Disc Contents Contents Search

OIL AND GAS ECONOMIC ANALYSIS WITH VISICALC

Mark A. Clement[1]

ABSTRACT

Recent expansion in microcomputer user memory to 128k and greater, offers the petroleum industry the opportunity to use the Visicalc (spreadsheet) program for economic analysis of potential oil and gas production. This places within the reach of most professionals a tool which can produce an economic analysis previously denied them due to extensive time and/or capital investment requirements. Even when owning a larger computer, the savings in mainframe time, and in standby time for professionals, merit consideration of using a microcomputer spreadsheet type analysis.

The basic design of the system presented involved an economic analysis which can be made on a microcomputer with a minimum usable memory of 128k. Both input and calculated data values are displayed. A fifteen year maximum potential production cash flow is developed.

The economic analysis system described consists of four sections:

1. Section I, Input data;
2. Section II, Pre-tax cash flow and present net worth;
3. Section III, After tax cash flow and present net worth;
4. Section IV, Sensitivity analysis with present net worth and return on investment.

Data is entered and calculations are displayed on an annual basis. Forty-eight subjects are addressed in the data input section. Once the basic data for the analysis is entered, the economic analysis is completed in a matter of seconds. A predicted production schedule is developed for the project and a cash flow is calculated. The economic limit of the project is recognized. The analysis contains an after tax cash flow section. A sensitivity section illustrates present net worth and return on investment, both before and after tax, using various discount rates. Once the initial economic analysis has been made, the impact of individual scenario variations on the present net worth of the project may be obtained in a few seconds. An enlarged system requiring a 256k CPU capacity, develops the analysis on a monthly basis.

Spreadsheet economic analysis can be fast, well displayed, user friendly and easily learned. The system provides an excellent opportunity for use as a training aid for professional and non-professional personnel who have had little or no prior association with the economics of oil and gas production.

A microcomputer spreadsheet program is a very powerful calculation and display tool, which, properly utilized, has great potential for use in oil and gas economic analysis. Regardless of the microcomputer or spreadsheet considered, there now exists the opportunity to ease the time consumption burden, diminish the potential for errors in repetitive calculations, and have a consistent, rapidly reviewable approach to economic analysis.

---

[1]Consultant, Dallas, Texas 75234.

