL Revenue M\$	(15) Hedge Revenue M\$	(16) Other Revenue M\$	(17) Total Revenue M\$	(18) Production Taxes M\$	(19) Ad Valorem Taxes M\$	(20) \$/BOE6	
12-2018	1,189.022	49.019	.000	0.000	0.000	1,238.040	87.839	.000	1.141	
12-2019	2,469.341	117.408	.000	0.000	0.000	2,586.749	183.530	.000	2.044	
12-2020	1,812.400	92.635	.000	0.000	0.000	1,905.034	135.162	.000	3.453	
12-2021	1,168.327	68.852	.000	0.000	0.000	1,237.178	87.778	.000	5.046	
12-2022	952.012	60.060	.000	0.000	0.000	1,012.072	71.807	.000	6.368	
12-2023	862.071	51.061	.000	0.000	0.000	913.132	64.787	.000	7.574	
12-2024	750.742	44.872	.000	0.000	0.000	795.614	56.449	.000	8.682	
12-2025	665.565	40.040	.000	0.000	0.000	705.605	50.063	.000	9.781	
12-2026	601.669	36.374	.000	0.000	0.000	638.043	45.269	.000	10.809	
12-2027	550.715	33.421	.000	0.000	0.000	584.136	41.444	.000	11.800	
12-2028	510.328	31.067	.000	0.000	0.000	541.395	38.412	.000	12.726	
12-2029	473.996	28.929	.000	0.000	0.000	502.926	35.683	.000	13.695	
12-2030	444.323	27.177	.000	0.000	0.000	471.500	33.453	.000	14.603	
12-2031	418.726	25.659	.000	0.000	0.000	444.385	31.529	.000	15.490	
12-2032	397.444	24.393	.000	0.000	0.000	421.836	29.929	.000	16.314	
12-2033	376.641	23.135	.000	0.000	0.000	399.775	28.364	.000	17.212	
12-2034	359.134	22.054	.000	0.000	0.000	381.188	27.045	.000	18.052	
12-2035	343.450	21.061	.000	0.000	0.000	364.511	25.862	.000	18.882	
12-2036	330.190	20.195	.000	0.000	0.000	350.384	24.860	.000	19.651	
S Tot	14,676.097	817.410	.000	0.000	0.000	15,493.507	1,099.264	.000	7.950	
After	5,548.396	303.451	.000	0.000	0.000	5,851.848	415.189	.000	29.193	
Total	20,224.493	1,120.861	.000	0.000	0.000	21,345.354	1,514.453	.000	13.703	
(21) End Mo-Year	(22) Operating Expense M\$	(23) Gross Count	(24) Net	(25) Workover Expense M\$	(26) 3rd Party COPAS M\$	(27) Other Deductions M\$	(28) Investment M\$	(29) Future Net Cash Flow M\$	(30) Cumulative Cash Flow M\$	(31) Cum.Cash Flow Disc.@ 10.0% M\$
12-2018	24,910	7	7.0	0.000	0.000	0.000	1,586.123	-460.832	-460.832	-462.189
12-2019	101,775	10	10.0	0.000	0.000	0.000	679.767	1,621.677	1,160.845	1,008.367
12-2020	138,000	10	10.0	0.000	0.000	0.000	.000	1,631.872	2,792.717	2,329.612
12-2021	138,000	10	10.0	0.000	0.000	0.000	.000	1,011.400	3,804.118	3,069.234
12-2022	138,000	10	10.0	0.000	0.000	0.000	.000	802.266	4,606.384	3,599.967
12-2023	138,000	10	10.0	0.000	0.000	0.000	.000	710.345	5,316.729	4,025.209
12-2024	138,000	10	10.0	0.000	0.000	0.000	.000	601.166	5,917.894	4,350.884
12-2025	138,000	10	10.0	0.000	0.000	0.000	.000	517.543	6,435.437	4,604.617
12-2026	138,000	10	10.0	0.000	0.000	0.000	.000	454.774	6,890.211	4,806.430
12-2027	138,000	10	10.0	0.000	0.000	0.000	.000	404.692	7,294.903	4,968.991
12-2028	138,000	10	10.0	0.000	0.000	0.000	.000	364.983	7,659.886	5,101.689
12-2029	138,000	10	10.0	0.000	0.000	0.000	.000	329.243	7,989.129	5,210.029
12-2030	138,000	10	10.0	0.000	0.000	0.000	.000	300.047	8,289.176	5,299.404
12-2031	138,000	10	10.0	0.000	0.000	0.000	.000	274.856	8,564.032	5,373.516
12-2032	138,000	10	10.0	0.000	0.000	0.000	.000	253.907	8,817.939	5,435.487
12-2033	138,000	10	10.0	0.000	0.000	0.000	.000	233.411	9,051.350	5,487.047
12-2034	138,000	10	10.0	0.000	0.000	0.000	.000	216.143	9,267.493	5,530.269
12-2035	138,000	10	10.0	0.000	0.000	0.000	.000	200.649	9,468.142	5,566.590
12-2036	138,000	10	10.0	0.000	0.000	0.000	.000	187.525	9,655.667	5,597.318
S Tot	2,472.685			0.000	0.000	0.000	2,265.890	9,655.667	9,655.667	5,597.318
After	3,372.239			0.000	0.000	0.000	.000	2,064.420	11,720.087	5,758.968
Total	5,844.924			0.000	0.000	0.000	2,265.890	11,720.087	11,720.087	5,758.968
Strip Pricing (5-01-18)									Percent	Cum. Disc.
Year	WTI Cushing Oil \$/STB								5.00	7,738.005
2018	66.38								8.00	6,418.327
2019	61.62								10.00	5,758.968
2020	56.43								12.00	5,217.847
2021	53.90								15.00	4,563.716
2022	55.65								20.00	3,750.720
2023	60.00									
Thereafter	Flat									
Cap	60.00									

