

PNGE 441: Oil and Gas Property Evaluation
Project #2
“Investment Decision based on Predicted Oil and Gas Production”

By Micah Pingley, Matt Goralczyk, and Joshua Cook
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West Virginia University
Department of Petroleum and Natural Gas Engineering

Table of Contents

Executive Summary	Page 3
Introduction	Page 4
Background	Page 5
Problem Statement	Page 6
Methodology and Procedures	Page 7
Results	Page 10
Conclusions	Page 16
References	Page 17
Appendix	Page 18

Executive Summary

Executive Summary

The purpose of this project was to evaluate two oil wells based on known production data in order to determine which the better investment is. The wells chosen by this group were the WLS 1-28 and LDA 1-34 wells. The production data from these wells was acquired from the Pump-Production Spreadsheet found on the class website. Type curve and decline curve analysis were compiled for each well and the production was forecasted for the next three years. Once the future production was calculated based on the decline rate, D_i , and the hyperbolic exponent, b , is found, then an economic analysis was performed on the which gave the net cash flows and net present values of the wells. With an assumed discount rate of 15%, a net present value of \$156,624 was calculated for the LDA 1-34 well and a net present value of \$501,485 was calculated for the WLS 1-28 well. The WLS 1-28 appears to be a better investment.

Introduction

In this project, the group uses a type curve and a decline curve analysis to predict oil and gas production on two different wells. After the production has been forecasted, a net present value is determined for both wells based on current oil and gas prices. A present value profile is also presented to give management a visualization of the performance of each well as an added feature.

Background

In the previous project in the class, a net present value program was developed to make it more convenient to analyze the economic performance of producing oil and gas wells under certain economic conditions. This program was used in this program to calculate the net present value of two different wells that a management team will be considering based on the results of this report. A present value profile is also presented.

The Fetkovich type curve analysis and Intelligent Production Decline Analysis program were tools of interpretation used in this project and were covered in class. Interpretation is an art and is cultivated, so the results in this report will be subject for more experienced human interpretation.

Problem Statement

A company is offered two wells to invest in and the only data available is the oil and gas production data. Management has indicated that the company will only invest in one of the wells and has handed down the current annual interest rate of 15%. The production rates are given on the class website. This data is to be used to predict future production by finding the proper D_i , Q_i , and b values for the decline curves of both gas and oil production. The tools of prediction are type curve and decline curve analysis. These tools are to be used concurrently to help in the interpretation of the past production to help predict the future production over the next three years. Current crude oil and gas prices are to be used in the economic analysis along with consistent operating costs and tax rates. The net present value is to be found using the program developed in the first project from PNGE 441. A recommendation of which well to invest in is to be made based on the results from all the above information.

Methodology and Procedures

Acquiring Production Data

First, production data for oil and gas must be obtained and organized. The data acquired must be in chronological order and is usually presented on a monthly basis. The data presented to this group was on a monthly basis for a total of seven years.

Type Curve Analysis

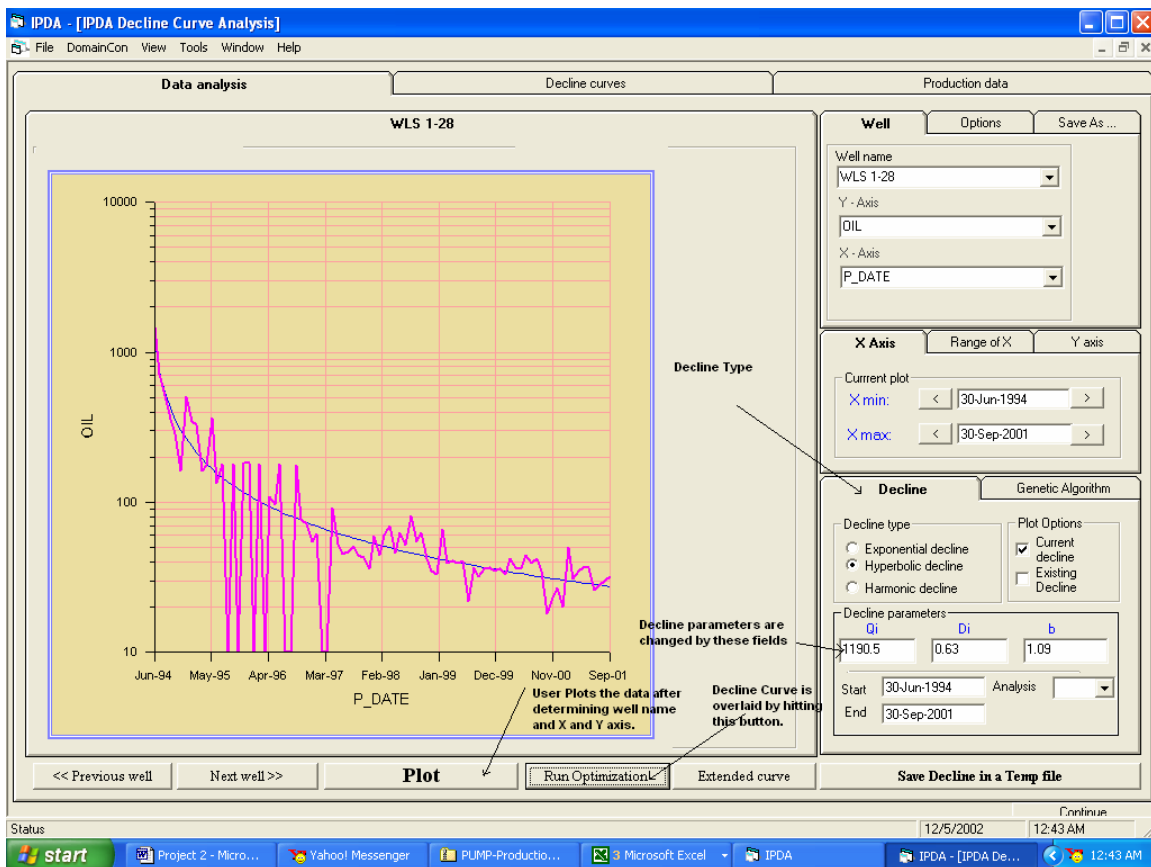
Next, a type curve analysis was performed on the data. In this project a Fetkovich type curve was used. A Fetkovich type curve combines the early transient flow period with empirical hyperbolic equations. The assumptions for the Fetkovich type curve are that the well must be in pseudo-steady state to determine the decline parameters D_i , b and Q_i (initial production rate). Other assumptions are that the wells must be circular, bounded reservoirs with the well in the center, the reservoir fluids must be single phase, and that all production be liquids.