Poster session presentation

THE OIL AND GAS ECONOMICS ANALYZER

SERIAL NO. 300100 VERSION 1.3

THE OIL AND GAS ECONOMICS ANALYZER

B C D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T U	V
SUBJECT	1ST YR	2ND YR	3RD YR	4TH YR	5TH YR	6TH YR	7TH YR	8TH YR	9TH YR	10TH YR	11TH YR	12TH YR	13TH YR	14TH YR	15TH YR	S-P-E-C-I-A-L	D-A-T-A
OIL PRODUCTION DECLINE RATE		0.30	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	W.INT. TO CSG PT	1.00
OIL PRODUCTION RATE BBL/YR	14400	10080	7560	5670	4253	3189	2392	1794	1346	1009	757	568	426	319	239	W.I. CSG THRU TK	1.00
OIL PRICE RATE INCREASE/YR		0.00	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	W.I. AFT TKS BPO	1.00
OIL SALES PRICE $/BBL	30.00	30.00	30.60	31.82	33.10	34.42	35.80	37.23	38.72	40.27	41.88	43.55	45.30	47.11	48.99	W.I. AFTER P/OUT	1.00
WINDFALL PROFIT BASE PRICE	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00	31.00	32.00	33.00	34.00	35.00	36.00	NET REV OIL BPO	0.82
WINDFALL PROFIT TAX RATE	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	NET REV OIL APO	0.82
SALES PRICE AFTER WINDFL PR	27.60	27.90	28.62	29.78	30.97	32.19	33.46	34.76	36.10	37.49	38.91	40.39	41.91	43.48	45.09	NET REV GAS BPO	0.82
GAS PRODUCTION DECLINE RATE		0.30	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	NET REV GAS APO	0.82
GAS PRODUCTION RATE MCF/YR	7200	5040	3780	2835	2126	1595	1196	897	673	505	378	284	213	160	120	MISC & AD VALORM	0.04
GAS PRICE RATE INCREASE/YR		0.00	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	OIL SEV TAX RATE	.046
GAS SALES PRICE $/MCF (102)	3.22	3.22	3.28	3.42	3.55	3.69	3.84	4.00	4.16	4.32	4.49	4.67	4.86	5.06	5.26	GAS SEV TAX RATE	.075
ADJUST FOR BTU OF 1250	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	INCOME TAX RATE	0.50
BTU ADJUSTED SALES PRICE	4.03	4.03	4.11	4.27	4.44	4.62	4.80	4.99	5.19	5.40	5.62	5.84	6.08	6.32	6.57	MINIMUM TAX RATE	0.20
LEASE AND SEISMIC COSTS	18000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	INVEST TAX CREDT	0.10
ABD LSE & SEISMIC WRITE OFF	0	0	0	5000	0	0	0	0	0	0	0	0	0	0	0	STATUT DEPL RATE	0.15
TANG D&T 5000 TANG COMP	75000	0	18000	0	0	0	0	0	0	0	0	0	0	0	0	PNV DISC'NT RATE	0.12
IDC. D&T 95000 IDC.COMP.	10000	0	7000	0	0	0	0	0	0	0	0	0	0	0	0	GAS/OIL CONV FAC	7.00
WATER PRODUCTION BBLS/YEAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
OPERATION COST INCREASE/YR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	D-E-P-R-E-C-I-A-T-I-O-N	
OPERATIONS COST PER YEAR	6000	6300	6615	6946	7293	7658	8041	8443	8865	9308	9773	10262	10775	11314	11880	S-C-H-E-D-U-L-E	
GAS COMPRESSION COST $/MCF	0.20	0.21	0.22	0.23	0.24	0.26	0.27	0.28	0.30	0.31	0.33	0.34	0.36	0.38	0.40		
GAS COMPRESSION COST $/YEAR	1440	1058	833	656	517	407	321	252	199	157	123	97	76	60	47	ACRS DEPR 1ST YR	0.15
WATER DISPOSAL COST $/BBL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ACRS DEPR 2ND YR	0.22
WATER DISPOSAL COST $/YEAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ACRS DEPR 3RD YR	0.21
OPER COST + COMP + WTR DISP	7440	7358	7448	7602	7810	8065	8361	8695	9064	9465	9897	10359	10852	11374	11927	ACRS DEPR 4TH YR	0.21
GENERAL & ADMINISTRATIVE/YR	3000	3150	3308	3473	3647	3829	4020	4221	4432	4654	4887	5131	5388	5657	5940	ACRS DEPR 5TH YR	0.21