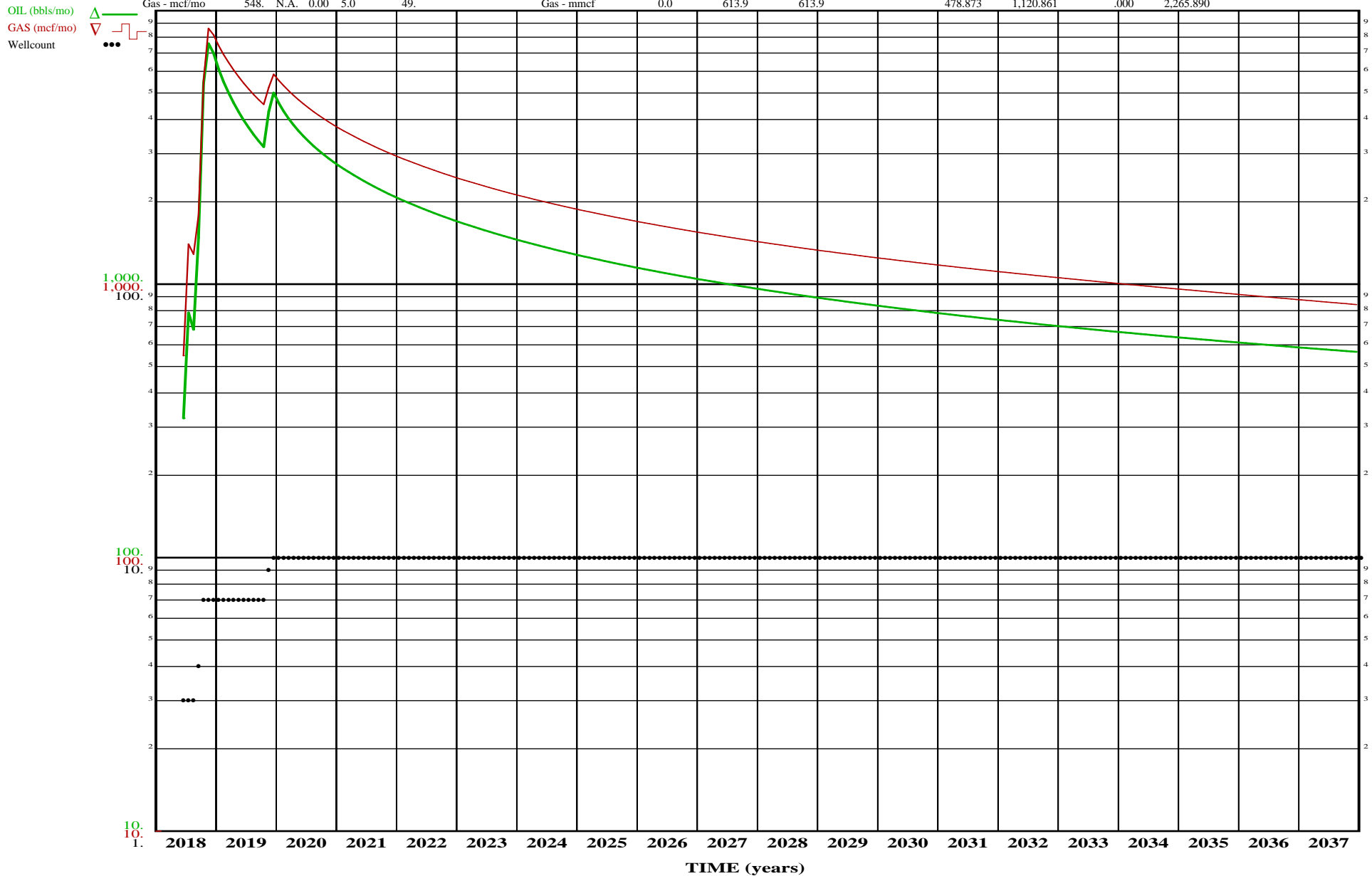
8 Months in first year 50.001 Year Life (05/2068)

THESE DATA ARE PART OF A CG&A REPORT AND ARE SUBJECT TO THE CONDITIONS IN THE TEXT OF THE REPORT.  
 TEXAS REGISTERED ENGINEERING FIRM F-693.

Summary Plot- PUD  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Proved Undeveloped Reserves

Gross Production

	Start Date 06/2018					04/2018 Cumulatives	50.00 Year Life (05/2068)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>		Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	324.	N.A.	0.00	3.0	91.	Oil - mbbls	0.0	444.5	444.5	346.732	20,224.493	1,514.453	5,844.924	11,720.087	5,758.968
Gas - mcf/mo	548.	N.A.	0.00	5.0	49.	Gas - mmcf	0.0	613.9	613.9	478.873	1,120.861	,000	2,265.890		



◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
 First Production 00/ 0      First Data 00/ 0      Last Data 00/ 0  
 06 / 08 / 2018      14 : 48 : 31      21      API:

Table II- PUD  
 Lease Reserve Summary  
 Bandolier Energy, LLC Interests  
 Certain Properties in Oklahoma - Spyglass/Personia Concession  
 Proved Undeveloped Reserves  
 As of May 1, 2018

OPERATOR				Current	WellCnt	Ultimate	Gross	Net	Oil Revenue	Prod Tax	Expenses	Future Net	Cash Flow		
LEASE NAME				Interest	Life	Recovery	Reserves	Reserves	Gas Revenue	Adv. Tax	Investments	Cash Flow	Disc. @ 10.0		
Table	Class	Major	Well No.	%			MBBL / MFCF		MS / MS	MS / MS	MS / MS	MS / %	MS / Yrs		
Table	Class	Major	Well No.	Start Date	ASN										
(MISSISSIPPI CHAT) -- OSAGE COUNTY, OKLAHOMA															
PERFORMANCE PETROLEUM															
	1	PUD	Oil	10/18	355	78.0000 NI 100.0000 WI	1 40.7	35.8 88.6	35.8 88.6	27.9 69.1	1,631.7 161.8	127.3 0.0	560.7 226.6	879.0 100.0	429.8 1.17
	2	PUD	Oil	10/18	356	78.0000 NI 100.0000 WI	1 40.7	35.8 88.6	35.8 88.6	27.9 69.1	1,630.6 161.8	127.2 0.0	560.7 226.6	878.0 99.0	427.6 1.20
	3	PUD	Oil	06/18	326	78.0000 NI 100.0000 WI	1 40.7	35.8 88.6	35.8 88.6	27.9 69.1	1,641.9 161.9	128.0 0.0	560.7 226.6	888.5 100.0	452.3 0.84
	4	PUD	Oil	10/18	354	78.0000 NI 100.0000 WI	1 40.7	35.8 88.6	35.8 88.6	27.9 69.1	1,629.5 161.8	127.1 0.0	560.7 226.6	877.0 99.0	425.5 1.23
	5	PUD	Oil	11/19	357	78.0000 NI 100.0000 WI	1 37.6	32.9 27.8	32.9 27.8	25.7 21.7	1,477.5 50.8	108.4 0.0	518.2 226.6	675.1 69.0	282.4 2.54
	6	PUD	Oil	11/19	358	78.0000 NI 100.0000 WI	1 37.6	32.9 27.8	32.9 27.8	25.7 21.7	1,476.3 50.8	108.4 0.0	518.2 226.6	674.1 68.0	280.3 2.58
	7	PUD	Oil	12/19	359	78.0000 NI 100.0000 WI	1 37.3	31.9 27.8	31.9 27.8	24.9 21.7	1,432.5 50.8	105.2 0.0	514.3 226.6	637.1 59.0	254.7 2.81
(BURGESS / CHAT) -- OSAGE COUNTY, OKLAHOMA															
PERFORMANCE PETROLEUM															
	8	PUD	Oil	09/18	344	78.0000 NI 100.0000 WI	1 49.7	67.9 58.7	67.9 58.7	53.0 45.8	3,107.0 107.0	228.0 0.0	684.6 226.6	2,074.8 100.0	1,078.6 0.62
	9	PUD	Oil	09/18	345	78.0000 NI 100.0000 WI	1 49.7	67.9 58.7	67.9 58.7	53.0 45.8	3,104.4 107.0	227.8 0.0	684.2 226.6	2,072.7 100.0	1,073.8 0.65
	10	PUD	Oil	11/18	346	78.0000 NI 100.0000 WI	1 49.5	67.8 58.7	67.8 58.7	52.9 45.8	3,093.1 106.9	227.0 0.0	682.7 226.6	2,063.7 100.0	1,053.9 0.76
<b>GRAND TOTAL</b>							<b>10</b>	<b>444.5</b> <b>613.9</b>	<b>444.5</b> <b>613.9</b>	<b>346.7</b> <b>478.9</b>	<b>20,224.5</b> <b>1,120.9</b>	<b>1,514.5</b> <b>0.0</b>	<b>5,844.9</b> <b>2,265.9</b>	<b>11,720.1</b>	<b>5,759.0</b>

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 TEXAS REGISTERED ENGINEERING FIRM F-693.

Scenario: 1.172

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Table I- PROB  
 Composite Reserve Estimates and Economic Forecasts  
 Bandolier Energy, LLC Interests  
 Certain Properties in Osage County, Oklahoma  
 Probable Undeveloped Reserves  
 As of May 1, 2018

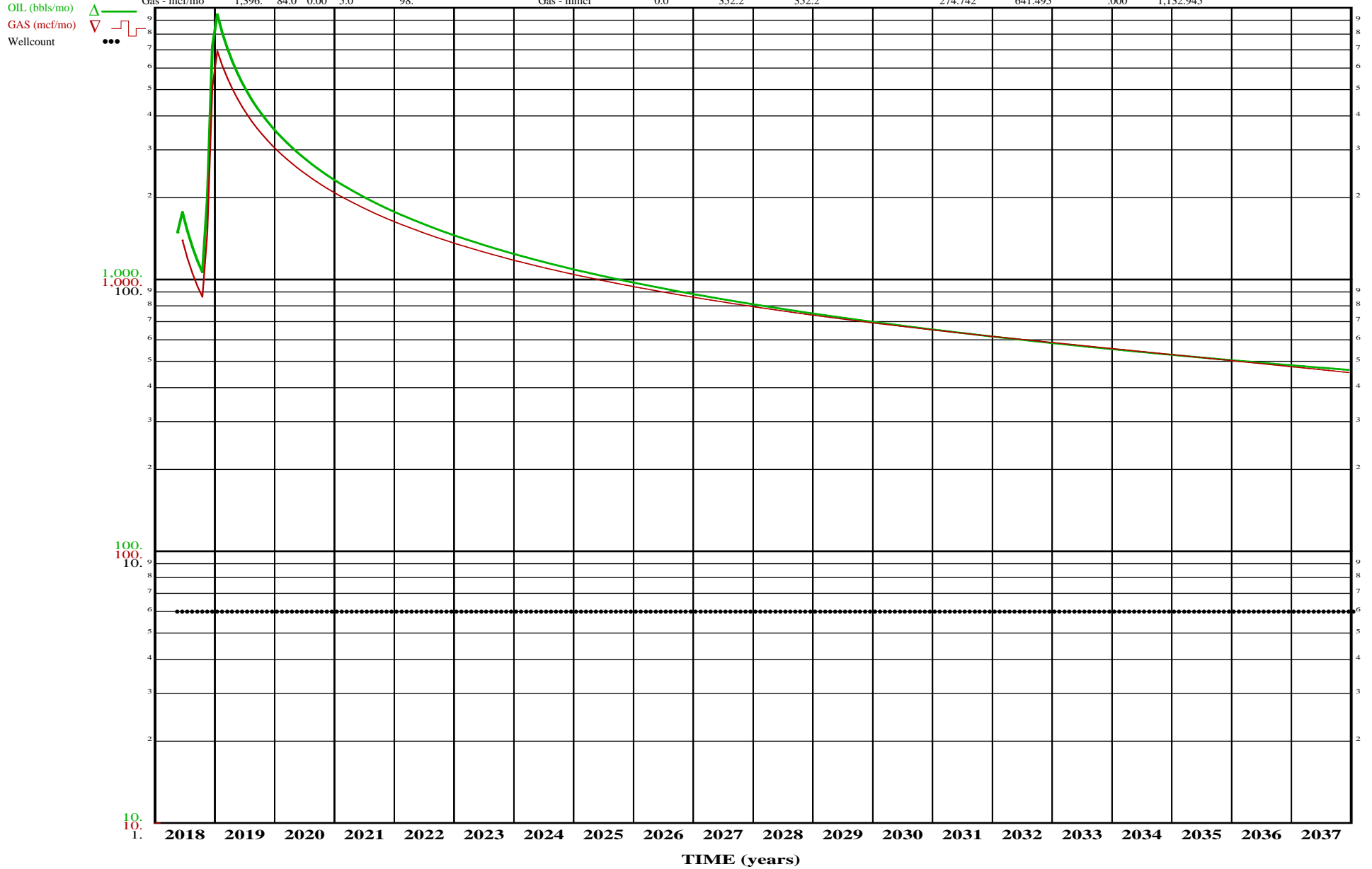
(1) End Mo-Year	(2) Gross Oil Production MMBLS	(3) Gross Gas Production MMCF	(4) Gross NGL Production MGals	(5) Net Oil Production MMBLS	(6) Net Gas Sales MMCF	(7) Net NGL Production MMBLS	(8) Avg Oil Price \$/BBL	(9) Avg Gas Price \$/MCF	(10) Avg NGL Price \$/Gal	
12-2018	17.7	12.1	.0	13.791	9.463	.000	-1.250	65.130	0.800	2.288
12-2019	67.1	53.7	.0	52.335	41.866	.000	-1.250	60.370	0.800	2.200
12-2020	34.1	30.0	.0	26.604	23.401	.000	-1.250	55.180	0.800	2.168
12-2021	24.2	22.0	.0	18.900	17.186	.000	-1.250	52.650	0.800	2.224
12-2022	19.2	17.8	.0	14.986	13.909	.000	-1.250	54.400	0.800	2.400
12-2023	16.1	15.2	.0	12.551	11.823	.000	-1.250	58.750	0.800	2.400
12-2024	14.0	13.3	.0	10.898	10.387	.000	-1.250	58.750	0.800	2.400
12-2025	12.3	11.9	.0	9.629	9.266	.000	-1.250	58.750	0.800	2.400
12-2026	11.1	10.8	.0	8.674	8.417	.000	-1.250	58.750	0.800	2.400
12-2027	10.1	9.9	.0	7.913	7.733	.000	-1.250	58.750	0.800	2.400
12-2028	9.4	9.2	.0	7.309	7.188	.000	-1.250	58.750	0.800	2.400
12-2029	8.7	8.6	.0	6.768	6.694	.000	-1.250	58.750	0.800	2.400
12-2030	8.1	8.1	.0	6.326	6.288	.000	-1.250	58.750	0.800	2.400
12-2031	7.6	7.6	.0	5.945	5.938	.000	-1.250	58.750	0.800	2.400
12-2032	7.2	7.2	.0	5.628	5.645	.000	-1.250	58.750	0.800	2.400
12-2033	6.8	6.9	.0	5.320	5.347	.000	-1.250	58.750	0.800	2.400
12-2034	6.5	6.5	.0	5.061	5.080	.000	-1.250	58.750	0.800	2.400
12-2035	6.2	6.2	.0	4.829	4.826	.000	-1.250	58.750	0.800	2.400
12-2036	5.9	5.9	.0	4.633	4.597	.000	-1.250	58.750	0.800	2.400
S Tot	292.4	262.9	.0	228.101	205.054	.000		58.300		2.313
After	113.5	89.3	.0	88.5	69.689	.000		58.750		2.400
Total	406.0	352.2	.0	316.651	274.742	.000		58.426		2.335
Cum	.0	.0	.0							
Ult	406.0	352.2	.0							
(11) End Mo-Year	(12) Oil Revenue M\$	(13) Gas Revenue M\$	(14) NGL Revenue M\$	(15) Hedge Revenue M\$	(16) Other Revenue M\$	(17) Total Revenue M\$	(18) Production Taxes M\$	(19) Ad Valorem Taxes M\$	(20) \$/BOE6	
12-2018	898.205	21.651	.000	0.000	0.000	919.856	65.264	.000	.848	
12-2019	3,159.456	92.105	.000	0.000	0.000	3,251.561	230.698	.000	1.396	
12-2020	1,468.020	50.732	.000	0.000	0.000	1,518.752	107.755	.000	2.714	
12-2021	995.091	38.221	.000	0.000	0.000	1,033.312	73.313	.000	3.804	
12-2022	815.248	33.382	.000	0.000	0.000	848.629	60.210	.000	4.785	
12-2023	737.346	28.376	.000	0.000	0.000	765.722	54.328	.000	5.702	
12-2024	640.251	24.929	.000	0.000	0.000	665.180	47.195	.000	6.556	
12-2025	565.686	22.239	.000	0.000	0.000	587.925	41.713	.000	7.411	
12-2026	509.617	20.200	.000	0.000	0.000	529.817	37.590	.000	8.217	
12-2027	464.893	18.559	.000	0.000	0.000	483.452	34.301	.000	8.998	
12-2028	429.414	17.251	.000	0.000	0.000	446.665	31.691	.000	9.733	
12-2029	397.622	16.065	.000	0.000	0.000	413.686	29.351	.000	10.503	
12-2030	371.649	15.092	.000	0.000	0.000	386.742	27.439	.000	11.229	
12-2031	349.277	14.250	.000	0.000	0.000	363.527	25.792	.000	11.940	
12-2032	330.658	13.547	.000	0.000	0.000	344.206	24.421	.000	12.605	
12-2033	312.573	12.833	.000	0.000	0.000	325.406	23.088	.000	13.330	
12-2034	297.341	12.192	.000	0.000	0.000	309.533	21.961	.000	14.015	
12-2035	283.715	11.583	.000	0.000	0.000	295.298	20.951	.000	14.698	
12-2036	272.174	11.033	.000	0.000	0.000	283.207	20.094	.000	15.336	
S Tot	13,298.234	474.242	.000	0.000	0.000	13,772.476	977.157	.000	5.732	
After	5,202.309	167.253	.000	0.000	0.000	5,369.562	380.970	.000	25.897	
Total	18,500.543	641.495	.000	0.000	0.000	19,142.038	1,358.128	.000	11.305	
(21) End Mo-Year	(22) Operating Expense M\$	(23) Gross Count	(24) Net	(25) Workover Expense M\$	(26) 3rd Party COPAS M\$	(27) Other Deductions M\$	(28) Investment M\$	(29) Future Net Cash Flow M\$	(30) Cumulative Cash Flow M\$	(31) Cum.Cash Flow Disc.@ 10.0% M\$
12-2018	13.038	6	6.0	0.000	0.000	0.000	1,132.945	-291.391	-291.391	-266.195
12-2019	82.800	6	6.0	0.000	0.000	0.000	.000	2,938.063	2,646.672	2,372.315
12-2020	82.800	6	6.0	0.000	0.000	0.000	.000	1,328.197	3,974.869	3,446.540
12-2021	82.800	6	6.0	0.000	0.000	0.000	.000	877.199	4,852.067	4,087.901
12-2022	82.800	6	6.0	0.000	0.000	0.000	.000	705.619	5,557.687	4,554.662
12-2023	82.800	6	6.0	0.000	0.000	0.000	.000	628.594	6,186.280	4,930.947
12-2024	82.800	6	6.0	0.000	0.000	0.000	.000	535.185	6,721.466	5,220.868
12-2025	82.800	6	6.0	0.000	0.000	0.000	.000	463.412	7,184.878	5,448.056
12-2026	82.800	6	6.0	0.000	0.000	0.000	.000	409.426	7,594.304	5,629.741
12-2027	82.800	6	6.0	0.000	0.000	0.000	.000	366.351	7,960.654	5,776.898
12-2028	82.800	6	6.0	0.000	0.000	0.000	.000	332.174	8,292.828	5,897.664
12-2029	82.800	6	6.0	0.000	0.000	0.000	.000	301.535	8,594.363	5,996.884
12-2030	82.800	6	6.0	0.000	0.000	0.000	.000	276.502	8,870.866	6,079.244
12-2031	82.800	6	6.0	0.000	0.000	0.000	.000	254.935	9,125.800	6,147.984
12-2032	82.800	6	6.0	0.000	0.000	0.000	.000	236.984	9,362.785	6,205.822
12-2033	82.800	6	6.0	0.000	0.000	0.000	.000	219.519	9,582.303	6,254.313
12-2034	82.800	6	6.0	0.000	0.000	0.000	.000	204.772	9,787.075	6,295.260
12-2035	82.800	6	6.0	0.000	0.000	0.000	.000	191.547	9,978.622	6,329.934
12-2036	82.800	6	6.0	0.000	0.000	0.000	.000	180.314	10,158.935	6,359.479
S Tot	1,503.438			0.000	0.000	0.000	1,132.945	10,158.935	10,158.935	6,359.479
After	2,593.975			0.000	0.000	0.000	.000	2,394.617	12,553.552	6,529.016
Total	4,097.413			0.000	0.000	0.000	1,132.945	12,553.552	12,553.552	6,529.016
Strip Pricing (5-01-18)									Percent	Cum. Disc.
Year	WTI Cushing Oil \$/STB			Henry Hub Gas \$/MMBTU						
2018	66.38			2.86						
2019	61.62			2.75						
2020	56.43			2.71						
2021	53.90			2.78						
2022	55.65			3.00						
2023	60.00			3.00						
Thereafter	Flat			Flat						
Cap	60.00			3.00						
8 Months in first year								50.001	Year Life (05/2068)	

THESE DATA ARE PART OF A CG&A REPORT AND ARE SUBJECT TO THE CONDITIONS IN THE TEXT OF THE REPORT.  
 TEXAS REGISTERED ENGINEERING FIRM F-693.

*Summary Plot- PROB*  
*Bandolier Energy, LLC Interests*  
*Certain Properties in Osage County, Oklahoma*  
*Probable Undeveloped Reserves*

*Gross Production*

	Start Date 05/2018					04/2018 Cumulatives	50.00 Year Life (05/2068)		Current Interest %	NetOilProd. NetGasSales mdbl/mmcf	OilRevenue GasRevenue M\$	Prod. Tax Adv. Tax M\$	Expenses Investments M\$	FutureNet CashFlow M\$	CashFlow Disc.@10.0% M\$
	Q <sub>i</sub>	D <sub>ei</sub>	n	D <sub>ef</sub>	Q <sub>ab</sub>		Remaining Reserves	Ultimate Recovery							
Oil - bbls/mo	1,490.	N.A.	0.00	3.0	182.	Oil - mbbls	0.0	406.0	316.651	18,500.543	1,358.128	4,097.413	12,553.552	6,529.016	
Gas - mcf/mo	1,396.	84.0	0.00	5.0	98.	Gas - mmcf	0.0	352.2	274.742	641.495	.000	1,132.945			



◆ ⊗ \* -- Annual Averages      Perfs: 0. - 0.      Status:  
 First Production 00/ 0      First Data 00/ 0      Last Data 00/ 0  
 06 / 08 / 2018      14 : 48 : 33      21      API:

*Cawley, Gillespie & Associates, Inc.*

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**SUMMARY**



**Table II- PROB**  
**Lease Reserve Summary**  
**Bandolier Energy, LLC Interests**  
**Certain Properties in Osage County, Oklahoma**  
**Probable Undeveloped Reserves**  
**As of May 1, 2018**

OPERATOR				Current Interest %	WellCnt Life	Ultimate Recovery	Gross Reserves MBBL / MMCF	Net Reserves	Oil Revenue Gas Revenue MS / MS	Prod Tax Adv. Tax MS / MS	Expenses Investments MS / MS	Future Net Cash Flow Rate of Return MS / %	Cash Flow Disc. @ 10.0 Payout MS / Yrs		
LEASE NAME	Table	Class	Major											Well No.	Start Date
<b>(BURGESS / CHAT) -- OSAGE COUNTY, OKLAHOMA</b>															
<b>PERFORMANCE PETROLEUM</b>															
W. BLACKLAND #1-34	1	PROB	Oil	11/18	348	78.0000 NI 100.0000 W1	49.5	67.8	67.8	52.9	3,090.0	226.8	682.3	2,061.2	1,048.8
								58.7	58.7	45.8	106.9	0.0	226.6	100.0	0.80
W. BLACKLAND #2-35	2	PROB	Oil	05/18	347	78.0000 NI 100.0000 W1	50.0	71.4	71.4	55.7	3,290.3	241.1	689.6	2,466.9	1,429.1
								58.8	58.8	45.9	107.2	0.0	0.0		
W. BLACKLAND #3-35	3	PROB	Oil	11/18	351	78.0000 NI 100.0000 W1	49.5	67.8	67.8	52.9	3,086.8	226.6	682.0	2,058.6	1,043.5
								58.7	58.7	45.8	106.9	0.0	226.6	100.0	0.83
W. BLACKLAND #4-35	4	PROB	Oil	12/18	352	78.0000 NI 100.0000 W1	49.4	67.8	67.8	52.9	3,083.1	226.3	681.5	2,055.5	1,037.6
								58.7	58.7	45.8	106.9	0.0	226.6	100.0	0.86
W. BLACKLAND #6-34	5	PROB	Oil	12/18	349	78.0000 NI 100.0000 W1	49.4	67.8	67.8	52.9	3,079.6	226.1	681.2	2,052.5	1,032.0
								58.7	58.7	45.8	106.8	0.0	226.6	100.0	0.89
W. BLACKLAND #7-34	6	PROB	Oil	12/18	350	78.0000 NI 100.0000 W1	49.4	63.3	63.3	49.4	2,870.7	211.3	680.8	1,858.9	938.1
								58.7	58.7	45.8	106.8	0.0	226.6	100.0	0.94
<b>GRAND TOTAL</b>					<b>6</b>			<b>406.0</b>	<b>406.0</b>	<b>316.7</b>	<b>18,500.5</b>	<b>1,358.1</b>	<b>4,097.4</b>	<b>12,553.6</b>	<b>6,529.0</b>
								352.2	352.2	274.7	641.5	0.0	1,132.9		

THESE DATA ARE PART OF A CG&A REPORT AND ARE SUBJECT TO THE CONDITIONS IN THE TEXT OF THE REPORT.  
 TEXAS REGISTERED ENGINEERING FIRM F-693.

Scenario: .797

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**APPENDIX**  
**Explanatory Comments for Summary Tables**

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**HEADINGS**

Table I  
Description of Table Information  
Identity of Interest Evaluated  
Property Description – Location  
Reserve Classification and Development Status  
Effective Date of Evaluation

**FORECAST**

(Columns)

- (1) (11) (21) Calendar or Fiscal years/months commencing on effective date.
- (2) (3) (4) Gross Production (8/8th) for the years/months which are economical. These are expressed as thousands of barrels (Mbbbl) and millions of cubic feet (MMcf) of gas at standard conditions. Total future production, cumulative production to effective date and ultimate recovery at the effective date are shown following the annual/monthly forecasts.
- (5) (6) (7) Net Production accruable to evaluated interest is calculated by multiplying the revenue interest times the gross production. These values take into account changes in interest and gas shrinkage.
- (8) Average (volume weighted) gross liquid price per barrel before deducting production-severance taxes.
- (9) Average (volume weighted) gross gas price per Mcf before deducting production-severance taxes.
- (10) Average (volume weighted) gross NGL price per barrel before deducting production-severance taxes.
- (12) Revenue derived from oil sales -- column (5) times column (8).
- (13) Revenue derived from gas sales -- column (6) times column (9).
- (14) Revenue derived from NGL sales -- column (7) times column (10).
- (15) Revenue derived from hedge positions.
- (16) Revenue derived from other sources not included in column (12) through column (15); may include revenue from electrical sales, pipeline gas transportation, 3<sup>rd</sup> party saltwater disposal, etc.
- (17) Total Revenue – sum of column (12) through column (16).
- (18) Production-Severance taxes deducted from gross oil, gas and NGL revenue.
- (19) Ad Valorem taxes.
- (20) \$/BOE<sub>6</sub> – is the total of column (22), column (25), column (26), and column (27) divided by Barrels of Oil Equivalent (“BOE”). BOE is net oil production column (5) plus net gas production column (6) converted to oil at six Mcf gas per one bbl oil plus net NGL production column (7) converted to oil at one bbl NGL per 0.65 bbls of oil.
- (22) Operating Expenses are direct operating expenses to the evaluated working interest and may include combined fixed rate administrative overhead charges for operated oil and gas producers known as COPAS.
- (23) Average gross wells.
- (24) Average net wells are gross wells times working interest.
- (25) Workover Expenses are non-direct operating expenses and may include maintenance, well service, compressor, tubing, and pump repair.
- (26) 3<sup>rd</sup> Party COPAS are combined fixed rate administrative overhead charges for non-operated oil and gas producers.
- (27) Other Deductions may include compression-gathering expenses, transportation costs and water disposal costs.
- (28) Investments, if any, include re-completions, future drilling costs, pumping units, etc. and may include either tangible or intangible or both, and the costs for plugging and the salvage value of equipment at abandonment may be shown as negative investments at end of life.
- (29) (30) Future Net Cash Flow is column (17) less the total of column (18), column (19), column (22), column (25), column (26), column (27) and column (28). The data in column (29) are accumulated in column (30). Federal income taxes have not been considered.
- (31) Cumulative Discounted Cash Flow is calculated by discounting monthly cash flows at the specified annual rates.

**MISCELLANEOUS**

- DCF Profile • The cumulative cash flow discounted at six different interest rates are shown at the bottom of columns (30-31). Interest has been compounded monthly. The DCF’s for the “Without Hedge” case may be shown to the left of the main DCF profile.
- Life • The economic life of the appraised property is noted in the lower right-hand corner of the table.
- Footnotes • Comments regarding the evaluation may be shown in the lower left-hand footnotes.
- Price Deck • A table of oil and gas prices, price caps and escalation rates may be shown in the lower middle footnotes.
- Differentials • Total annual price adjustments may be shown in gray font to the left of column (8), column (9) and column (10).

## APPENDIX

### Methods Employed in the Estimation of Reserves

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The four methods customarily employed in the estimation of reserves are (1) *production performance*, (2) *material balance*, (3) *volumetric* and (4) *analogy*. Most estimates, although based primarily on one method, utilize other methods depending on the nature and extent of the data available and the characteristics of the reservoirs.

Basic information includes production, pressure, geological and laboratory data. However, a large variation exists in the quality, quantity and types of information available on individual properties. Operators are generally required by regulatory authorities to file monthly production reports and may be required to measure and report periodically such data as well pressures, gas-oil ratios, well tests, etc. As a general rule, an operator has complete discretion in obtaining and/or making available geological and engineering data. The resulting lack of uniformity in data renders impossible the application of identical methods to all properties, and may result in significant differences in the accuracy and reliability of estimates.

A brief discussion of each method, its basis, data requirements, applicability and generalization as to its relative degree of accuracy follows:

*Production performance.* This method employs graphical analyses of production data on the premise that all factors which have controlled the performance to date will continue to control and that historical trends can be extrapolated to predict future performance. The only information required is production history. Capacity production can usually be analyzed from graphs of rates versus time or cumulative production. This procedure is referred to as "decline curve" analysis. Both capacity and restricted production can, in some cases, be analyzed from graphs of producing rate relationships of the various production components. Reserve estimates obtained by this method are generally considered to have a relatively high degree of accuracy with the degree of accuracy increasing as production history accumulates.

*Material balance.* This method employs the analysis of the relationship of production and pressure performance on the premise that the reservoir volume and its initial hydrocarbon content are fixed and that this initial hydrocarbon volume and recoveries therefrom can be estimated by analyzing changes in pressure with respect to production relationships. This method requires reliable pressure and temperature data, production data, fluid analyses and knowledge of the nature of the reservoir. The material balance method is applicable to all reservoirs, but the time and expense required for its use is dependent on the nature of the reservoir and its fluids. Reserves for depletion type reservoirs can be estimated from graphs of pressures corrected for compressibility versus cumulative production, requiring only data that are usually available. Estimates for other reservoir types require extensive data and involve complex calculations most suited to computer models which makes this method generally applicable only to reservoirs where there is economic justification for its use. Reserve estimates obtained by this method are generally considered to have a degree of accuracy that is directly related to the complexity of the reservoir and the quality and quantity of data available.

*Volumetric.* This method employs analyses of physical measurements of rock and fluid properties to calculate the volume of hydrocarbons in-place. The data required are well information sufficient to determine reservoir subsurface datum, thickness, storage volume, fluid content and location. The volumetric method is most applicable to reservoirs which are not susceptible to analysis by production performance or material balance methods. These are most commonly newly developed and/or no-pressure depleting reservoirs. The amount of hydrocarbons in-place that can be recovered is not an integral part of the volumetric calculations but is an estimate inferred by other methods and a knowledge of the nature of the reservoir. Reserve estimates obtained by this method are generally considered to have a low degree of accuracy; but the degree of accuracy can be relatively high where rock quality and subsurface control is good and the nature of the reservoir is uncomplicated.

*Analogy.* This method which employs experience and judgment to estimate reserves, is based on observations of similar situations and includes consideration of theoretical performance. The analogy method is applicable where the data are insufficient or so inconclusive that reliable reserve estimates cannot be made by other methods. Reserve estimates obtained by this method are generally considered to have a relatively low degree of accuracy.

Much of the information used in the estimation of reserves is itself arrived at by the use of estimates. These estimates are subject to continuing change as additional information becomes available. Reserve estimates which presently appear to be correct may be found to contain substantial errors as time passes and new information is obtained about well and reservoir performance.

**APPENDIX**  
**Petroleum Reserves Definitions**  
*Society of Petroleum Engineers (SPE) and World Petroleum Congresses (WPC)*

Definitions jointly approved in March of 1997

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**INTRODUCTION**

Reserves are those quantities of petroleum which are anticipated to be commercially recovered from known accumulations from a given date forward. All reserve estimates involve some degree of uncertainty. The uncertainty depends chiefly on the amount of reliable geologic and engineering data available at the time of the estimate and the interpretation of these data. The relative degree of uncertainty may be conveyed by placing reserves into one of two principal classifications, either proved or unproved. Unproved reserves are less certain to be recovered than proved reserves and may be further sub-classified as probable and possible reserves to denote progressively increasing uncertainty in their recoverability.

The intent of the SPE and WPC in approving additional classifications beyond proved reserves is to facilitate consistency among professionals using such terms. In presenting these definitions, neither organization is recommending public disclosure of reserves classified as unproved. Public disclosure of the quantities classified as unproved reserves is left to the discretion of the countries or companies involved.

Estimation of reserves is done under conditions of uncertainty. The method of estimation is called deterministic if a single best estimate of reserves is made based on known geological, engineering, and economic data. The method of estimation is called probabilistic when the known geological, engineering, and economic data are used to generate a range of estimates and their associated probabilities. Identifying reserves as proved, probable, and possible has been the most frequent classification method and gives an indication of the probability of recovery. Because of potential differences in uncertainty, caution should be exercised when aggregating reserves of different classifications.

Reserves estimates will generally be revised as additional geologic or engineering data becomes available or as economic conditions change. Reserves do not include quantities of petroleum being held in inventory, and may be reduced for usage or processing losses if required for financial reporting.

Reserves may be attributed to either natural energy or improved recovery methods. Improved recovery methods include all methods for supplementing natural energy or altering natural forces in the reservoir to increase ultimate recovery. Examples of such methods are pressure maintenance, cycling, waterflooding, thermal methods, chemical flooding, and the use of miscible and immiscible displacement fluids. Other improved recovery methods may be developed in the future as petroleum technology continues to evolve.

**PROVED RESERVES**

Proved reserves are those quantities of petroleum which, by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under current economic conditions, operating methods, and government regulations. Proved reserves can be categorized as developed or undeveloped.

If deterministic methods are used, the term reasonable certainty is intended to express a high degree of confidence that the quantities will be recovered. If probabilistic methods are used, there should be at least a 90% probability that the quantities actually recovered will equal or exceed the estimate.

Establishment of current economic conditions should include relevant historical petroleum prices and associated costs and may involve an averaging period that is consistent with the purpose of the reserve estimate, appropriate contract obligations, corporate procedures, and government regulations involved in reporting these reserves.

In general, reserves are considered proved if the commercial producibility of the reservoir is supported by actual production or formation tests. In this context, the term proved refers to the actual quantities of petroleum reserves and not just the productivity of the well or reservoir. In certain cases, proved reserves may be assigned on the basis of well logs and/or core analysis that indicate the subject reservoir is hydrocarbon bearing and is analogous to reservoirs in the same area that are producing or have demonstrated the ability to produce on formation tests.

The area of the reservoir considered as proved includes (1) the area delineated by drilling and defined by fluid contacts, if any, and (2) the undrilled portions of the reservoir that can reasonably be judged as commercially productive on the basis of available geological and engineering data. In the absence of data on fluid contacts, the lowest known occurrence of hydrocarbons controls the proved limit unless otherwise indicated by definitive geological, engineering or performance data.

Reserves may be classified as proved if facilities to process and transport those reserves to market are operational at the time of the estimate or there is a reasonable expectation that such facilities will be installed. Reserves in undeveloped locations may be classified as proved undeveloped provided (1) the locations are direct offsets to wells that have indicated commercial production in the objective formation, (2) it is reasonably certain such locations are within the known proved productive limits of the objective formation, (3) the locations conform to existing well spacing regulations where applicable, and (4) it is reasonably certain the locations will be developed. Reserves from other locations are categorized as proved undeveloped only where interpretations of geological and engineering data from wells indicate with reasonable certainty that the objective formation is laterally continuous and contains commercially recoverable petroleum at locations beyond direct offsets.

Reserves which are to be produced through the application of established improved recovery methods are included in the proved classification when (1) successful testing by a pilot project or favorable response of an installed program in the same or an analogous reservoir with similar rock and fluid properties provides support for the analysis on which the project was based, and, (2) it is reasonably certain that the project will proceed. Reserves to be recovered by improved recovery methods that have yet to be established through commercially successful applications are included in the proved classification only (1) after a favorable production response from the subject reservoir from either (a) a representative pilot or (b) an installed program where the response provides support for the analysis on which the project is based and (2) it is reasonably certain the project will proceed.

### **UNPROVED RESERVES**

Unproved reserves are based on geologic and/or engineering data similar to that used in estimates of proved reserves but technical, contractual, economic, or regulatory uncertainties preclude such reserves being classified as proved. Unproved reserves may be further classified as probable reserves and possible reserves.

Unproved reserves may be estimated assuming future economic conditions different from those prevailing at the time of the estimate. The effect of possible future improvements in economic conditions and technological developments can be expressed by allocating appropriate quantities of reserves to the probable and possible classifications.

### **PROBABLE RESERVES**

Probable reserves are those unproved reserves which analysis of geological and engineering data suggests are more likely than not to be recoverable. In this context, when probabilistic methods are used, there should be at least a 50% probability that the quantities actually recovered will equal or exceed the sum of estimated proved plus probable reserves.

In general, probable reserves may include (1) reserves anticipated to be proved by normal step-out drilling where sub-surface control is inadequate to classify these reserves as proved, (2) reserves in formations that appear to be productive based on well log characteristics but lack core data or definitive tests and which are not analogous to producing or proved reservoirs in the area, (3) incremental reserves attributable to infill drilling that could have been classified as proved if closer statutory spacing had been approved at the time of the estimate, (4) reserves attributable to improved recovery methods that have been established by repeated commercially successful applications when (a) a project or pilot is planned but not in operation and (b) rock, fluid, and reservoir characteristics appear favorable for commercial application, (5) reserves in an area of the formation that appears to be separated from the proved area by faulting and the geologic interpretation indicates the subject area is structurally higher than the proved area, (6) reserves attributable to a future workover, treatment, re-treatment, change of equipment, or other mechanical procedures, where such procedure has not been proved successful in wells which exhibit similar behavior in analogous reservoirs, and (7) incremental reserves in proved reservoirs where an alternative interpretation of performance or volumetric data indicates more reserves than can be classified as proved.

### **POSSIBLE RESERVES**

Possible reserves are those unproved reserves which analysis of geological and engineering data suggests are less likely to be recoverable than probable reserves. In this context, when probabilistic methods are used, there should be at least a 10% probability that the quantities actually recovered will equal or exceed the sum of estimated proved plus probable plus possible reserves.

In general, possible reserves may include (1) reserves which, based on geological interpretations, could possibly exist beyond areas classified as probable, (2) reserves in formations that appear to be petroleum bearing based on log and core analysis but may not be productive at commercial rates, (3) incremental reserves attributed to infill drilling that are subject to technical uncertainty, (4) reserves attributed to improved recovery methods when (a) a project or pilot is planned but not in operation and (b) rock, fluid, and reservoir characteristics are such that a reasonable doubt exists that the project will be commercial, and (5) reserves in an area of the formation that appears to be separated from the proved area by faulting and geological interpretation indicates the subject area is structurally lower than the proved area.

### **RESERVE STATUS CATEGORIES**

Reserve status categories define the development and producing status of wells and reservoirs.

**Developed:** Developed reserves are expected to be recovered from existing wells including reserves behind pipe. Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. Developed reserves may be subcategorized as producing or non-producing.

**Producing:** Reserves subcategorized as producing are expected to be recovered from completion intervals which are open and producing at the time of the estimate. Improved recovery reserves are considered producing only after the improved recovery project is in operation.

**Non-producing:** Reserves subcategorized as non-producing include shut-in and behind-pipe reserves. Shut-in reserves are expected to be recovered from (1) completion intervals which are open at the time of the estimate but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. Behind-pipe reserves are expected to be recovered from zones in existing wells, which will require additional completion work or future re-completion prior to the start of production.

**Undeveloped Reserves:** Undeveloped reserves are expected to be recovered: (1) from new wells on undrilled acreage, (2) from deepening existing wells to a different reservoir, or (3) where a relatively large expenditure is required to (a) re-complete an existing well or (b) install production or transportation facilities for primary or improved recovery projects.

*Approved by the Board of Directors, Society of Petroleum Engineers (SPE), and the Executive Board, World Petroleum Congresses (WPC), March 1997.*