The data was overlaid on the Fetkovich type curve in a convenient fashion on a Microsoft Excel application named; *Arps Fetkovich Type Curve.xls*. This was also handed along with the production data. The application allowed the group to input the data into a “match data” sheet where the production is visualized on the Fetkovich Type Curve. The user then could shift the data curve to overlay the best fit on the hyperbolic exponent line (b) by adjusting match points: t_{dmatch} and q_{dmatch} . The analysis in this project using the type curve was only carried as far as finding the hyperbolic decline exponent. The decline curve analysis was performed using another tool. The interpretation method for the Fetkovich type curve was to compare the hyperbolic decline

curve exponent. The application, *IPDA* (Intelligent Production Decline Analysis), was used to determine the parameters required for future decline; Q_i , D_i and b .

Decline Curve Analysis

The decline curve analysis program, IPDA, requires the user to open a project file and insert the production data into the program by a Microsoft Excel worksheet. The user declares the well name, latitude and longitude of the well at the initial prompt and then the program allows the user to then plot the data and optimize by choosing a type curve. Here is a screenshot of the program:



After the user Plots, they may Run Optimization. The decline curve is then overlaid on top of the production and the parameters can then be changed to the user's

satisfaction. Since this is an interpretation tool, there is no definite solution to each type curve. There is also a smoothing tool that the user can use to smooth the production data to better visualize a curve fit.

When the user is satisfied with the curve fit, then the values of Q_i , D_i and b can be used to forecast the production for as long as the user wants. If the decline is hyperbolic, then oil production for each interval of time is calculated by the equation:

$$N_p = \frac{q_i^b}{D_i(1-b)} [q_i^{1-b} - q^{1-b}] * f$$

where f is the constant to account for units. The production is calculated per month by

This equation is satisfactory for the wells in this project because both wells fit the hyperbolic decline type. Hyperbolic decline type curves are for hyperbolic decline exponents greater than zero and non-equal to one.

Economic Analysis

The economic analysis was performed after the future production has been predicted. The incremental calculations were performed on a monthly basis and then revenue was calculated. In both wells, gas and oil production were predicted and then the revenue was calculated at the current gas and oil price. The operating cost was assumed at \$500 per month, the tax rate is 45%, and the discount rate was 15%. The net present value was determined for each increment and then the results for both wells are presented in the results section of this report. The well with the highest net present value wins the management's investment decision.

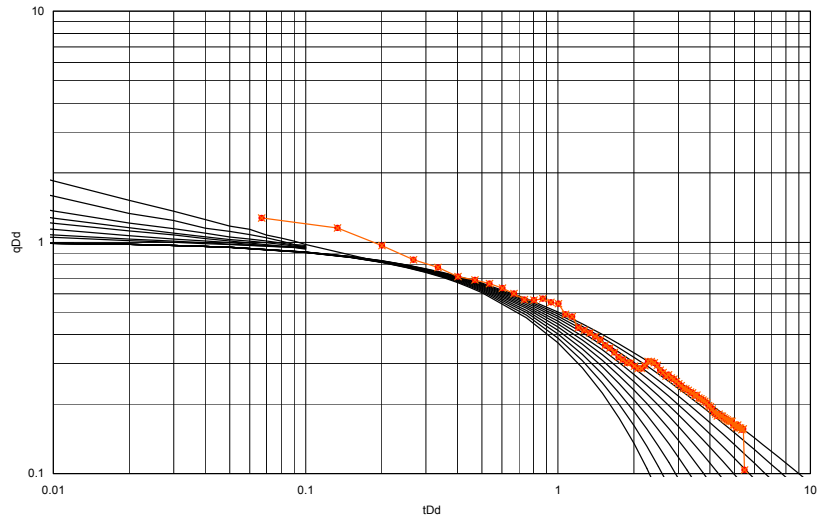
Results and Discussion

Type Curve and Decline Curve Analysis

The detailed results of calculated data are listed in the appendix for the type curve, decline curve, and economic analysis. First the production data from each well was graphed to show the decline curves for both gas and oil. This process was completed using both Excel and the IPDA program found in the Petroleum Computer Laboratory. Both systems were used so that the results could be compared as a system of checks and balances to improve the accuracy of the results. The Type curve analysis done using Excel showed consistency within reason to that obtained by the IPDA program. The only time that the results from the two systems did not agree was when gas production type curve analysis was completed. This is because the Fetkovich Type curves are not meant to be used for gas production. The Fetkovich Type Curves are only meant to be used for single phase production where as in both wells there is oil and gas production. The following charts show the Fetkovich Type curves for gas and oil production of both wells. Larger versions of these curves are shown in the appendix at the end of this report.

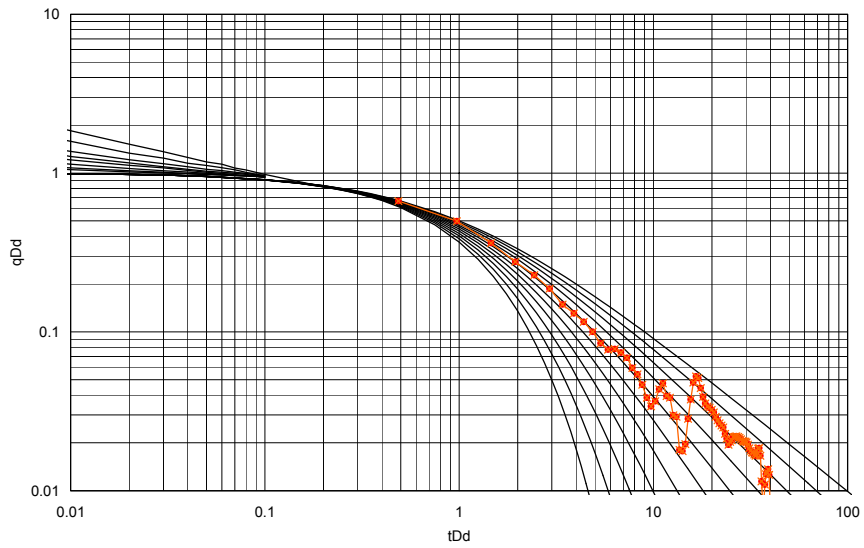
Type Curve for LDA 1-34 Gas Production

Type Curve for Gas Production in LDA 1-34



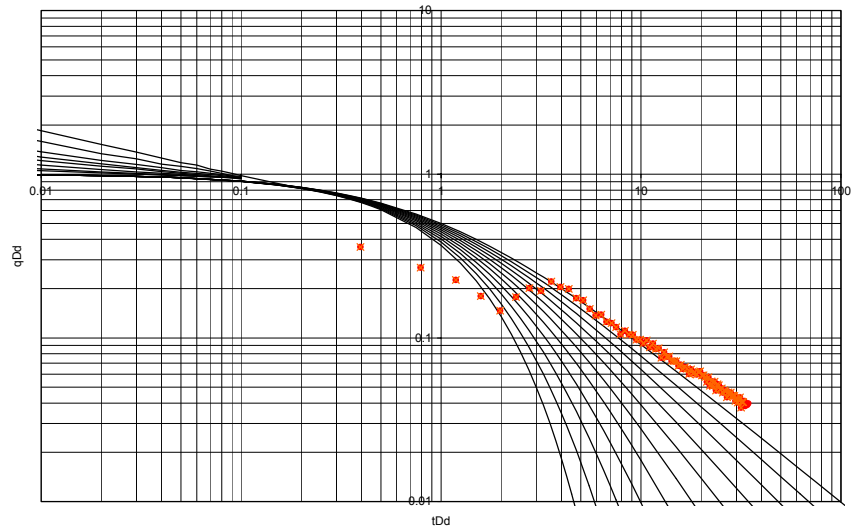
Type Curve for Oil Production Well LDA 1-34

