Executive Summary

This report is about the process of predicting the production of oil and gas for three wells and recommending a particular well that would be the most profitable. This was made easy due to the use of the hyperbolic decline curve formula. After formatting the hyperbolic decline curve to the original graph, an extension of the decline curve of three years was made for Wells 3, 11, 19. Now there is a curve for the production of oil and gas for the next three years. With the amount of oil and gas produced by each well known, as well as the price of each, the net cash flow and the net present value was derived. After reviewing the data and graphs from the three wells, it was clear that Well #3 was the appropriate choice. Well #3 had the highest net present value, therefore has the highest profit capability out of the three wells.

Introduction

Vandalay Industries has been hired by a company to perform the task of analyzing the data of three wells by predicting the future production of the oil and gas from each well. Their main purpose is to recognize the well that exhibits the highest possible present earning value. After applying engineering methods, and solving the problem, we at Vandalay Industries, will recommend the particular well to the company that will increase their net cash flow.

Methodology

After past information on the production of each well was collected, a graph was made for the oil and gas using the pivot table on Microsoft excel. A hyperbolic decline curve was made from the oil and gas of the three wells that accurately resembled the decline curve of each graph. The decline equation is as follows, q = qi * (1 + b * Di * t) ^ (-1/b). In this equation, qi is the initial rate, b is equal to the decline exponent, Di is the decline rate, and t is equal to the time in months.

The numbers for the formula were plugged in randomly until the there was a curve that resembled that of the well's curve. Directly after matching the decline curve to the curve of each well, an extension of each decline curve by three years was made.

Now, there is a rough estimate of what the production of oil in blue barrels (BBLs) and gas in thousand cubic foot (MCF).

Because there is the amount of oil and gas produced, it is possible to find the net cash flow for each well. Using the current oil prices of $30 per BBL and $5 per MCF, the revenue was found by multiplying the cost and the production number. There is a direct cost of $4.35 for every BBL of oil and $0.65 for every MCF involved. The tax rate for oil and gas is 48% on the total after the direct cost is subtracted. Subtracting the direct cost and the tax from the revenue will give the net cash flow each month. Because the net cash flow was an assumption of what the profit for the oil and gas of each well will be in the future, it is necessary to find the net present value using the equation F = P(1+I)^n. In the equation, F is equal to the future lump sum, which is the net cash flow that was found. The I is the monthly interest rate, which was found to be 0.6%. The P is what we are solving for and n is the number of months. The sum of the months will derive the total net present value for the oil and gas for each well. This number is what each well is worth today. The total net present values for the oil and the gas is what is to be looked at when comparing wells and figuring out which one is the best buy.

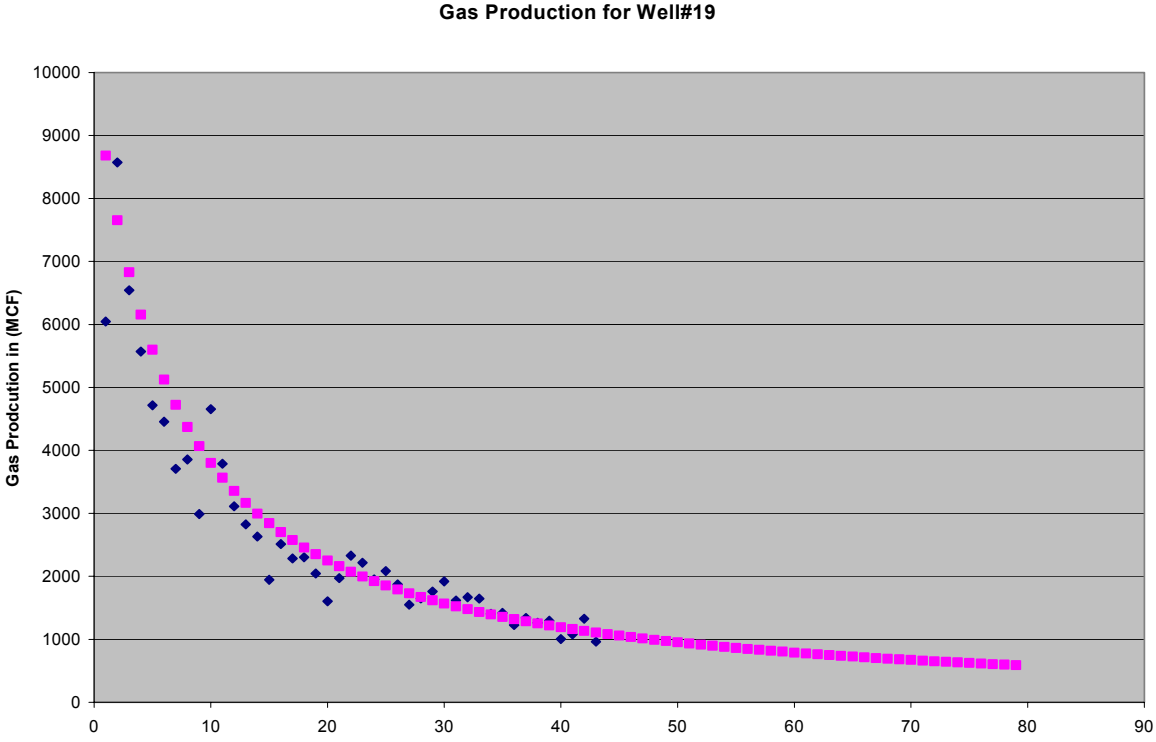
Results and Discussions

The following tables and graphs are the information that was responsible for deciding which well was the most profitable. Each well has a graph for the oil and gas production and a table stating the future production of oil and gas.

The y-axis on each graph represents the number of blue barrels (BBLs) of oil or thousand cubic foot (MCF) of gas. The x-axis is the time in months the graph was recorded. The blue dotted line on each graph represents the past production of the well. The pink dotted line is the decline curve that was made to resemble the well's original curve. Notice that the pink line extends further than that of the blue. This represents the graph's production three years into the future.

The tables are based on the oil and gas production three years into the future. The total amount of money listed on the bottom of each table is the total present value for each well.

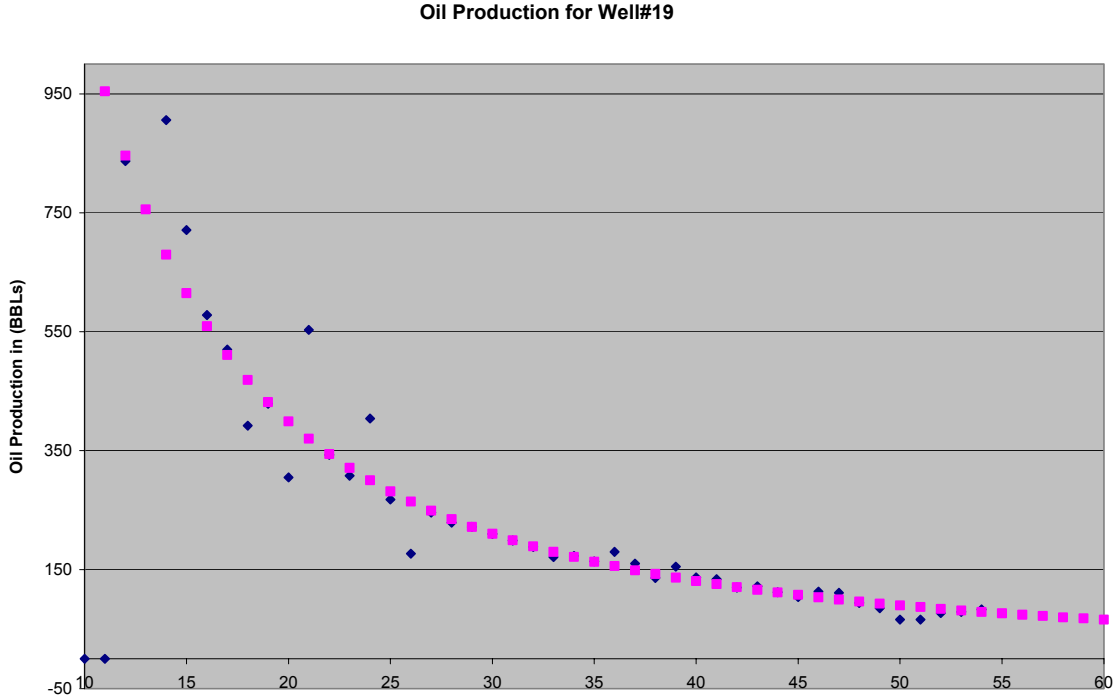
In the graphs for Well #11 and Well #3, there are two separate curves on the graph. This is because there was a break in the graph, which is where there was no production for the well for a few months. After that short period of no production, the well saw a drastic increase in production and then started again on its decline. Since we are only concerned with what the well is going to do in the future, there is no need to make a decline curve for the first curve.



Well #19 Gas Prediction

Month	Revenue	Cost	Tax	Net Cash	Present	Month	Revenue	Cost	Tax	Net Cash	Present
1	$4,765.12	$ 619.47	$1,989.91	$2,155.74	$ 2,154.45	19	$ 3,464.53	$450.39	$1,446.79	$1,567.35	$1,566.42
2	$4,669.99	$ 607.10	$1,950.19	$2,112.70	$ 2,111.44	20	$ 3,411.55	$443.50	$1,424.66	$1,543.39	$1,542.46
3	$4,578.32	$ 595.18	$1,911.91	$2,071.23	$ 2,069.99	21	$ 3,360.05	$436.81	$1,403.16	$1,520.09	$1,519.18
4	$4,489.92	$ 583.69	$1,874.99	$2,031.24	$ 2,030.02	22	$ 3,309.97	$430.30	$1,382.24	$1,497.43	$1,496.53
5	$4,404.63	$ 572.60	$1,839.37	$1,992.65	$ 1,991.46	23	$ 3,261.25	$423.96	$1,361.90	$1,475.39	$1,474.51
6	$4,322.29	$ 561.90	$1,804.99	$1,955.40	$ 1,954.23	24	$ 3,213.84	$417.80	$1,342.10	$1,453.94	$1,453.07
7	$4,242.75	$ 551.56	$1,771.77	$1,919.42	$ 1,918.27	25	$ 3,167.70	$411.80	$1,322.83	$1,433.07	$1,432.21
8	$4,165.88	$ 541.56	$1,739.67	$1,884.64	$ 1,883.51	26	$ 3,122.76	$405.96	$1,304.06	$1,412.74	$1,411.89
9	$4,091.54	$ 531.90	$1,708.63	$1,851.01	$ 1,849.90	27	$ 3,078.99	$400.27	$1,285.79	$1,392.93	$1,392.10
10	$4,019.62	$ 522.55	$1,678.59	$1,818.48	$ 1,817.39	28	$ 3,036.34	$394.72	$1,267.97	$1,373.64	$1,372.82
11	$3,950.01	$ 513.50	$1,649.52	$1,786.98	$ 1,785.91	29	$ 2,994.77	$389.32	$1,250.62	$1,354.83	$1,354.02
12	$3,882.59	$ 504.74	$1,621.37	$1,756.49	$ 1,755.43	30	$ 2,954.24	$384.05	$1,233.69	$1,336.50	$1,335.70
13	$3,817.28	$ 496.25	$1,594.09	$1,726.94	$ 1,725.90	31	$ 2,914.71	$378.91	$1,217.18	$1,318.62	$1,317.83
14	$3,753.96	$ 488.02	$1,567.66	$1,698.29	$ 1,697.27	32	$ 2,876.15	$373.90	$1,201.08	$1,301.17	$1,300.39
15	$3,692.57	$ 480.03	$1,542.02	$1,670.52	$ 1,669.52	33	$ 2,838.53	$369.01	$1,185.37	$1,284.15	$1,283.38
16	$3,633.00	$ 472.29	$1,517.14	$1,643.57	$ 1,642.58	34	$ 2,801.80	$364.23	$1,170.03	$1,267.54	$1,266.78
17	$3,575.19	$ 464.77	$1,493.00	$1,617.42	$ 1,616.45	35	$ 2,765.95	$359.57	$1,155.06	$1,251.32	$1,250.57
18	$3,519.06	$ 457.48	$1,469.56	$1,592.02	$ 1,591.07	36	$ 2,730.93	$355.02	$1,140.44	$1,235.47	$1,234.73

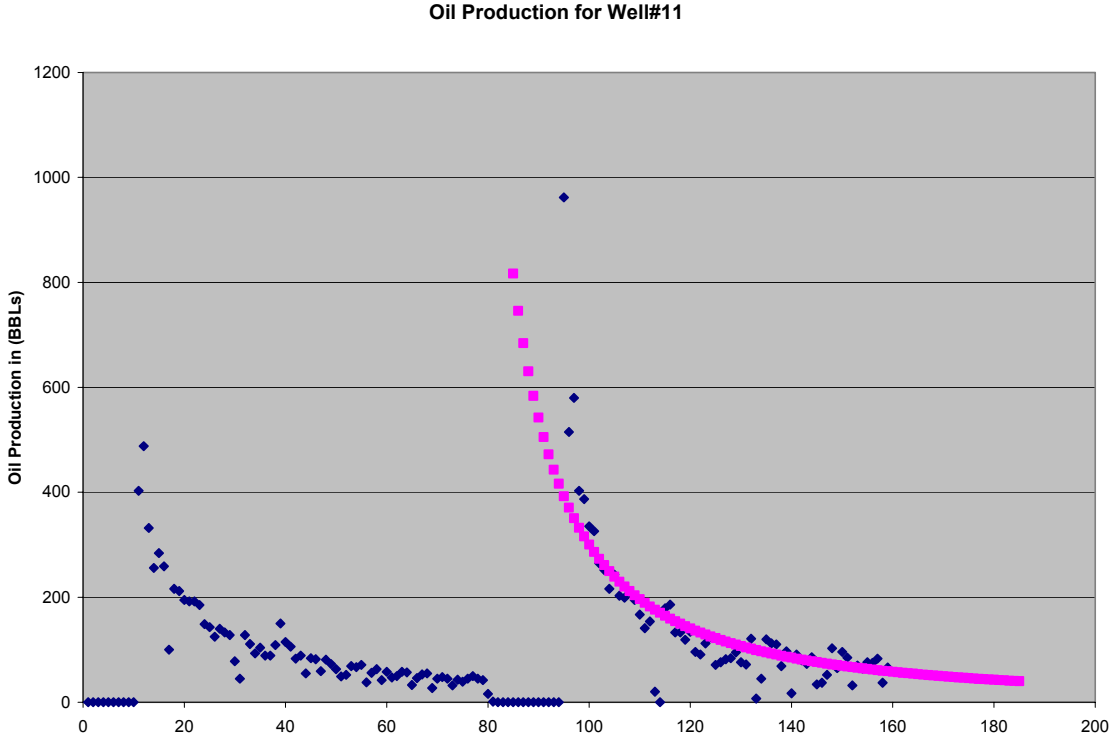
Total	$ 58,269.34



Well #19 Oil Prediction

Month	Revenue	Cost	Tax	Net Cash	Present	Month	Revenue	Cost	Tax	Net Cash	Present
1	$ 2,789.12	$391.38	$ 1,150.92	$1,246.82	$1,246.08	19	$1,648.04	$ 231.26	$680.06	$ 736.73	$728.38
2	$ 2,697.00	$378.45	$ 1,112.90	$1,205.64	$1,204.20	20	$1,607.02	$ 225.50	$663.13	$ 718.39	$709.82
3	$ 2,609.51	$366.17	$ 1,076.80	$1,166.53	$1,164.44	21	$1,567.56	$ 219.96	$646.85	$ 700.75	$691.98
4	$ 2,526.34	$354.50	$ 1,042.48	$1,129.36	$1,126.65	22	$1,529.58	$ 214.64	$631.18	$ 683.77	$674.81
5	$ 2,447.21	$343.40	$ 1,009.83	$1,093.98	$1,090.71	23	$1,493.01	$ 209.50	$616.09	$ 667.43	$658.28
6	$ 2,371.86	$332.83	$ 978.74	$1,060.30	$1,056.49	24	$1,457.78	$ 204.56	$601.55	$ 651.68	$642.36
7	$ 2,300.04	$322.75	$ 949.10	$1,028.19	$1,023.89	25	$1,423.82	$ 199.79	$587.53	$ 636.49	$627.02
8	$ 2,231.54	$313.14	$ 920.83	$ 997.57	$ 992.80	26	$1,391.07	$ 195.20	$574.02	$ 621.85	$612.23
9	$ 2,166.15	$303.96	$ 893.85	$ 968.34	$ 963.13	27	$1,359.48	$ 190.77	$560.98	$ 607.73	$597.97
10	$ 2,103.68	$295.19	$ 868.08	$ 940.42	$ 934.79	28	$1,328.98	$ 186.49	$548.40	$ 594.10	$584.20
11	$ 2,043.97	$286.81	$ 843.43	$ 913.72	$ 907.71	29	$1,299.53	$ 182.35	$536.24	$ 580.93	$570.91
12	$ 1,986.84	$278.80	$ 819.86	$ 888.18	$ 881.81	30	$1,271.08	$ 178.36	$524.50	$ 568.21	$558.08
13	$ 1,932.14	$271.12	$ 797.29	$ 863.73	$ 857.02	31	$1,243.58	$ 174.50	$513.16	$ 555.92	$545.68
14	$ 1,879.75	$263.77	$ 775.67	$ 840.31	$ 833.28	32	$1,217.00	$ 170.77	$502.19	$ 544.04	$533.69
15	$ 1,829.52	$256.72	$ 754.94	$ 817.86	$ 810.53	33	$1,191.28	$ 167.16	$491.58	$ 532.54	$522.10
16	$ 1,781.35	$249.96	$ 735.06	$ 796.32	$ 788.71	34	$1,166.40	$ 163.67	$481.31	$ 521.42	$510.89
17	$ 1,735.11	$243.48	$ 715.98	$ 775.65	$ 767.78	35	$1,142.31	$ 160.29	$471.37	$ 510.65	$500.04
18	$ 1,690.71	$237.24	$ 697.66	$ 755.80	$ 747.68	36	$1,118.99	$ 157.02	$461.74	$ 500.22	$489.54

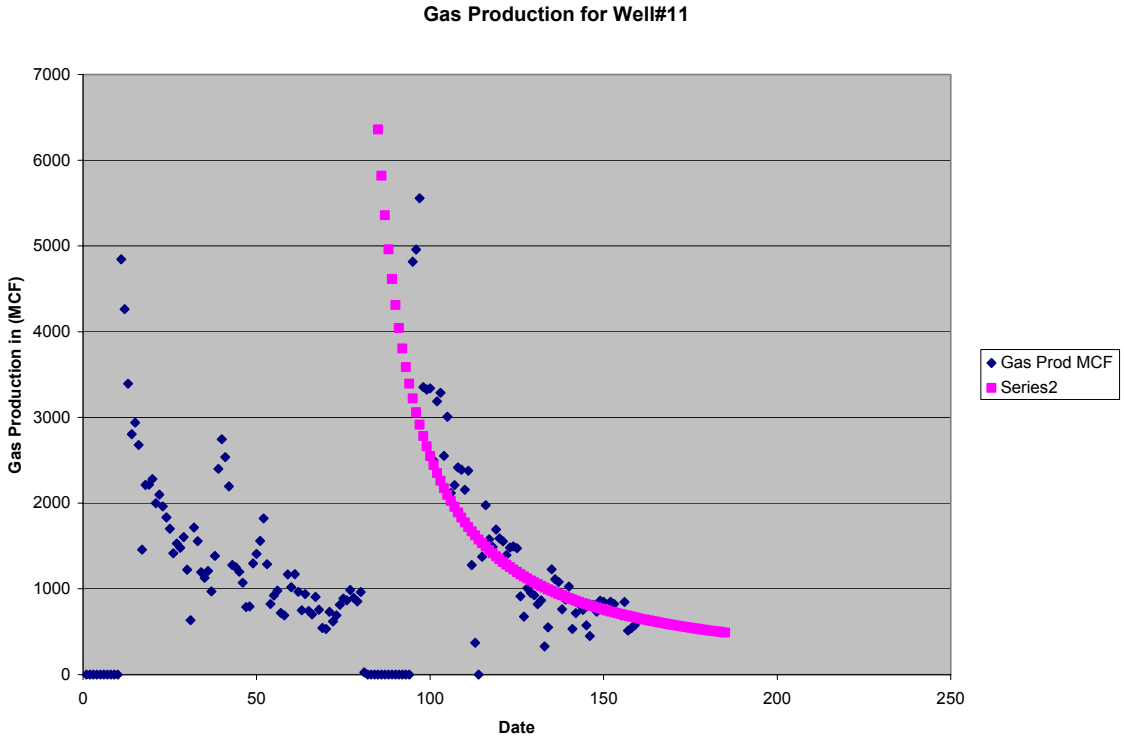
Total	$ 28,155.68



Well #11 Oil Prediction

Month	Revenue	Cost	Tax	Net Cash	Present	Month	Revenue	Cost	Tax	Net Cash	Present
1	$2,150.78	$301.80	$887.51	$ 961.47	$ 960.89	19	$1,428.53	$221.93	$ 579.17	$ 627.43	$ 620.32
2	$2,110.75	$296.19	$870.99	$ 943.57	$ 942.44	20	$1,406.69	$218.54	$ 570.31	$ 617.84	$ 610.47
3	$2,071.93	$290.74	$854.97	$ 926.22	$ 924.55	21	$1,385.41	$215.23	$ 561.68	$ 608.49	$ 600.87
4	$1,837.41	$285.45	$744.94	$ 807.02	$ 805.08	22	$1,364.64	$212.01	$ 553.27	$ 599.37	$ 591.51
5	$1,804.41	$280.33	$731.56	$ 792.52	$ 790.15	23	$1,344.39	$208.86	$ 545.05	$ 590.47	$ 582.38
6	$1,772.37	$275.35	$718.57	$ 778.45	$ 775.65	24	$1,324.63	$205.79	$ 537.04	$ 581.79	$ 573.48
7	$1,741.26	$270.52	$705.96	$ 764.79	$ 761.58	25	$1,305.34	$202.79	$ 529.22	$ 573.32	$ 564.79
8	$1,711.05	$265.82	$693.71	$ 751.52	$ 747.92	26	$1,286.51	$199.87	$ 521.59	$ 565.05	$ 556.31
9	$1,681.69	$261.26	$681.80	$ 738.62	$ 734.64	27	$1,268.12	$197.01	$ 514.13	$ 556.98	$ 548.03
10	$1,653.15	$256.83	$670.23	$ 726.09	$ 721.74	28	$1,250.17	$194.22	$ 506.85	$ 549.09	$ 539.95
11	$1,625.40	$252.52	$658.98	$ 713.90	$ 709.20	29	$1,232.63	$191.50	$ 499.74	$ 541.39	$ 532.05
12	$1,598.41	$248.32	$648.04	$ 702.04	$ 697.01	30	$1,215.49	$188.84	$ 492.79	$ 533.86	$ 524.34
13	$1,572.15	$244.25	$637.40	$ 690.51	$ 685.15	31	$1,198.74	$186.23	$ 486.00	$ 526.50	$ 516.81
14	$1,546.60	$240.28	$627.04	$ 679.29	$ 673.61	32	$1,182.37	$183.69	$ 479.37	$ 519.31	$ 509.44
15	$1,521.73	$236.41	$616.95	$ 668.36	$ 662.38	33	$1,166.37	$181.20	$ 472.88	$ 512.28	$ 502.24
16	$1,497.50	$232.65	$607.13	$ 657.73	$ 651.44	34	$1,150.72	$178.77	$ 466.53	$ 505.41	$ 495.21
17	$1,473.91	$228.98	$597.57	$ 647.36	$ 640.80	35	$1,135.41	$176.39	$ 460.33	$ 498.69	$ 488.33
18	$1,450.93	$225.41	$588.25	$ 637.27	$ 630.42	36	$1,120.44	$174.07	$ 454.26	$ 492.11	$ 481.60

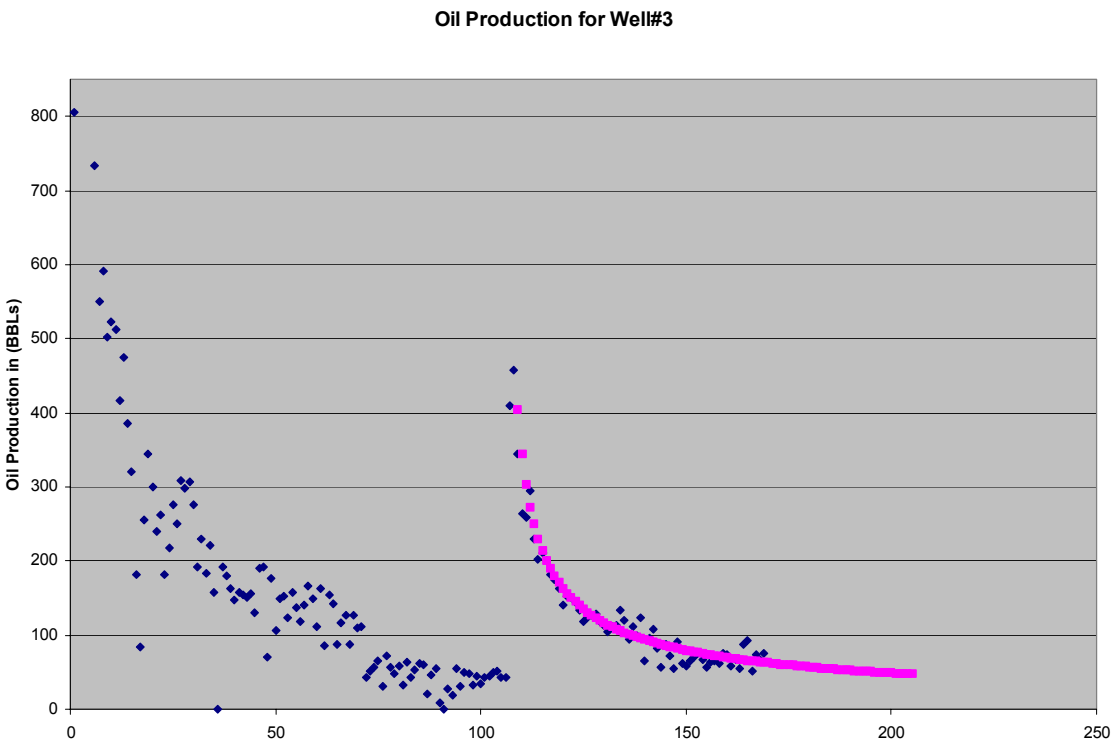
Total	$ 23,352.81



Well #11 Gas Prediction

Month	Revenue	Cost	Tax	Net Cash	Present	Month	Revenue	Cost	Tax	Net Cash	Present
1	$3,794.24	$493.25	$1,584.48	$1,716.52	$ 1,715.49	19	$2,969.92	$386.09	$1,240.24	$1,343.59	$1,328.37
2	$3,737.63	$485.89	$1,560.84	$1,690.91	$ 1,688.88	20	$2,933.85	$381.40	$1,225.17	$1,327.27	$1,311.45
3	$3,682.57	$478.73	$1,537.84	$1,665.99	$ 1,663.00	21	$2,898.57	$376.81	$1,210.44	$1,311.32	$1,294.90
4	$3,628.98	$471.77	$1,515.46	$1,641.75	$ 1,637.82	22	$2,864.08	$372.33	$1,196.04	$1,295.71	$1,278.72
5	$3,576.82	$464.99	$1,493.68	$1,618.16	$ 1,613.31	23	$2,830.33	$367.94	$1,181.95	$1,280.44	$1,262.90
6	$3,526.04	$458.38	$1,472.47	$1,595.18	$ 1,589.45	24	$2,797.32	$363.65	$1,168.16	$1,265.51	$1,247.42
7	$3,476.57	$451.95	$1,451.81	$1,572.80	$ 1,566.21	25	$2,765.01	$359.45	$1,154.67	$1,250.89	$1,232.27
8	$3,428.36	$445.69	$1,431.68	$1,550.99	$ 1,543.57	26	$2,733.38	$355.34	$1,141.46	$1,236.58	$1,217.45
9	$3,381.38	$439.58	$1,412.07	$1,529.74	$ 1,521.50	27	$2,702.42	$351.31	$1,128.53	$1,222.57	$1,202.93
10	$3,335.58	$433.63	$1,392.94	$1,509.02	$ 1,499.99	28	$2,672.09	$347.37	$1,115.87	$1,208.86	$1,188.72
11	$3,290.91	$427.82	$1,374.29	$1,488.81	$ 1,479.02	29	$2,642.40	$343.51	$1,103.46	$1,195.42	$1,174.81
12	$3,247.34	$422.15	$1,356.09	$1,469.10	$ 1,458.56	30	$2,613.30	$339.73	$1,091.32	$1,182.26	$1,161.17
13	$3,204.82	$416.63	$1,338.33	$1,449.86	$ 1,438.60	31	$2,584.80	$336.02	$1,079.41	$1,169.36	$1,147.82
14	$3,163.32	$411.23	$1,321.00	$1,431.09	$ 1,419.12	32	$2,556.86	$332.39	$1,067.74	$1,156.72	$1,134.73
15	$3,122.81	$405.96	$1,304.08	$1,412.76	$ 1,400.10	33	$2,529.48	$328.83	$1,056.31	$1,144.34	$1,121.91
16	$3,083.24	$400.82	$1,287.56	$1,394.86	$ 1,381.53	34	$2,502.63	$325.34	$1,045.10	$1,132.19	$1,109.34
17	$3,044.59	$395.80	$1,271.42	$1,377.37	$ 1,363.40	35	$2,476.31	$321.92	$1,034.11	$1,120.28	$1,097.01
18	$3,006.83	$390.89	$1,255.65	$1,360.29	$ 1,345.68	36	$2,450.49	$318.56	$1,023.33	$1,108.60	$1,084.92

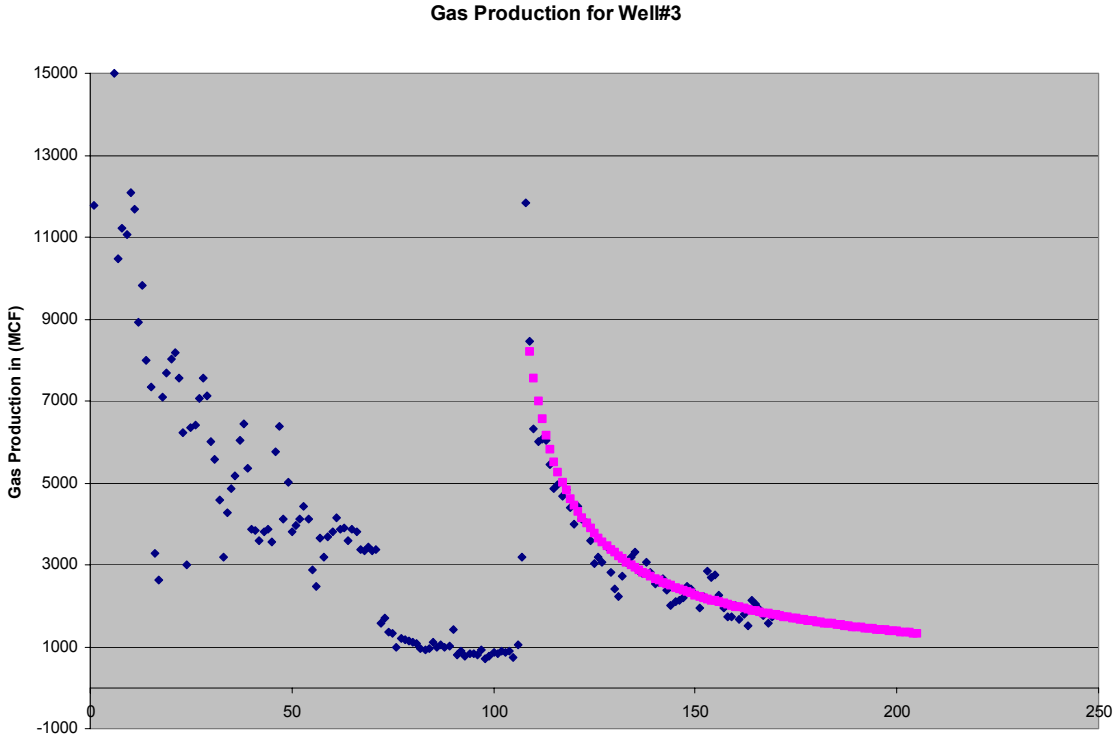
Total	$ 48,922.06



Well #3 Oil Prediction

Month	Revenue	Cost	Tax	Net Cash	Present	Month	Revenue	Cost	Tax	Net Cash	Present
1	$1,941.58	$267.14	$803.73	$ 870.71	$ 865.52	19	$1,656.79	$228.92	$685.38	$ 742.49	$662.72
2	$1,922.43	$264.58	$795.76	$ 862.08	$ 851.83	20	$1,643.97	$227.19	$680.05	$ 736.73	$653.65
3	$1,903.75	$262.09	$788.00	$ 853.66	$ 838.48	21	$1,631.41	$225.50	$674.84	$ 731.07	$644.77
4	$1,885.53	$259.65	$780.42	$ 845.46	$ 825.46	22	$1,619.08	$223.83	$669.72	$ 725.53	$636.06
5	$1,867.74	$257.27	$773.03	$ 837.44	$ 812.77	23	$1,606.99	$222.20	$664.70	$ 720.09	$627.53
6	$1,850.38	$254.95	$765.81	$ 829.63	$ 800.38	24	$1,595.13	$220.60	$659.78	$ 714.76	$619.17
7	$1,833.42	$252.67	$758.76	$ 821.99	$ 788.28	25	$1,583.49	$219.02	$654.94	$ 709.52	$610.97
8	$1,816.86	$250.45	$751.87	$ 814.53	$ 776.47	26	$1,572.06	$217.48	$650.20	$ 704.39	$602.92
9	$1,800.67	$248.28	$745.14	$ 807.24	$ 764.93	27	$1,560.84	$215.96	$645.55	$ 699.34	$595.04
10	$1,784.84	$246.16	$738.57	$ 800.11	$ 753.65	28	$1,549.83	$214.47	$640.97	$ 694.39	$587.30
11	$1,769.36	$244.08	$732.14	$ 793.15	$ 742.64	29	$1,539.01	$213.00	$636.48	$ 689.52	$579.71
12	$1,754.22	$242.04	$725.85	$ 786.33	$ 731.87	30	$1,528.38	$211.56	$632.07	$ 684.74	$572.25
13	$1,739.41	$240.05	$719.69	$ 779.67	$ 721.33	31	$1,517.93	$210.14	$627.74	$ 680.05	$564.94
14	$1,724.91	$238.10	$713.67	$ 773.14	$ 711.03	32	$1,507.66	$208.75	$623.48	$ 675.43	$557.76
15	$1,710.72	$236.19	$707.77	$ 766.75	$ 700.95	33	$1,497.58	$207.38	$619.29	$ 670.90	$550.71
16	$1,696.82	$234.32	$702.00	$ 760.50	$ 691.08	34	$1,487.66	$206.04	$615.18	$ 666.44	$543.79
17	$1,683.20	$232.48	$696.34	$ 754.37	$ 681.43	35	$1,477.90	$204.71	$611.13	$ 662.06	$536.99
18	$1,669.86	$230.69	$690.80	$ 748.37	$ 671.98	36	$1,468.31	$203.41	$607.15	$ 657.75	$530.31

Total	$ 24,406.65



Well #3 Gas Prediction

Month	Revenue	Cost	Tax	Net Cash	Present	Month	Revenue	Cost	Tax	Net Cash	Present
1	$8,985.35	$1,168.10	$3,752.28	$ 4,064.97	$4,040.73	19	$7,600.14	$988.02	$3,173.82	$3,438.30	$3,068.90
2	$8,892.34	$1,156.00	$3,713.44	$ 4,022.89	$3,975.05	20	$7,537.74	$979.91	$3,147.76	$3,410.07	$3,025.55
3	$8,801.60	$1,144.21	$3,675.55	$ 3,981.84	$3,911.02	21	$7,476.56	$971.95	$3,122.21	$3,382.39	$2,983.09
4	$8,713.05	$1,132.70	$3,638.57	$ 3,941.78	$3,848.58	22	$7,416.55	$964.15	$3,097.15	$3,355.25	$2,941.50
5	$8,626.61	$1,121.46	$3,602.47	$ 3,902.68	$3,787.68	23	$7,357.69	$956.50	$3,072.57	$3,328.62	$2,900.75
6	$8,542.20	$1,110.49	$3,567.22	$ 3,864.49	$3,728.24	24	$7,299.94	$948.99	$3,048.45	$3,302.49	$2,860.82
7	$8,459.74	$1,099.77	$3,532.79	$ 3,827.19	$3,670.24	25	$7,243.26	$941.62	$3,024.79	$3,276.85	$2,821.68
8	$8,379.18	$1,089.29	$3,499.14	$ 3,790.74	$3,613.60	26	$7,187.63	$934.39	$3,001.55	$3,251.68	$2,783.30
9	$8,300.42	$1,079.05	$3,466.26	$ 3,755.11	$3,558.29	27	$7,133.01	$927.29	$2,978.75	$3,226.97	$2,745.68
10	$8,223.42	$1,069.05	$3,434.10	$ 3,720.28	$3,504.25	28	$7,079.38	$920.32	$2,956.35	$3,202.71	$2,708.78
11	$8,148.12	$1,059.26	$3,402.65	$ 3,686.21	$3,451.45	29	$7,026.71	$913.47	$2,934.35	$3,178.88	$2,672.59
12	$8,074.45	$1,049.68	$3,371.89	$ 3,652.88	$3,399.85	30	$6,974.96	$906.75	$2,912.74	$3,155.47	$2,637.09
13	$8,002.35	$1,040.31	$3,341.78	$ 3,620.26	$3,349.40	31	$6,924.12	$900.14	$2,891.51	$3,132.47	$2,602.26
14	$7,931.78	$1,031.13	$3,312.31	$ 3,588.34	$3,300.06	32	$6,874.17	$893.64	$2,870.65	$3,109.87	$2,568.07
15	$7,862.69	$1,022.15	$3,283.46	$ 3,557.08	$3,251.80	33	$6,825.06	$887.26	$2,850.15	$3,087.66	$2,534.52
16	$7,795.03	$1,013.35	$3,255.20	$ 3,526.47	$3,204.59	34	$6,776.80	$880.98	$2,829.99	$3,065.82	$2,501.59
17	$7,728.74	$1,004.74	$3,227.52	$ 3,496.48	$3,158.39	35	$6,729.34	$874.81	$2,810.17	$3,044.35	$2,469.25
18	$7,663.79	$ 996.29	$3,200.40	$ 3,467.10	$3,113.17	36	$6,682.67	$868.75	$2,790.68	$3,023.24	$2,437.51

Total	$ 113,129.32

Conclusions

The information for every well, was carefully looked over when deciding which well was the one to be recommended. The analysis shows that Vandalay Industries believes that Well #3 is the appropriate decision. Because Well #3 is shown to produce more oil and gas in the next three years, it is the well that will make the most money. Each well resembles one another when comparing total oil cash flow, however, Well #3 stands above the other two when comparing gas cash flow. It produces almost twice as much as the other wells. From the information from the graphs and tables, it is quite clear that the best choice. Vandalay Industries highly recommends the purchase of Well #3. There is no doubt that it will make much more of a profit than that of any other well and will increase company cash flow.

Vandalay Industries

Joshua Pike

Engineering 101

10-22-02