Liberty Consulting

Gas and Oil Predictions

Stephen Hoffmann
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Engineering 101
Project 1

Group 5

Executive Summery:

       This project asked to determine the most profitable oil and gas well in similar location and size. This determination was deciphered by using Excel's capabilities, and calculating the economic values for the next few years. Out of the three wells I have determined that Moore #4-64 produces the largest amount of profit, and is the wisest choice to invest in.

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Introduction:

We are a consulting company called liberty, and asked to define the most profitable oil and gas wells with data collected over a assorted time. We started to narrow the wells down by the size of each well. Then we made some graphs that showed us where the locations of the wells were, and the size of the wells. Next we picked three comparable wells that we could analyze the data for each well. After that, we plotted each of the wells and calculated the exponential decay of each well. That would then allow us to predict what the wells are going to produce and how much money the wells are going to make for future years. Then we took into account of the net present value of money, and calculated the real world worth of the profits of each well. Finally, we were able to decipher the most lucrative well for the buyer to invest its money into.

Methodology:

The fist steps in this project was to narrow the massive amount of data in Excel down. We organized the data by using the filtering function to be able to single out one well at a time. Then we put that into a pivot table and organized the data even more. After that we made a bubble graph of all of the wells in Excel to show us the general size of each well, and location. Then after we had that worked out we took the wells and made a bar graph showing the wells in descending order from largest to smallest. We then picked out the three wells that we thought were the most comparable.

When we picked out the three wells we then were able to analyze the data for each well. We made two graphs for each well; oil and gas productions. The oil is measured in barrels (bbls) per month, and gas was measured in one thousand cubic feet (MCF) per month. We also graphed these graphs on a logarithmic scale to predict the wells production for future years to come. We accomplished this by calculating the hyperbolic decay curve $\{Q=qi\ (1+b*di*T)^{(-1/b)}\}$ of the data for both the oil and the gas wells. All of this data processing was done by using the abilities of Excel.

After we had all of the predictions and the information about the wells all mapped out we calculated the profits for each of the wells. We broke up each well by its oil and gas productions. We also had to research and predict to the best of our knowledge the prices of oil and gas for the years to come. For that we gathered information off the internet (www.oil-gasonline.com), and found out what each oil and gas is worth on the market today and what kind of trends it's supposed to take. After that we calculated the direct cost (direct operation cost for one MCF of gas = $0.65, and one barrel of oil = $4.35) and revenues (annual amount produced * the cost of production of the year) for all of the wells' oil and gas. After that was calculated the taxation $\{Tax = (Revenue - Direct\ cost)*(Tax\ rate = 48\%)\}$ had to be taken into account. Then that would allow us to determine the net cash flow in us dollars. We finally made calculations for the net present value of money $\{Present\ value = (net\ cash\ flow) / ((1-\ interest\ rate)^{n})\}$ for each of the wells.

Results and Discussions:

The graphs below represent actual and predicted productions for both oil and gas of each well. The curved pink line is the hyperbolic decay curve that was created using the actual production (blue dots) of the wells. The production for each of the oil and gas are being predicted for the next ten years. The oil is measured in barrels, gas in MCF, and time in months.
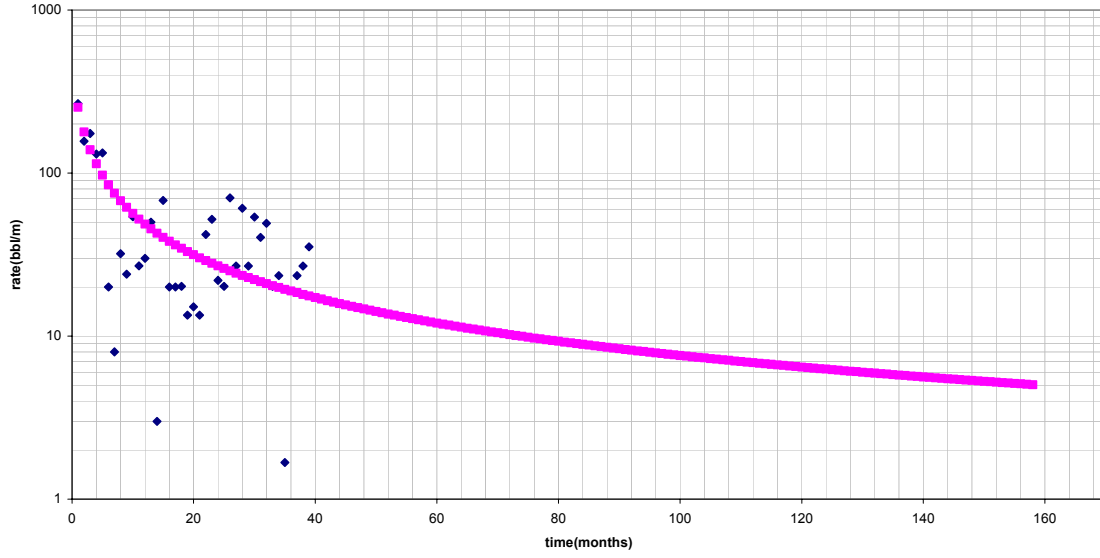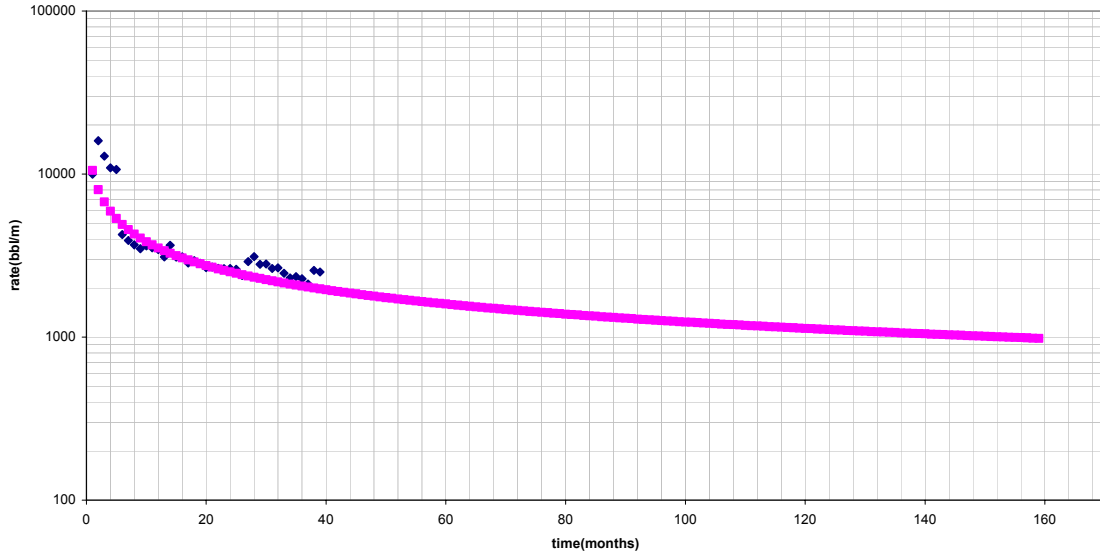
Moore #6-64