Type Curve for Oil Production in LDA 1-34



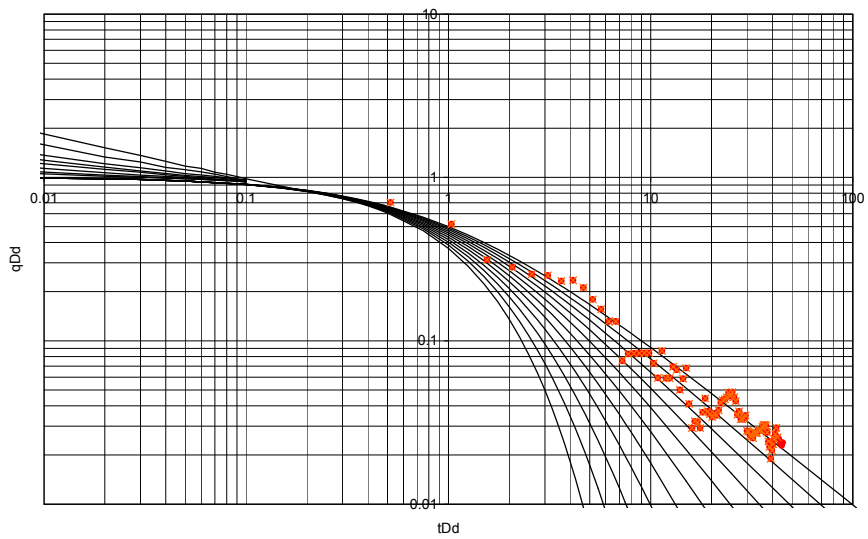
Type Curve for WLS 1-28 Gas Production

Type Curve for Gas Production for WLS 1-28



Type Curve for Oil Production in Well WLS 1-28

Type Curve for Oil Production in WLS 1-28



Decline Curve Parameters

Oil Data	Well LDA 1- 34	Gas Data	Well LDA 1- 34
<i>b</i> =	0.9	<i>b</i> =	1.4
<i>D_i</i> =	0.0692	<i>D_i</i> =	0.1267
<i>Q_i</i> =	2358	<i>Q_i</i> =	31000
<i>Tax</i>		<i>Tax</i>	
<i>Rate</i> =	0.45	<i>Rate</i> =	0.45
<i>Oil</i>		<i>Gas</i>	
<i>Price</i> =	\$27	<i>Price</i> =	\$4

Oil Data	Well WLS 1- 28	Gas Data	Well WLS 1- 28
<i>b</i> =	1.1	<i>b</i> =	1.44
<i>D_i</i> =	0.63	<i>D_i</i> =	0.49
<i>Q_i</i> =	1190.5	<i>Q_i</i> =	1135.8
<i>Tax</i>		<i>Tax</i>	
<i>Rate</i> =	0.45	<i>Rate</i> =	0.45
<i>Oil</i>		<i>Gas</i>	
<i>Price</i> =	27	<i>Price</i> =	4

Economic Analysis

For this project the current gas and oil prices are \$4.00 per MCF and \$27.00 per STB respectively and the tax rate used was 45%. The net cash flows and net present values for the two wells are shown in the table on the following page.