ECONOMIC ANALYSIS OF PREDICTED FUTURE PERFORMANCE OF OIL, CONDENSATE AND / OR GAS PRODUCTION

YEAR	OIL (CONDENSATE) PRODUCTION (BARRELS) GROSS	NET	POST/WPT SALES PRICE $ PER BBL	NET OIL REVENUE (LESS SEV) (TAX) $	GAS PRODUCTION (MCF) GROSS	NET	SALES PRICE $ PER MCF	NET GAS REVENUE (LESS SEV) (TAX) $	N-E-T REVENUE O-I-L & G-A-S	N-E-T E-X-P-E-N-S-E-S: LEASES & SEISMIC $	CAPITAL EXPENSE $	IDC $	OPERAT'N COMPRESS WTR DISP	GENERAL & ADMIN $	MISC & AD VAL $	T-O-T-A-L EXPENSE $	B-E-F-O-R-E T-A-X C-A-S-H F-L-O-W: UNDISCOUNTED ANNUAL	CUMUL.	NPV DISC@ 0.12 ANNUAL	CUMULATIVE
1ST YR	14400	11808	27.60	310909	7200	5904	4.03	21981	332891	18000	80000	105000	7440	3000	13316	226756	106135	106135	100288	100288
2ND YR	10080	8266	27.90	220002	5040	4133	4.03	15387	235389	0	0	0	7358	3150	9416	19924	215465	321600	181782	282070
3RD YR	7560	6199	28.62	169260	3780	3100	4.11	11771	181031	0	18000	7000	7448	3308	7241	42997	138034	459634	103978	386047
4TH YR	5670	4649	29.78	132076	2835	2325	4.27	9181	141257	0	0	0	7602	3473	5650	16725	124532	584166	83756	469804
5TH YR	4253	3487	30.97	103019	2126	1744	4.44	7161	110181	0	0	0	7810	3647	4407	15864	94317	678483	56638	526442
6TH YR	3189	2615	32.19	80325	1595	1308	4.62	5586	85911	0	0	0	8065	3829	3436	15330	70581	749063	37843	564285
7TH YR	2392	1961	33.46	62609	1196	981	4.80	4357	66966	0	0	0	8361	4020	2679	15060	51906	800969	24848	589133
8TH YR	1794	1471	34.76	48784	897	736	4.99	3398	52183	0	0	0	8695	4221	2087	15004	37179	838148	15891	605025
9TH YR	1346	1103	36.10	38001	673	552	5.19	2651	40652	0	0	0	9064	4432	1626	15122	25530	863678	9743	614768
10TH YR	1009	827	37.49	29594	505	414	5.40	2068	31661	0	0	0	9465	4654	1266	15385	16276	879954	5546	620314
11TH YR	757	621	38.91	23040	378	310	5.62	1613	24653	0	0	0	9897	4887	986	15769	8884	888838	2703	623017
12TH YR	568	465	40.39	17934	284	233	5.84	1258	19192	0	0	0	10359	5131	768	16258	2934	891772	797	623814
13TH YR	426	349	41.91	13957	213	175	6.08	981	14938	0	0	0	10852	5388	598	16837	-1899	889873	-461	623353
14TH YR	0	0	43.48	0	0	0	6.32	0	0	0	0	0	0	0	0	0	0	889873	0	623353
15TH YR	0	0	45.09	0	0	0	6.57	0	0	0	0	0	0	0	0	0	0	889873	0	623353
TOTAL	53443	43823		1249510	26721	21912		87394	1336904	18000	98000	112000	112415	53139	53476	447030	889873	889873	623353	623353

TAX CONSIDERATIONS

YEAR	GROSS REVENUE BEFORE TAXES $	N-E-T E-X-P-E-N-S-E-S: WINDFALL PROF TX $	SEVERNCE TAXES $	DEPREC'N $	IDC $	COMPRESS & OPERAT'N	GENERAL & ADMIN $	MISC & AD VAL $	ABDN LSE & SEIS $	NET REVENUE AFTER EXPENSES $	STATUTRY DEPLET'N (V-25) $	ALLOWABL STATUTRY DEPLET'N $	INCOME TAX RATE (V-22) $	INVSTMNT TAX CREDIT (V-24) $	FM. 4625 STAT DPL MIN TAX (V-23) $	BEFORE TAX CASH FLOW (S-46) $	A-F-T-E-R T-A-X C-A-S-H F-L-O-W: UNDISCOUNTED ANNUAL	CUMUL.	NPV DISC@ 0.12 ANNUAL	CUMULATIVE
1ST YR	378004	28339	16774	12000	105000	7440	3000	13316	0	192135	56701	56701	-67717	8000	-11340	106135	35078	35078	33145	33145
2ND YR	264603	17358	11856	17600	0	7358	3150	9416	0	197865	39690	39690	-79087	0	-7938	215465	128440	163517	108361	141506
3RD YR	202421	12274	9116	19500	7000	7448	3308	7241	0	136534	30363	30363	-53085	1800	-6073	138034	80676	244193	60771	202277
4TH YR	157888	9518	7113	20760	0	7602	3473	5650	5000	98772	23683	23683	-37544	0	-4737	124532	82251	326444	55319	257597
5TH YR	123153	7424	5548	20580	0	7810	3647	4407	0	73737	18473	18473	-27632	0	-3695	94317	62990	389434	37826	295423
6TH YR	96059	5822	4326	3780	0	8065	3829	3436	0	66801	14409	14409	-26196	0	-2882	70581	41503	430937	22253	317676
7TH YR	74926	4588	3372	3780	0	8361	4020	2679	0	48126	11239	11239	-18443	0	-2248	51906	31214	462152	14943	332619
8TH YR	58442	3632	2628	0	0	8695	4221	2087	0	37179	8766	8766	-14206	0	-1753	37179	21219	483371	9070	341688
9TH YR	45585	2886	2047	0	0	9064	4432	1626	0	25530	6838	6838	-9346	0	-1368	25530	14816	498188	5654	347343
10TH YR	35556	2301	1595	0	0	9465	4654	1266	0	16276	5333	5333	-5471	0	-1067	16276	9738	507926	3318	350661
11TH YR	27734	1839	1242	0	0	9897	4887	986	0	8884	4160	4160	-2362	0	-832	8884	5690	513616	1731	352392
12TH YR	21633	1474	967	0	0	10359	5131	768	0	2934	3245	1467	-734	0	-293	2934	1907	515523	518	352910
13TH YR	16873	1183	753	0	0	10852	5388	598	0	-1899	2531	0	949	0	0	-1899	-949	514574	-230	352680
14TH YR	0	0	0	0	0	0	0	0	13000	-13000	0	0	6500	0	0	0	6500	521074	1408	354088
15TH YR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	521074	0	354088
TOTAL	1502878	98639	67335	98000	112000	112415	53139	53476	18000	889873	225432	221123	-334375	9800	-44225	889873	521074	521074	354088	354088