Moore #6-64 oil
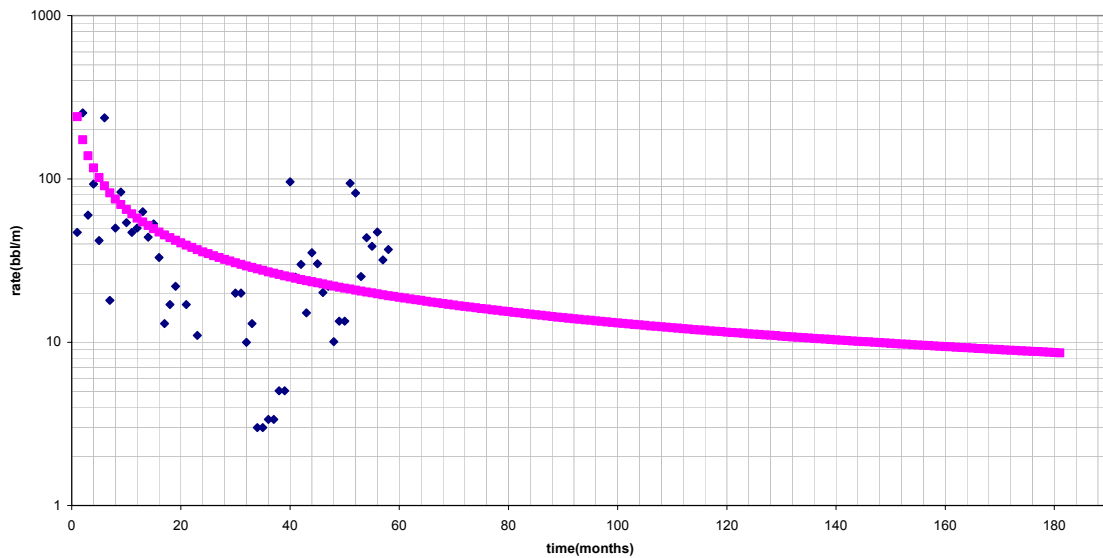
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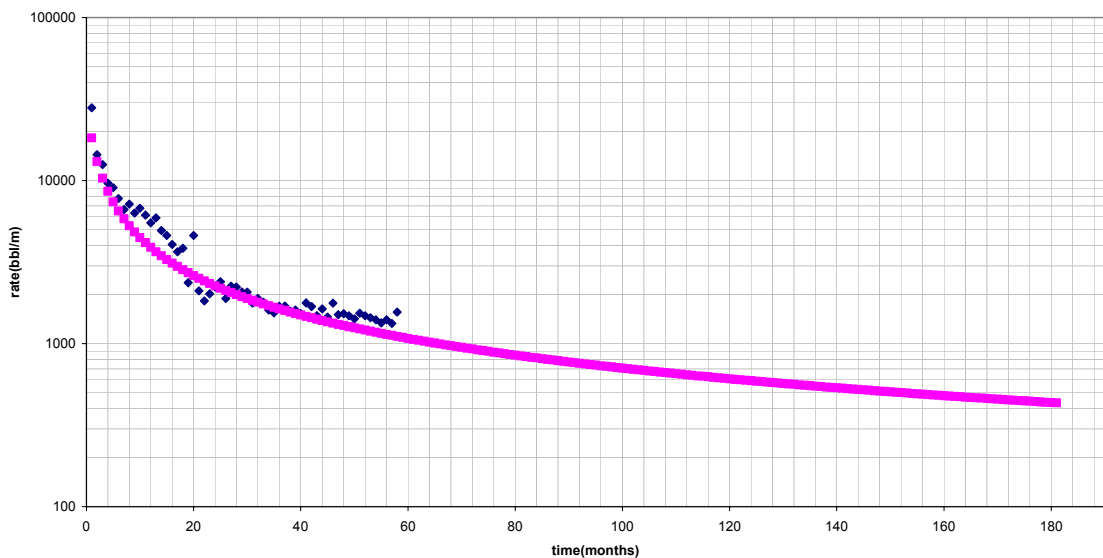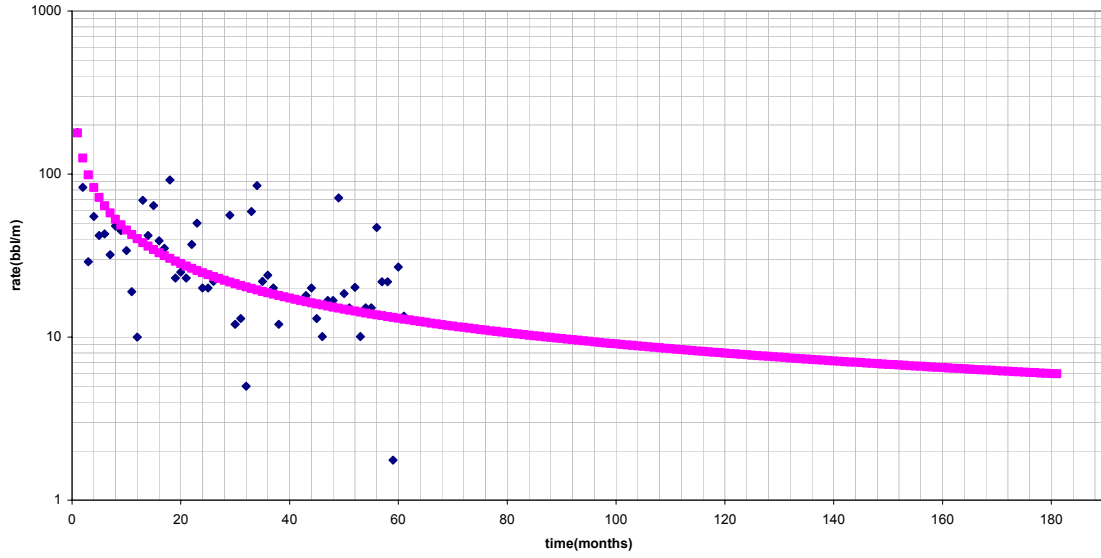
Moore #4-64

Moore #4-64 oil
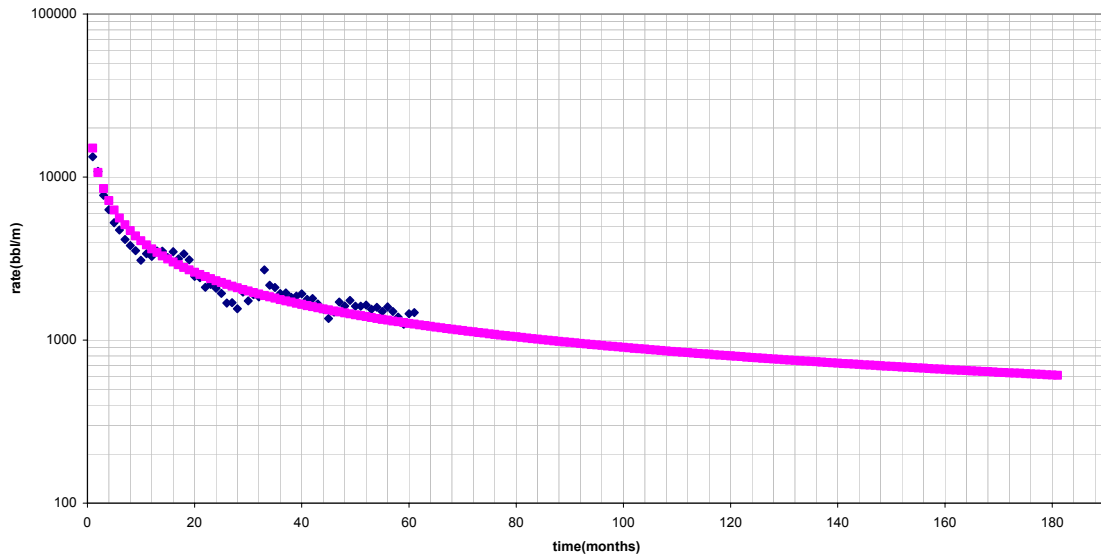

Moore #4-64 gas

Chambers #6-65

Chambers #6-65 oil

Chambers #6-65 gas

The following charts were created from the graphs above. These tables show the taxation, revenue, net present value for each of the wells, and with this information we were able to make a recommendation on one of the wells. The technical information on the calculation was discussed in the methodology page.

Moore #6-64 oil

Year	Oil Prod. bbl/year	Revenue	Operating cost	Tax	NCF	Sum NCF	NPV
1	215.1815489	6025.083369	936.0397376	2442.741	2646.303	18192.98	2405.73
2	190.6311421	5337.67198	829.2454683	2164.045	2344.382		1937.506
3	171.888957	4812.890796	747.7169629	1951.283	2113.89		1588.197
4	157.0401639	4397.12459	683.124713	1782.72	1931.28		1319.09
5	144.941171	4058.352788	630.4940938	1645.372	1782.487		1106.784
6	134.8635756	3776.180118	586.6565541	1530.971	1658.552		936.2095
7	126.3197347	3536.952571	549.4908459	1433.982	1553.48		797.1809
8	118.9699496	3331.158589	517.5192808	1350.547	1463.092		682.5434
9	112.5697679	3151.953502	489.6784905	1277.892	1384.383		587.1135
10	106.9384505	2994.276615	465.1822598	1213.965	1315.129		507.0392
						18192.98	11867.39

When all of the calculations were figured out the total net present value of the production of oil was $11,867 by the tenth year.

Moore #6-64 gas

Year	Gas prod. MCF/year	Revenue	Operating cost	Tax	NCF	Sum NCF	NPV	total NPV
1	12197.31109	36591.93327	7928.252208	13758.57	14905.11	96876.04	13550.1	75669.78
2	10596.23798	31788.71393	6887.554684	11952.56	12948.6		10701.32	
3	9395.319189	28185.95757	6106.957473	10597.92	11481.08		8625.905	
4	8458.348916	25375.04675	5497.926795	9541.018	10336.1		7059.697	
5	7705.180562	23115.54169	5008.367365	8691.444	9415.731		5846.428	
6	7085.432428	21256.29728	4605.531078	7992.368	8658.398		4887.44	
7	6565.77156	19697.31468	4267.751514	7406.19	8023.373		4117.259	
8	6123.225459	18369.67638	3980.096548	6906.998	7482.582		3490.679	
9	5741.424326	17224.27298	3731.925812	6476.327	7016.021		2975.478	
10	5408.374125	16225.12238	3515.443182	6100.646	6609.033		2548.068	
						96876.04	63802.38	

The total net present value of the production of gas was $63,802 by the tenth year. Total profit of both oil and gas of this well is $75,669.

Moore #4-64 oil

Year	Oil Prod. Bbl/year	revenue	Operating cost	Tax	NCF	Sum NCF	NPV
1	185.3193828	5188.9427	120.4575988	2432.873	2635.612	893.0463	2396.011
2	150.2281796	4206.389	97.64831675	1972.196	2136.545		1765.74
3	126.7161623	3548.0525	82.3655055	1663.53	1802.157		1353.987
4	109.8095863	3074.6684	71.37623108	1441.58	1561.712		1066.67
5	97.03981125	2717.1147	63.07587731	1273.939	1380.1		856.9336
6	87.03806404	2437.0658	56.57474162	1142.636	1237.855		698.7371
7	78.98250686	2211.5102	51.33862946	1036.882	1123.289		576.425
8	72.34904869	2025.7734	47.02688165	949.7983	1028.948		480.0119
9	56.004697	1568.1315	36.40305305	735.2297	796.4988		337.7932
10	62.79329894	1758.2124	40.81564431	824.3504	893.0463		344.308
					14595.76		9876.618

The total net present value for the gas production was $9,876 by the tenth year.

Moore #4-64 gas

Year	Gas Prod. MCF/year	Revenue	Operating cost	Tax	NCF	Sum NCF	NPV	Total NPV
1	22020.06916	66060.2075	14313.04496	24838.6	26908.52	190659.9	24462.3	133579.8
2	19589.55263	58768.6579	12733.20921	22097	23938.43		19783.83	
3	17821.00707	53463.0212	11583.65459	20102.1	21777.27		16361.59	
4	16459.3784	49378.1352	10698.59596	18566.2	20113.36		13737.7	
5	15369.07981	46107.2394	9989.901876	17336.3	18781.02		11661.53	
6	14470.43025	43411.2907	9405.779661	16322.6	17682.87		9981.517	
7	13713.10466	41139.314	8913.518029	15468.4	16757.41		8599.203	
8	13063.53892	39190.6168	8491.300299	14735.7	15963.64		7447.158	
9	12498.37016	37495.1105	8123.940601	14098.2	15273.01		6477.246	
10	11018.29414	33054.8824	7161.891191	12428.6	13464.36		5191.092	
					190659.9		123703.2	

The total net present value of the gas production was $123,703 by the tenth year. Total profit of both oil and gas of this well is 133,579.

Chambers #6-65 oil

Year	Oil Prod. bbl/year	Revenue	Operating cost	Tax	NCF	Sum NCF	NPV
1	144.2026197	4037.6734	93.73170282	1893.092	2050.85	954.0325	1864.409
2	128.3515544	3593.8435	83.42851037	1684.999	1825.416		1508.608
3	116.1313665	3251.6783	75.4853882	1524.573	1651.62		1240.887
4	106.3787127	2978.604	69.14616326	1396.54	1512.918		1033.343
5	98.38699543	2754.8359	63.95154703	1291.624	1399.26		868.8303
6	408.6591309	11442.456	265.6284351	5364.877	5811.95		3280.694
7	86.01035738	2408.29	55.9067323	1129.144	1223.239		627.7152
8	81.10054357	2270.8152	52.71535332	1064.688	1153.412		538.0752
9	76.8139668	2150.7911	49.92907842	1008.414	1092.448		463.3047
10	67.08146017	1878.2809	43.60294911	880.6454	954.0325		367.8208
					18675.15		11793.69

The total net present value of the oil production was $11,793 by the tenth year.

Chambers #6-65 gas

Year	Gas Prod. MCF/year	Revenue	Operating cost	Tax	NCF	Sum NCF	NPV	Total NPV
1	14078.98264	42236.9479	9151.338716	15881.1	17204.52	161622.2	15640.47	113335.7
2	12627.82018	37883.4605	8208.083117	14244.2	15431.2		12753.05	
3	11501.16548	34503.4965	7475.757565	12973.3	14054.42		10559.3	
4	10596.49054	31789.4716	6887.718849	11952.8	12948.91		8844.281	
5	9851.139125	29553.4174	6403.240431	11112.1	12038.09		7474.708	
6	41414.63104	124243.893	26919.51018	46715.7	50608.68		28567.28	
7	8688.852597	26066.5578	5647.754188	9801.03	10617.78		5448.599	
8	8224.810211	24674.4306	5346.126637	9277.59	10050.72		4688.734	
9	7818.164785	23454.4944	5081.80711	8818.89	9553.797		4051.743	
10	7458.336501	22375.0095	4847.918725	8413	9114.087		3513.875	
					161622.2		101542	

The total net present value of the gas production was 101,542 by the tenth year. Total profit of both oil and gas of this well is 113,335.

Well Names	Combined NPV
Moore # 6-64	**75,669.78**
Moore # 4-64	**133,579.80**
Chambers # 6-65	**113,335.70**

     This table shows that Moore #6-64 well is the most lucrative well to invest your money into, because it has the highest total oil and gas net present value.

Conclusion:

The wells and the data that was collected from them were evaluated so that we could recommend to the client the most lucrative well to invest into. After formulating a predicted production, and then calculating the value of the productions with all of the taxation and operation costs, we were able to come up with a recommendation. We chose well Moore #4-64 because this was the well that made the most valuable amount of profits, which is at $133,579.80.