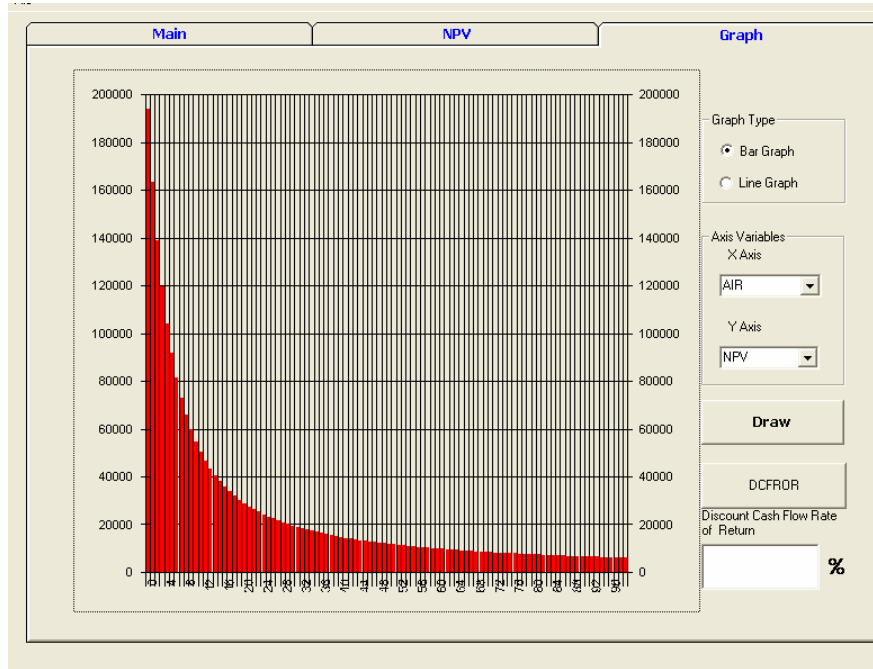
Net Present Value

	Well WLS 1-28		Well LDA 1-34	
Time (months)	Net Cash Flow	NPV	Net Cash Flow	NPV
1	\$19,710.70	\$19,467.36	\$5,942.20	\$5,868.84
2	\$19,535.48	\$19,056.10	\$5,906.77	\$5,761.83
3	\$19,363.87	\$18,655.50	\$5,871.73	\$5,656.93
4	\$19,195.75	\$18,265.22	\$5,837.06	\$5,554.11
5	\$19,031.01	\$17,884.90	\$5,802.77	\$5,453.31
6	\$18,869.54	\$17,514.24	\$5,768.84	\$5,354.49
7	\$18,711.25	\$17,152.90	\$5,735.27	\$5,257.61
8	\$18,556.04	\$16,800.61	\$5,702.06	\$5,162.63
9	\$18,403.80	\$16,457.06	\$5,669.19	\$5,069.51
10	\$18,254.46	\$16,121.99	\$5,636.67	\$4,978.20
11	\$18,107.93	\$15,795.14	\$5,604.49	\$4,888.67
12	\$17,964.12	\$15,476.24	\$5,572.64	\$4,800.88
13	\$17,822.96	\$15,165.07	\$5,541.12	\$4,714.78
14	\$17,684.36	\$14,861.37	\$5,509.92	\$4,630.36
15	\$17,548.26	\$14,564.94	\$5,479.04	\$4,547.56
16	\$17,414.59	\$14,275.54	\$5,448.47	\$4,466.36
17	\$17,283.27	\$13,992.99	\$5,418.21	\$4,386.72
18	\$17,154.25	\$13,717.06	\$5,388.25	\$4,308.61
19	\$17,027.45	\$13,447.58	\$5,358.60	\$4,232.00
20	\$16,902.83	\$13,184.35	\$5,329.24	\$4,156.85
21	\$16,780.32	\$12,927.20	\$5,300.17	\$4,083.13
22	\$16,659.86	\$12,675.95	\$5,271.38	\$4,010.82
23	\$16,541.41	\$12,430.45	\$5,242.88	\$3,939.89
24	\$16,424.90	\$12,190.51	\$5,214.66	\$3,870.30
25	\$16,310.30	\$11,956.01	\$5,186.71	\$3,802.03
26	\$16,197.54	\$11,726.77	\$5,159.03	\$3,735.05
27	\$16,086.59	\$11,502.66	\$5,131.61	\$3,669.34
28	\$15,977.40	\$11,283.54	\$5,104.46	\$3,604.87
29	\$15,869.93	\$11,069.27	\$5,077.57	\$3,541.60
30	\$15,764.13	\$10,859.73	\$5,050.93	\$3,479.53
31	\$15,659.96	\$10,654.78	\$5,024.55	\$3,418.62
32	\$15,557.38	\$10,454.31	\$4,998.41	\$3,358.85
33	\$15,456.36	\$10,258.20	\$4,972.52	\$3,300.20
34	\$15,356.86	\$10,066.33	\$4,946.87	\$3,242.64
35	\$15,258.84	\$9,878.60	\$4,921.45	\$3,186.16
36	\$15,162.26	\$9,694.89	\$4,896.27	\$3,130.72
37		\$501,485.36		\$156,624.01

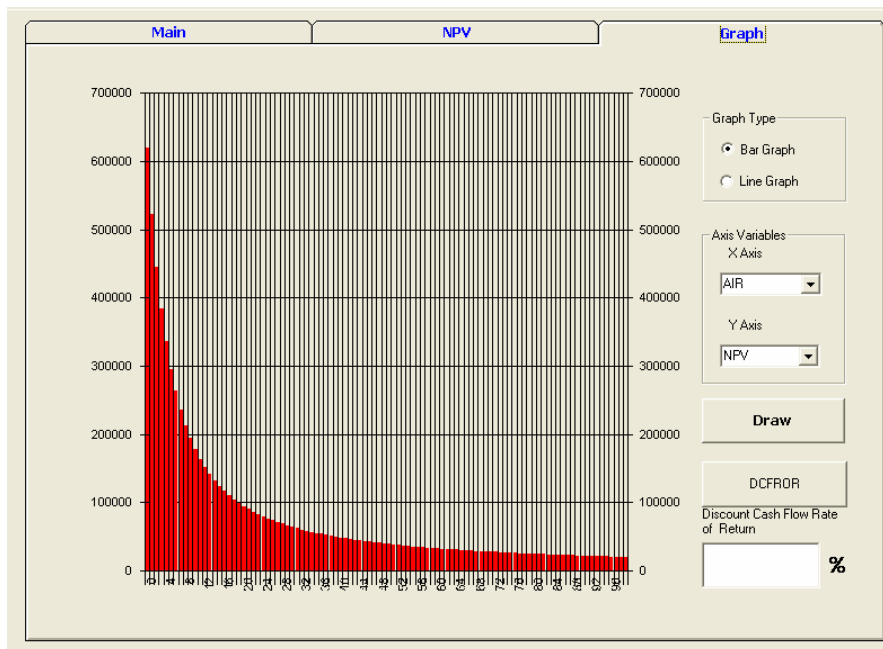
The net present value of \$156,624 was calculated for the LDA 1-34 well. A net present value of \$501,485 was calculated for the WLS 1-28 well after the 3 year production

period. The WLS 1-28 appears to be a better investment. The present value profile screenshots from the program *NPVcalc* are presented here:

Present Value Profile for LDA 1-34



Present Value Profile for WLS 1-28



Conclusions

After completion of the economic and decline curve analysis, WLS 1-28 offers the most attractive NPV value. It is therefore concluded that WLS 1-28 is the best option for investment. The net present value found for WLS 1-28 was \$501,485 where as well LDA 1-34 has a value of only \$156,624. This NPV was found for each well after finding the future production over the three year period following the end of production data.

References

Oil Property Evaluation, Second Edition by Robert S. Thompson and John D. Wright. Copyright 1984, 1985 by Thompson-Wright Associates, Golden, Colorado 80402.

IPDA (Intelligent Production Decline Analysis). Used by permission by the Consortium for Virtual Operations Research, copyright 2002 West Virginia University.

NPVcalc, permission granted by Micah Pingley, West Virginia University. Copyright 2002.

Appendix

- Production data
- Economic data
- Performance matrix

Production Data

Well Name	Latitude	Longitude	P_DATE	OIL	GAS
WLS 1-28	34.79451	-97.63036	1/31/1994	0	0
WLS 1-28	34.79451	-97.63036	2/28/1994	0	0
WLS 1-28	34.79451	-97.63036	3/31/1994	0	0
WLS 1-28	34.79451	-97.63036	4/30/1994	0	0
WLS 1-28	34.79451	-97.63036	5/31/1994	0	0
WLS 1-28	34.79451	-97.63036	6/30/1994	1,485	27,711
WLS 1-28	34.79451	-97.63036	7/31/1994	711	10,943
WLS 1-28	34.79451	-97.63036	8/31/1994	515	8,178
WLS 1-28	34.79451	-97.63036	9/30/1994	357	6,864
WLS 1-28	34.79451	-97.63036	10/31/1994	285	5,475
WLS 1-28	34.79451	-97.63036	11/30/1994	161	4,459
WLS 1-28	34.79451	-97.63036	12/31/1994	510	5,399
WLS 1-28	34.79451	-97.63036	1/31/1995	344	6,131
WLS 1-28	34.79451	-97.63036	2/28/1995	327	5,901
WLS 1-28	34.79451	-97.63036	3/31/1995	161	6,719
WLS 1-28	34.79451	-97.63036	4/30/1995	177	6,220
WLS 1-28	34.79451	-97.63036	5/31/1995	362	6,058
WLS 1-28	34.79451	-97.63036	6/30/1995	133	5,319
WLS 1-28	34.79451	-97.63036	7/31/1995	178	5,163
WLS 1-28	34.79451	-97.63036	8/31/1995	0	4,576
WLS 1-28	34.79451	-97.63036	9/30/1995	178	4,174
WLS 1-28	34.79451	-97.63036	10/31/1995	0	4,220
WLS 1-28	34.79451	-97.63036	11/30/1995	182	3,812
WLS 1-28	34.79451	-97.63036	12/31/1995	183	3,745
WLS 1-28	34.79451	-97.63036	1/31/1996	0	3,543
WLS 1-28	34.79451	-97.63036	2/29/1996	180	3,202
WLS 1-28	34.79451	-97.63036	3/31/1996	0	3,365
WLS 1-28	34.79451	-97.63036	4/30/1996	108	3,194
WLS 1-28	34.79451	-97.63036	5/31/1996	96	3,181
WLS 1-28	34.79451	-97.63036	6/30/1996	178	2,965
WLS 1-28	34.79451	-97.63036	7/31/1996	0	2,972
WLS 1-28	34.79451	-97.63036	8/31/1996	0	2,817
WLS 1-28	34.79451	-97.63036	9/30/1996	175	2,940
WLS 1-28	34.79451	-97.63036	10/31/1996	77	2,660
WLS 1-28	34.79451	-97.63036	11/30/1996	72	2,811
WLS 1-28	34.79451	-97.63036	12/31/1996	55	2,595
WLS 1-28	34.79451	-97.63036	1/31/1997	62	2,628
WLS 1-28	34.79451	-97.63036	2/28/1997	0	2,299
WLS 1-28	34.79451	-97.63036	3/31/1997	0	2,482

WLS 1-28	34.79451	-97.63036	4/30/1997	91	2,330
WLS 1-28	34.79451	-97.63036	5/31/1997	53	2,343
WLS 1-28	34.79451	-97.63036	6/30/1997	45	2,195
WLS 1-28	34.79451	-97.63036	7/31/1997	47	2,193
WLS 1-28	34.79451	-97.63036	8/31/1997	51	2,188
WLS 1-28	34.79451	-97.63036	9/30/1997	44	2,054
WLS 1-28	34.79451	-97.63036	10/31/1997	43	2,083
WLS 1-28	34.79451	-97.63036	11/30/1997	36	1,968
WLS 1-28	34.79451	-97.63036	12/31/1997	59	2,018
WLS 1-28	34.79451	-97.63036	1/31/1998	44	1,971
WLS 1-28	34.79451	-97.63036	2/28/1998	61	1,830
WLS 1-28	34.79451	-97.63036	3/31/1998	70	1,953
WLS 1-28	34.79451	-97.63036	4/30/1998	46	1,850
WLS 1-28	34.79451	-97.63036	5/31/1998	63	1,872
WLS 1-28	34.79451	-97.63036	6/30/1998	52	1,819
WLS 1-28	34.79451	-97.63036	7/31/1998	81	1,887
WLS 1-28	34.79451	-97.63036	8/31/1998	55	1,900
WLS 1-28	34.79451	-97.63036	9/30/1998	63	1,793
WLS 1-28	34.79451	-97.63036	10/31/1998	42	1,798
WLS 1-28	34.79451	-97.63036	11/30/1998	35	1,752
WLS 1-28	34.79451	-97.63036	12/31/1998	33	1,639
WLS 1-28	34.79451	-97.63036	1/31/1999	66	1,751
WLS 1-28	34.79451	-97.63036	2/28/1999	39	1,553
WLS 1-28	34.79451	-97.63036	3/31/1999	41	1,649
WLS 1-28	34.79451	-97.63036	4/30/1999	39	1,547
WLS 1-28	34.79451	-97.63036	5/31/1999	41	1,644
WLS 1-28	34.79451	-97.63036	6/30/1999	22	1,452
WLS 1-28	34.79451	-97.63036	7/31/1999	37	1,585
WLS 1-28	34.79451	-97.63036	8/31/1999	32	1,564
WLS 1-28	34.79451	-97.63036	9/30/1999	36	1,472
WLS 1-28	34.79451	-97.63036	10/31/1999	37	1,495
WLS 1-28	34.79451	-97.63036	11/30/1999	35	1,410
WLS 1-28	34.79451	-97.63036	12/31/1999	36	1,459
WLS 1-28	34.79451	-97.63036	1/31/2000	33	1,436
WLS 1-28	34.79451	-97.63036	2/29/2000	42	1,322
WLS 1-28	34.79451	-97.63036	3/31/2000	37	1,414
WLS 1-28	34.79451	-97.63036	4/30/2000	36	1,361
WLS 1-28	34.79451	-97.63036	5/31/2000	44	1,410
WLS 1-28	34.79451	-97.63036	6/30/2000	39	1,347
WLS 1-28	34.79451	-97.63036	7/31/2000	42	1,355
WLS 1-28	34.79451	-97.63036	8/31/2000	35	1,344
WLS 1-28	34.79451	-97.63036	9/30/2000	18	1,255
WLS 1-28	34.79451	-97.63036	10/31/2000	23	1,313
WLS 1-28	34.79451	-97.63036	11/30/2000	27	1,228
WLS 1-28	34.79451	-97.63036	12/31/2000	20	1,262
WLS 1-28	34.79451	-97.63036	1/31/2001	50	1,318
WLS 1-28	34.79451	-97.63036	2/28/2001	31	1,139
WLS 1-28	34.79451	-97.63036	3/31/2001	35	1,242

WLS 1-28	34.79451	-97.63036	4/30/2001	37	1,233
WLS 1-28	34.79451	-97.63036	5/31/2001	37	1,253
WLS 1-28	34.79451	-97.63036	6/30/2001	26	1,168
WLS 1-28	34.79451	-97.63036	7/31/2001	28	1,207
WLS 1-28	34.79451	-97.63036	8/31/2001	30	1,185
WLS 1-28	34.79451	-97.63036	9/30/2001	32	1,211
LDA 1-34	34.68219	-97.50902	1/31/1994	0	0
LDA 1-34	34.68219	-97.50902	2/28/1994	0	0
LDA 1-34	34.68219	-97.50902	3/31/1994	0	0
LDA 1-34	34.68219	-97.50902	4/30/1994	0	0
LDA 1-34	34.68219	-97.50902	5/31/1994	0	0
LDA 1-34	34.68219	-97.50902	6/30/1994	0	0
LDA 1-34	34.68219	-97.50902	7/31/1994	0	0
LDA 1-34	34.68219	-97.50902	8/31/1994	0	0
LDA 1-34	34.68219	-97.50902	9/30/1994	0	0
LDA 1-34	34.68219	-97.50902	10/31/1994	0	0
LDA 1-34	34.68219	-97.50902	11/30/1994	2,144	24,957
LDA 1-34	34.68219	-97.50902	12/31/1994	1,981	28,577
LDA 1-34	34.68219	-97.50902	1/31/1995	1,007	22,479
LDA 1-34	34.68219	-97.50902	2/28/1995	798	17,825
LDA 1-34	34.68219	-97.50902	3/31/1995	647	17,450
LDA 1-34	34.68219	-97.50902	4/30/1995	591	14,872
LDA 1-34	34.68219	-97.50902	5/31/1995	574	14,151
LDA 1-34	34.68219	-97.50902	6/30/1995	180	13,400
LDA 1-34	34.68219	-97.50902	7/31/1995	360	13,466
LDA 1-34	34.68219	-97.50902	8/31/1995	393	12,686
LDA 1-34	34.68219	-97.50902	9/30/1995	185	11,662
LDA 1-34	34.68219	-97.50902	10/31/1995	192	11,499
LDA 1-34	34.68219	-97.50902	11/30/1995	201	10,546
LDA 1-34	34.68219	-97.50902	12/31/1995	195	11,520
LDA 1-34	34.68219	-97.50902	1/31/1996	202	11,975
LDA 1-34	34.68219	-97.50902	2/29/1996	196	9,354
LDA 1-34	34.68219	-97.50902	3/31/1996	100	11,073
LDA 1-34	34.68219	-97.50902	4/30/1996	178	8,708
LDA 1-34	34.68219	-97.50902	5/31/1996	102	8,696
LDA 1-34	34.68219	-97.50902	6/30/1996	99	8,095
LDA 1-34	34.68219	-97.50902	7/31/1996	100	8,047
LDA 1-34	34.68219	-97.50902	8/31/1996	0	8,047
LDA 1-34	34.68219	-97.50902	9/30/1996	175	7,266
LDA 1-34	34.68219	-97.50902	10/31/1996	185	7,285
LDA 1-34	34.68219	-97.50902	11/30/1996	0	6,840
LDA 1-34	34.68219	-97.50902	12/31/1996	177	6,687
LDA 1-34	34.68219	-97.50902	1/31/1997	0	6,419
LDA 1-34	34.68219	-97.50902	2/28/1997	163	5,923
LDA 1-34	34.68219	-97.50902	3/31/1997	0	6,231
LDA 1-34	34.68219	-97.50902	4/30/1997	0	5,850
LDA 1-34	34.68219	-97.50902	5/31/1997	87	5,926
LDA 1-34	34.68219	-97.50902	6/30/1997	68	5,608

LDA 1-34	34.68219	-97.50902	7/31/1997	51	5,486
LDA 1-34	34.68219	-97.50902	8/31/1997	167	5,899
LDA 1-34	34.68219	-97.50902	9/30/1997	146	6,097
LDA 1-34	34.68219	-97.50902	10/31/1997	133	6,245
LDA 1-34	34.68219	-97.50902	11/30/1997	107	5,883
LDA 1-34	34.68219	-97.50902	12/31/1997	97	5,881
LDA 1-34	34.68219	-97.50902	1/31/1998	83	5,775
LDA 1-34	34.68219	-97.50902	2/28/1998	85	5,059
LDA 1-34	34.68219	-97.50902	3/31/1998	88	5,490
LDA 1-34	34.68219	-97.50902	4/30/1998	80	5,206
LDA 1-34	34.68219	-97.50902	5/31/1998	83	5,283
LDA 1-34	34.68219	-97.50902	6/30/1998	70	4,975
LDA 1-34	34.68219	-97.50902	7/31/1998	73	5,026
LDA 1-34	34.68219	-97.50902	8/31/1998	63	4,909
LDA 1-34	34.68219	-97.50902	9/30/1998	65	4,652
LDA 1-34	34.68219	-97.50902	10/31/1998	70	4,773
LDA 1-34	34.68219	-97.50902	11/30/1998	53	4,514
LDA 1-34	34.68219	-97.50902	12/31/1998	62	4,585
LDA 1-34	34.68219	-97.50902	1/31/1999	33	4,588
LDA 1-34	34.68219	-97.50902	2/28/1999	58	4,274
LDA 1-34	34.68219	-97.50902	3/31/1999	52	4,465
LDA 1-34	34.68219	-97.50902	4/30/1999	57	4,258
LDA 1-34	34.68219	-97.50902	5/31/1999	54	4,318
LDA 1-34	34.68219	-97.50902	6/30/1999	57	4,094
LDA 1-34	34.68219	-97.50902	7/31/1999	57	4,161
LDA 1-34	34.68219	-97.50902	8/31/1999	52	4,158
LDA 1-34	34.68219	-97.50902	9/30/1999	55	3,928
LDA 1-34	34.68219	-97.50902	10/31/1999	53	4,010
LDA 1-34	34.68219	-97.50902	11/30/1999	48	3,784
LDA 1-34	34.68219	-97.50902	12/31/1999	53	3,826
LDA 1-34	34.68219	-97.50902	1/31/2000	55	3,746
LDA 1-34	34.68219	-97.50902	2/29/2000	48	3,427
LDA 1-34	34.68219	-97.50902	3/31/2000	45	3,627
LDA 1-34	34.68219	-97.50902	4/30/2000	48	3,551
LDA 1-34	34.68219	-97.50902	5/31/2000	40	3,614
LDA 1-34	34.68219	-97.50902	6/30/2000	45	3,445
LDA 1-34	34.68219	-97.50902	7/31/2000	46	3,508
LDA 1-34	34.68219	-97.50902	8/31/2000	40	3,443
LDA 1-34	34.68219	-97.50902	9/30/2000	37	3,322
LDA 1-34	34.68219	-97.50902	10/31/2000	48	3,423
LDA 1-34	34.68219	-97.50902	11/30/2000	51	3,334
LDA 1-34	34.68219	-97.50902	12/31/2000	60	3,318
LDA 1-34	34.68219	-97.50902	1/31/2001	17	3,398
LDA 1-34	34.68219	-97.50902	2/28/2001	15	2,975
LDA 1-34	34.68219	-97.50902	3/31/2001	9	3,312
LDA 1-34	34.68219	-97.50902	4/30/2001	37	3,153
LDA 1-34	34.68219	-97.50902	5/31/2001	40	3,211
LDA 1-34	34.68219	-97.50902	6/30/2001	25	3,067

LDA 1-34	34.68219	-97.50902	7/31/2001	37	3,119
LDA 1-34	34.68219	-97.50902	8/31/2001	32	3,052
LDA 1-34	34.68219	-97.50902	9/30/2001	46	3,139

Economic Analysis

Well WLS 1-28	Hyperbolic Decline					
Time (month)	Oil Rate (Stb/M)	Di(Oil) per year	Gas Rate (Mcf/M)	Di (Gas) per year	Oil Volume STB	Gas Volume, MCF
0	233	0.1132	7593	0.1081		
1	230.8457224	0.11204	7526.199924	0.106715684	230.845722	7526.199924
2	228.7328516	0.1109	7460.815853	0.105366375	228.732852	7460.815853
3	226.6601871	0.10978	7396.800645	0.104050761	226.660187	7396.800645
4	224.6265743	0.10869	7334.109287	0.102767595	224.626574	7334.109287
5	222.6309032	0.10762	7272.698768	0.101515692	222.630903	7272.698768
6	220.6721055	0.10657	7212.527971	0.100293923	220.672106	7212.527971
7	218.7491529	0.10553	7153.557568	0.099101213	218.749153	7153.557568
8	216.8610554	0.10452	7095.749921	0.097936538	216.861055	7095.749921
9	215.0068593	0.10353	7039.068992	0.09679892	215.006859	7039.068992
10	213.1856458	0.10256	6983.480257	0.095687427	213.185646	6983.480257
11	211.396529	0.1016	6928.950626	0.09460117	211.396529	6928.950626
12	209.6386549	0.10067	6875.448369	0.093539299	209.638655	6875.448369
13	207.9111996	0.09974	6822.943044	0.092501001	207.9112	6822.943044
14	206.2133683	0.09884	6771.405433	0.091485501	206.213368	6771.405433
15	204.5443937	0.09795	6720.80748	0.090492056	204.544394	6720.80748
16	202.9035351	0.09708	6671.122231	0.089519954	202.903535	6671.122231
17	201.290077	0.09623	6622.323782	0.088568516	201.290077	6622.323782
18	199.7033282	0.09538	6574.387226	0.08763709	199.703328	6574.387226
19	198.1426208	0.09456	6527.288605	0.08672505	198.142621	6527.288605
20	196.607309	0.09374	6481.004868	0.085831798	196.607309	6481.004868
21	195.0967686	0.09295	6435.513819	0.084956759	195.096769	6435.513819
22	193.6103955	0.09216	6390.794087	0.084099382	193.610396	6390.794087
23	192.1476056	0.09139	6346.825082	0.083259137	192.147606	6346.825082
24	190.7078332	0.09063	6303.58696	0.082435516	190.707833	6303.58696
25	189.2905311	0.08988	6261.06059	0.08162803	189.290531	6261.06059
26	187.8951691	0.08915	6219.227519	0.08083621	187.895169	6219.227519
27	186.521234	0.08843	6178.069945	0.080059604	186.521234	6178.069945
28	185.1682282	0.08771	6137.570689	0.079297778	185.168228	6137.570689
29	183.8356699	0.08702	6097.713161	0.078550314	183.83567	6097.713161
30	182.5230918	0.08633	6058.481343	0.07781681	182.523092	6058.481343
31	181.230041	0.08565	6019.859758	0.077096878	181.230041	6019.859758
32	179.9560783	0.08498	5981.833449	0.076390145	179.956078	5981.833449
33	178.7007776	0.08432	5944.387958	0.075696251	178.700778	5944.387958
34	177.4637254	0.08368	5907.509304	0.07501485	177.463725	5907.509304

35	176.2445206	0.08304	5871.183963	0.074345607	176.244521	5871.183963
36	175.0427738	0.08241	5835.39885	0.0736882	175.042774	5835.39885

Time (month)	Revenue Oil	Revenue Gas	Operating Costs	Tax	Net Cash Flow	NPV
0					0	
1	6232.834504	30104.8	500	16126.93539	19710.69881	19467.35685
2	6175.786994	29843.263	500	15983.57268	19535.47772	19056.09776
3	6119.82505	29587.203	500	15843.16243	19363.8652	18655.50265
4	6064.917507	29336.437	500	15705.6096	19195.74506	18265.21741
5	6011.034388	29090.795	500	15570.82326	19031.0062	17884.9031
6	5958.146849	28850.112	500	15438.71643	18869.5423	17514.23509
7	5906.227129	28614.23	500	15309.20583	18711.25157	17152.90233
8	5855.248496	28383	500	15182.21168	18556.0365	16800.60662
9	5805.185202	28156.276	500	15057.65753	18403.80364	16457.06195
10	5756.012436	27933.921	500	14935.47006	18254.4634	16121.9939
11	5707.706283	27715.803	500	14815.57895	18107.92983	15795.139
12	5660.243682	27501.793	500	14697.91672	17964.12044	15476.24426
13	5613.60239	27291.772	500	14582.41855	17822.95601	15165.06656
14	5567.760944	27085.622	500	14469.0222	17684.36047	14861.37224
15	5522.69863	26883.23	500	14357.66785	17548.2607	14564.93663
16	5478.395447	26684.489	500	14248.29797	17414.5864	14275.54358
17	5434.832078	26489.295	500	14140.85724	17283.26996	13992.9851
18	5391.989861	26297.549	500	14035.29244	17154.24632	13717.06094
19	5349.850761	26109.154	500	13931.55233	17027.45285	13447.57826
20	5308.397344	25924.019	500	13829.58757	16902.82925	13184.3513
21	5267.612752	25742.055	500	13729.35061	16780.31742	12927.20101
22	5227.48068	25563.176	500	13630.79566	16659.86137	12675.95479
23	5187.985351	25387.3	500	13533.87856	16541.40712	12430.44618
24	5149.111497	25214.348	500	13438.5567	16424.90264	12190.51459
25	5110.84434	25044.242	500	13344.78901	16310.29768	11956.00507
26	5073.169567	24876.91	500	13252.53584	16197.5438	11726.76802
27	5036.073317	24712.28	500	13161.75889	16086.5942	11502.65901
28	4999.542161	24550.283	500	13072.42121	15977.4037	11283.53852
29	4963.563086	24390.853	500	12984.48708	15869.92865	11069.27175
30	4928.123479	24233.925	500	12897.92198	15764.12687	10859.72843
31	4893.211108	24079.439	500	12812.69256	15659.95758	10654.7826
32	4858.814115	23927.334	500	12728.76656	15557.38135	10454.31248
33	4824.920995	23777.552	500	12646.11277	15456.36005	10258.20028
34	4791.520587	23630.037	500	12564.70101	15356.85679	10066.33201
35	4758.602057	23484.736	500	12484.50206	15258.83585	9878.597372
36	4726.154893	23341.595	500	12405.48763	15162.26266	9694.889599
						501485.3572

Economic Analysis Well LDA 1-34					
Hyperbolic Decline					
Time (month)	Oil Rate (Stb/M)	Di(Oil) per year	Gas Rate (Mcf/M)	Di (Gas) per year	Oil Volume STB
0	419	0.0692	14.032	0.1267	
1	416.609273	0.068842706	13.88780267	0.124854443	416.609273
2	414.2443314	0.068489083	13.74711127	0.123061881	414.2443314
3	411.9047676	0.068139075	13.60979274	0.121320062	411.9047676
4	409.5901822	0.067792625	13.47572081	0.119626862	409.5901822
5	407.3001841	0.067449681	13.3447756	0.117980275	407.3001841
6	405.0343904	0.067110189	13.21684319	0.1163784	405.0343904
7	402.7924261	0.066774097	13.0918153	0.114819441	402.7924261
8	400.5739234	0.066441355	12.96958887	0.113301697	400.5739234
9	398.3785226	0.066111913	12.85006581	0.111823554	398.3785226
10	396.2058707	0.065785721	12.73315263	0.110383482	396.2058707
11	394.055622	0.065462733	12.61876025	0.108980029	394.055622
12	391.9274379	0.0651429	12.50680368	0.107611816	391.9274379
13	389.8209861	0.064826178	12.3972018	0.106277532	389.8209861
14	387.7359414	0.06451252	12.28987714	0.104975931	387.7359414
15	385.6719846	0.064201883	12.1847557	0.103705826	385.6719846
16	383.6288028	0.063894224	12.08176671	0.102466087	383.6288028
17	381.6060895	0.063589499	11.98084247	0.101255639	381.6060895
18	379.6035437	0.063287666	11.8819182	0.100073456	379.6035437
19	377.6208707	0.062988686	11.78493186	0.098918558	377.6208707
20	375.6577811	0.062692517	11.68982403	0.097790013	375.6577811
21	373.7139912	0.06239912	11.59653774	0.096686927	373.7139912
22	371.7892227	0.062108456	11.50501837	0.095608451	371.7892227
23	369.8832025	0.061820488	11.41521349	0.094553768	369.8832025
24	367.9956628	0.061535178	11.32707282	0.0935221	367.9956628
25	366.1263407	0.061252489	11.24054803	0.092512702	366.1263407
26	364.2749782	0.060972386	11.15559272	0.091524861	364.2749782
27	362.4413222	0.060694833	11.07216229	0.090557892	362.4413222
28	360.6251244	0.060419795	10.99021385	0.089611143	360.6251244
29	358.8261408	0.060147239	10.90970614	0.088683984	358.8261408
30	357.044132	0.059877131	10.83059948	0.087775815	357.044132
31	355.2788632	0.059609438	10.75285563	0.086886057	355.2788632
32	353.5301035	0.059344127	10.6764378	0.086014157	353.5301035
33	351.7976264	0.059081168	10.60131053	0.085159582	351.7976264
34	350.0812096	0.058820529	10.52743965	0.084321821	350.0812096
35	348.3806345	0.05856218	10.45479221	0.083500382	348.3806345
36	346.6956866	0.05830609	10.38333644	0.082694793	346.6956866

Gas Volume, MCF	Revenue Oil	Revenue Gas	Operating Costs	Tax	Net Cash Flow	NPV
					0	
13.88780267	\$11,248.45	\$55.55	\$500.00	\$4,861.80	5942.20087	\$5,868.84
13.74711127	\$11,184.60	\$54.99	\$500.00	\$4,832.81	5906.771967	\$5,761.83
13.60979274	\$11,121.43	\$54.44	\$500.00	\$4,804.14	5871.727343	\$5,656.93
13.47572081	\$11,058.93	\$53.90	\$500.00	\$4,775.78	5837.060791	\$5,554.11
13.3447756	\$10,997.10	\$53.38	\$500.00	\$4,747.72	5802.76624	\$5,453.31
13.21684319	\$10,935.93	\$52.87	\$500.00	\$4,719.96	5768.837753	\$5,354.49
13.0918153	\$10,875.40	\$52.37	\$500.00	\$4,692.49	5735.269521	\$5,257.61
12.96958887	\$10,815.50	\$51.88	\$500.00	\$4,665.32	5702.055859	\$5,162.63
12.85006581	\$10,756.22	\$51.40	\$500.00	\$4,638.43	5669.191205	\$5,069.51
12.73315263	\$10,697.56	\$50.93	\$500.00	\$4,611.82	5636.670115	\$4,978.20
12.61876025	\$10,639.50	\$50.48	\$500.00	\$4,585.49	5604.487259	\$4,888.67
12.50680368	\$10,582.04	\$50.03	\$500.00	\$4,559.43	5572.63742	\$4,800.88
12.3972018	\$10,525.17	\$49.59	\$500.00	\$4,533.64	5541.115488	\$4,714.78
12.28987714	\$10,468.87	\$49.16	\$500.00	\$4,508.11	5509.916459	\$4,630.36
12.1847557	\$10,413.14	\$48.74	\$500.00	\$4,482.85	5479.035433	\$4,547.56
12.08176671	\$10,357.98	\$48.33	\$500.00	\$4,457.84	5448.467608	\$4,466.36
11.98084247	\$10,303.36	\$47.92	\$500.00	\$4,433.08	5418.208282	\$4,386.72
11.8819182	\$10,249.30	\$47.53	\$500.00	\$4,408.57	5388.252844	\$4,308.61
11.78493186	\$10,195.76	\$47.14	\$500.00	\$4,384.31	5358.59678	\$4,232.00
11.68982403	\$10,142.76	\$46.76	\$500.00	\$4,360.28	5329.235662	\$4,156.85
11.59653774	\$10,090.28	\$46.39	\$500.00	\$4,336.50	5300.165153	\$4,083.13
11.50501837	\$10,038.31	\$46.02	\$500.00	\$4,312.95	5271.380998	\$4,010.82
11.41521349	\$9,986.85	\$45.66	\$500.00	\$4,289.63	5242.879027	\$3,939.89
11.32707282	\$9,935.88	\$45.31	\$500.00	\$4,266.54	5214.655153	\$3,870.30
11.24054803	\$9,885.41	\$44.96	\$500.00	\$4,243.67	5186.705364	\$3,802.03
11.15559272	\$9,835.42	\$44.62	\$500.00	\$4,221.02	5159.02573	\$3,735.05
11.07216229	\$9,785.92	\$44.29	\$500.00	\$4,198.59	5131.612392	\$3,669.34
10.99021385	\$9,736.88	\$43.96	\$500.00	\$4,176.38	5104.461568	\$3,604.87
10.90970614	\$9,688.31	\$43.64	\$500.00	\$4,154.38	5077.569544	\$3,541.60
10.83059948	\$9,640.19	\$43.32	\$500.00	\$4,132.58	5050.93268	\$3,479.53
10.75285563	\$9,592.53	\$43.01	\$500.00	\$4,110.99	5024.547401	\$3,418.62
10.6764378	\$9,545.31	\$42.71	\$500.00	\$4,089.61	4998.4102	\$3,358.85
10.60131053	\$9,498.54	\$42.41	\$500.00	\$4,068.42	4972.517636	\$3,300.20
10.52743965	\$9,452.19	\$42.11	\$500.00	\$4,047.44	4946.86633	\$3,242.64
10.45479221	\$9,406.28	\$41.82	\$500.00	\$4,026.64	4921.452965	\$3,186.16
10.38333644	\$9,360.78	\$41.53	\$500.00	\$4,006.04	4896.274286	\$3,130.72
						\$156,624.01

Performance Matrix

	Excel Type	Excel Decline	IPDA Decline	Economic Analysis	Write Up
Micah			X	X	X
Matt	X	X			X
Joshua			Consult	Consult	X