NPV SENSITIVITY

R-E-M-A-R-K-S

COST/BBL OIL AND/OR BBL EQV	9.52	NET OIL REV. (POST SEVERANCE TAX)	1249510
		NET GAS REV. (POST SEVERANCE TAX)	87394
AVG PRICE/BBL(PRE PRE TAX)	28.51	TOTAL REV. (POST SEVERANCE TAX)	1336904
AVG PRICE/MCF(PRE PRE TAX)	3.99		
		BEFORE TAX NET CASH FLOW (UNDISCT'D)	889873
PROJECT LIFE (YEARS)	12	AFTER TAX NET CASH FLOW (UNDISCT'D)	521074
		BEFORE TAX NET CSH FLW @PNV .12	623353
PAYOUT (YEARS)	1	AFTER TAX NET CSH FLW @PNV .12	354088
POTENTIONAL ADDITIONAL WELLS	00	INITIAL W.I. (DECIMAL EQUIVALENT)	1.00
		FINAL W.I. (DECIMAL EQUIVALENT)	1.00
WELL COMPLETION DATE	00-00-00	INITIAL NET REV OIL (DECIMAL EQUIV)	0.82
MONTHS TO ON-LINE	00	FINAL NET REV OIL (DECIMAL EQUIV)	0.82
FIRST PRODUCTION DATE	00-00-00	INITIAL NET REV GAS (DECIMAL EQUIV)	0.82
		FINAL NET REV GAS (DECIMAL EQUIV)	0.82

I-N-V-E-S-T-M-E-N-T C-O-S-T O-V-E-R-V-I-E-W

DRY HOLE COST	118000
COMPLETED WELL COST	203000

I-N-V-E-S-T-M-E-N-T

	INVEST BTAX $	INVEST ATAX $
	203000	101500
1ST YTR TX POSITION		
IDC	105000	
DEPREC	12000	
TOT DEDUCT	117000	
TAX CREDIT	8000	

P-R-E-S-E-N-T V-A-L-U-E P-R-O-F-I-L-E / R-E-T-U-R-N O-N I-N-V-E-S-T-M-N-T

DISC RATE	DISC NPV BTAX $	DISC NPV ATAX $	MULTIPLE BTAX $	MULTIPLE ATAX $
0.0	889873	521074	5.38	6.13
5.0	757348	437373	4.73	5.31
10.0	656875	374804	4.24	4.69
15.0	578740	326635	3.85	4.22
20.0	516621	288628	3.54	3.84
30.0	424794	232913	3.09	3.29
40.0	360717	194396	2.78	2.92
50.0	313760	166401	2.55	2.64
60.0	278001	145250	2.37	2.43

SUBJECT: FIELD: COUNTY: STATE: DATE: 03-29-1984 BY: