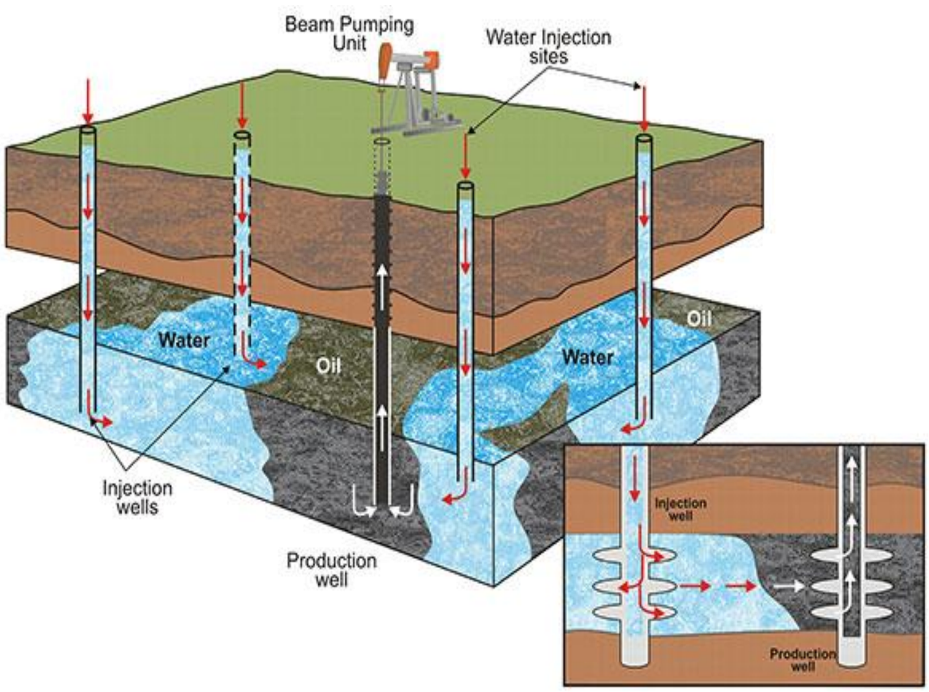
Waterflooding the Pecos County Section 91 Queen Reservoir

(Pressure Maintenance & Incremental Oil & Gas Production)

Amazing Energy



October 2018

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Executive Summary

The need to maintain reservoir pressure and to improve the oil displacement efficiency to commercially produce, and to increase ultimate recovery of oil and gas in Amazing Energy's Pecos County Queen Reservoir (Queen – P) has been inferred from the analysis of eight years (June 2012 – July 2018) of oil & gas production from more than 30 wells drilled in Sections 91, B (1) and C (12). The evidence is pretty conclusive: the resources (oil & gas) are there, but the reservoir, characterized as a saturated, solution gas reservoir lacks the energy to produce hydrocarbons in commercial (reserves) quantities.

Petrophysical analysis conducted in cores extracted from various wells drilled in the zone of interest, as well as information from neighboring leases – Walker and University – where successful waterflooding have been conducted, attest to the amiability of Queen – P to water injection.

A 5[1] Acre Five-Spot (4-Injectors, 1-Producer) prototype was used to estimate oil recovery. The hydrodynamic behavior was assumed to be similar for all the "drillable" areas of the reservoir as defined by the geological model, but the individual "5-Acre-5-Spot" recovery and production profile would be modified by the local formation thickness, porosity and permeability, fluid saturation, relevant well IP in an attempt to take into consideration permeability distribution and flow capacity.

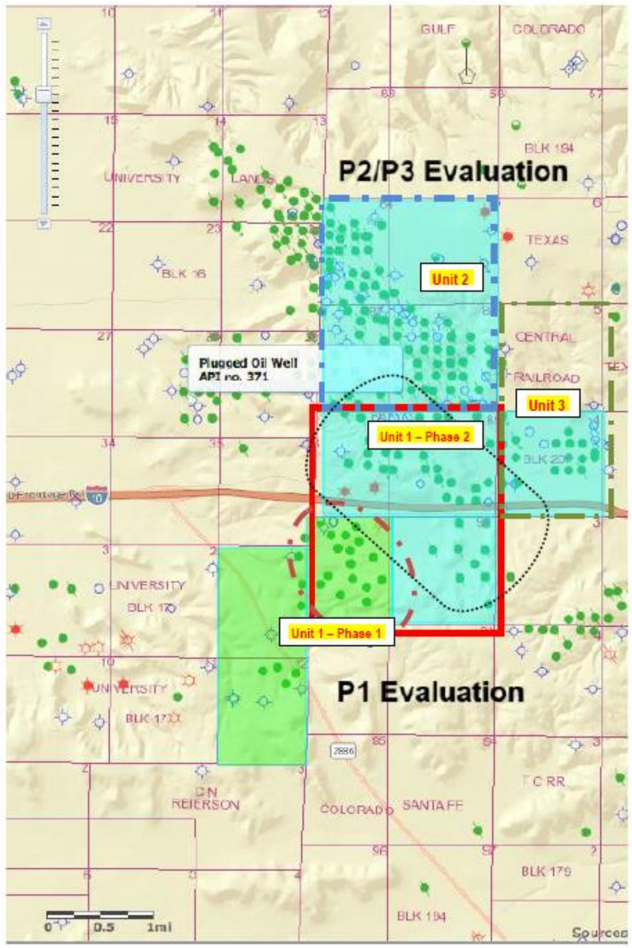
Using PEGTOOLS® PVT Calculator based on a set of widely accepted and industry used empirical equations is reasonable in lieu of lab derived PVT oil, gas and water properties. Amazing Energy is in the process of conducting a PVT test using separator samples obtained from well WWJD 13 or 30.

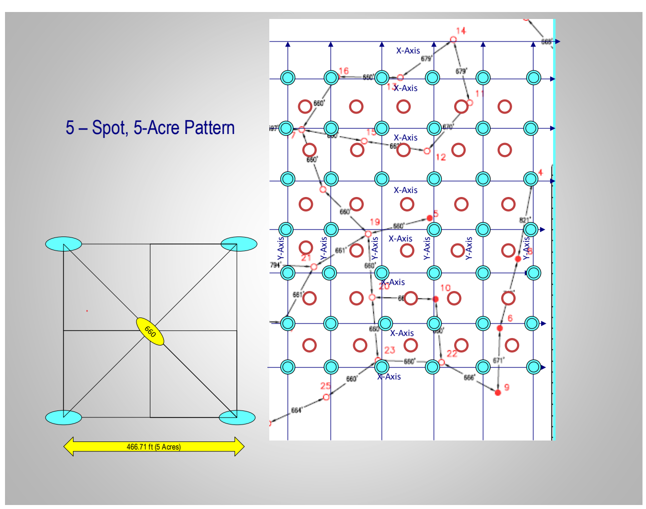
Amazing Energy 70K Pecos County Queen – P waterflood was divided into three units comprising Sections 91, 90, 89 and 88, and Unit 1 (Section 91) was further divided into Phase I, 30 5-Spot arrays, and Phase II, 40 additional 5-Spot arrays. Only Phase I has been evaluated and a Plan of Development for this phase is being proposed at this time; therefore, reserve estimates are limited to this section only.

The reasons for the project partition described before are three fold; first, Section 91 has been drilled and the presence of economically recoverable hydrocarbon resources has been established. Second, the presence of the existing wells ameliorates the economics of this phase since wells would be used as producers or injectors as deemed necessary; third, segmentation of the larger area would allow management to measure the practicality and economics of waterflooding the reservoir before committing to the full-flown extended project. Forecasted oil recovery from Phase I would be claimed as P_1 reserves and recovery from Phase II could be considered P_2 type reserves. Potential recovery from Units 2 and 3 could be considered P_3.

[1] I began the analysis considering a 20-Acre 5-Spot pattern; however, due to the low injectivity of the well-Queen sandstone system it was necessary to reduce the spacing to 5 acres.

Amazing Energy Pecos County Queen Reservoir Waterflooding Units



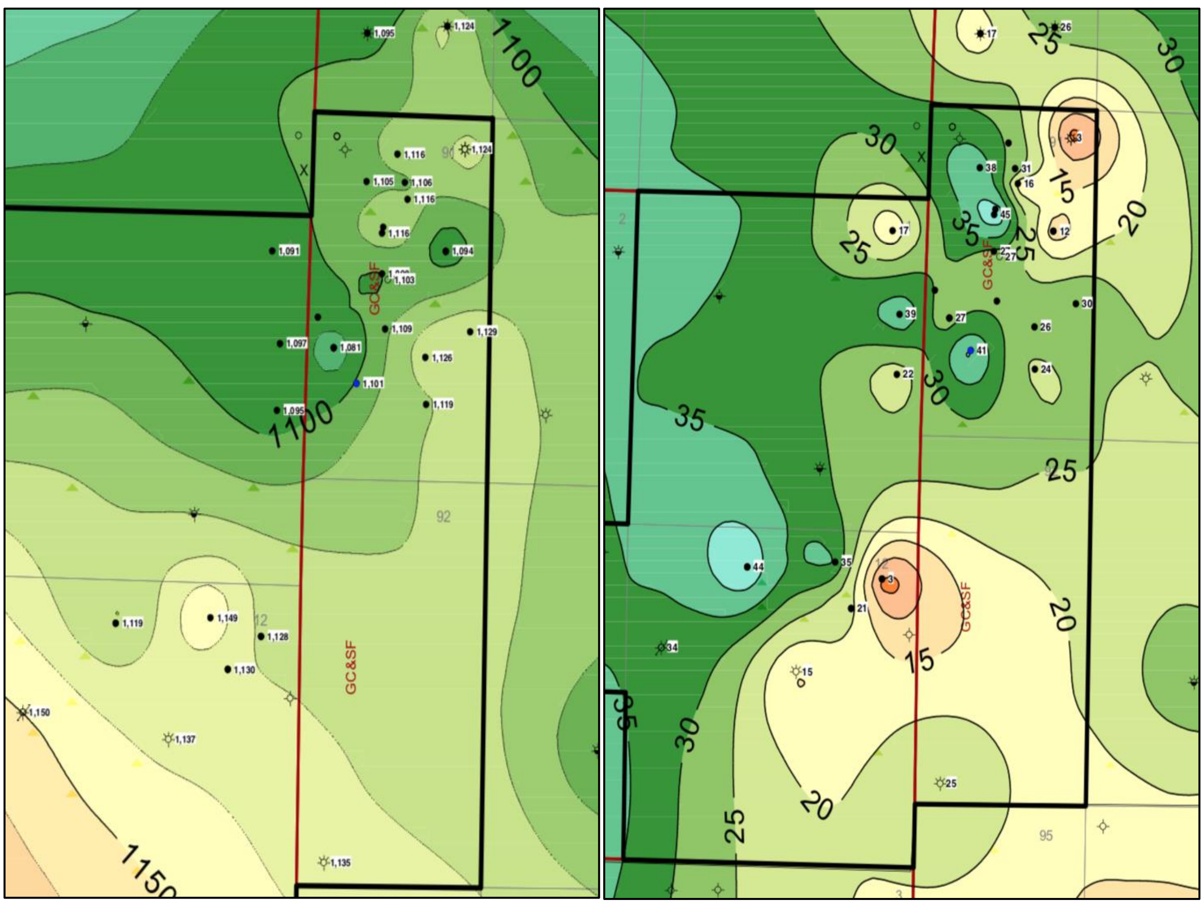


Unit 1, Phase 1A

Water injectivity was the dominant variable in the design o a 5-Acre, 5-spot waterflooding pattern, and the low rock permeability – form two observations only – severely restrict the formation flow capacity forcing the reduction of the size of the pattern. It could be considered a conservative view of the evaluation of the reservoir waterflooding potential. The development program (well drilling and completion schedule) would allow for the enhancement of the pattern size if larger permeabilities, manifested by higher water injectivity, were present.

The proposed waterflood for Unit 1[2] – Phase 1 comprises 30 producers and 42 injectors, corresponding to 30, 5-Spot Patterns. The final well tally, their location and use as injectors or producers would be decided using a combination of the existing well locations and the geological model as the driving guides and the mechanical and geological conditions of the drilled wells. Below are illustrations of the general area of Section 91 where the wells comprised in Unit 1, Phase 1 would be located and the initial 30 5-spot patterns superimposed on the northern part of Section 91.

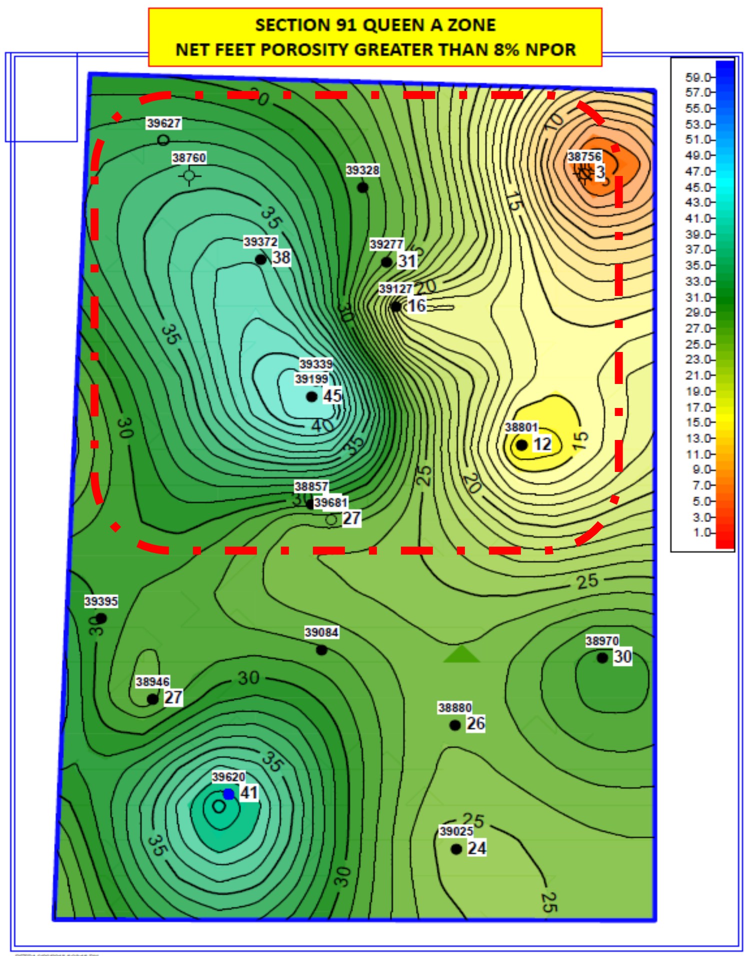
Top: Queen "A" (Closure 10') & Isopach – Queen "A" Net Porosity (API_{CUTOFF} = 60°; ϕ_{CUTOFF} = 8.0%, (Closure 5')



Top Isopach

[2] Unit 1 would be developed in two sub-phases, A & B; A would have 30 producers and 42 Injectors. The dashed lane shows the area to be developed first (P1H$_A$)

RESERVOIR ROCK & FLUIDS PROPERTIES								
WELLS CONSIDERED IN THE ANALYSIS		WWJD-11	WWJD-12	WWJD-13	WWJD-14	WWJD-15	WWJD-16
Oil Formation Volume Factor, BBL/STB, β_O	1.107						
Water Formation Volume Factor, BBL/STB, β_w	1.013						
Formation Thickness (h), ft	33	27	36	32	23	41	39
Porosity, (ϕ)	11.1%	11.1%	10.7%	11.5%	11.1%	11.1%	11.1%
Oil Viscosity, cp, (μ_o)	2.65						
Water Viscosity, cp, (μ_w)	0.61						
Connate water saturation, (S_{wc})	20.0%						
Initial water saturation, (S_{wi})	37.99%	36.81%	43.47%	35.82%	40.27%	37.39%	34.20%
Residual oil saturation, (S_{or})	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%
Mobile oil saturation, (S_{or})	43.96%	45.15%	38.49%	46.14%	41.69%	44.57%	47.76%
Area, Acres	5	5	5	5	5	5	5
Pore Volume (PV) , BBL	141,981	116,251	149,415	142,743	99,028	176,529	167,917
Original Oil in Place (OOIP), STB	79,528	66,358	76,300	82,758	53,432	99,841	99,810



PV$_{150Acres}$	OOIP$_{Ac-ft}$
4,262,519	861

Conditions at WBT			
Sw	(K_{ro}/K_{rw})	f_w	dF_w/dS_w
50.0%	1.707	71.8%	2.324
OOIP =		79,586	STB
E_V =		100.00%	80.00%
Oil Recovery @ BT =		30.80%	24.73%
Oil Recovery @ 5-Y =		52.17%	41.99%

OOIP$_{150Acres}$	OOIP$_{Ac-ft}$	OOIP$_{5Acres}$	OOIP$_{Ac-ft}$
2,387,575	482	79,586	482
E_V =		100.00%	80.00%
Oil Recovery @ BT =		30.80%	24.73%
Oil Recovery @ 10-Y =		61.83%	50.24%

Below is the waterflooding "Type Well" production forecast for the first two years of production:

Production Forecast
Queen Reservoir Type Production Well
EV = 80.0%

Time			$Q_{i-80\%}$	$Q_{o-80\%}$	$Q_{w-80\%}$	$Q_{g-80\%}$	$W_{i-80\%}$	$N_{p-80\%}$	$W_{p-80\%}$	$G_{p-80\%}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	STB	STB	STB	MMSCF
30	1.0	0.1	120	53	66	11	3,600	1,585	1,995	0
60	2.0	0.2	120	51	68	10	7,200	3,116	4,043	306
90	3.0	0.2	120	49	70	10	10,800	4,594	6,146	601
120	3.9	0.3	120	48	72	9	14,400	6,020	8,302	886
150	4.9	0.4	120	46	74	9	18,000	7,391	10,512	1,159
180	5.9	0.5	120	44	75	9	21,600	8,710	12,777	1,423
210	6.9	0.6	120	42	77	8	25,200	9,976	15,095	1,675
240	7.9	0.7	120	40	79	8	28,800	11,188	17,467	1,917
270	8.9	0.7	120	39	81	8	32,400	12,347	19,892	2,149
300	9.9	0.8	120	37	83	7	36,000	13,453	22,372	2,369
330	10.9	0.9	120	35	84	7	39,600	14,506	24,906	2,579
360	11.8	1.0	120	33	86	7	43,200	15,505	27,493	2,779
390	12.8	1.1	120	32	88	6	46,800	16,452	30,134	2,968
420	13.8	1.2	120	30	89	6	50,400	17,345	32,791	3,146
436	14.3	1.2	120	28	89	6	52,320	17,793	34,213	3,236
480	15.8	1.3	120	25	90	5	57,600	18,912	38,156	3,459
510	16.8	1.4	120	26	90	5	61,146	19,678	40,819	3,612
540	17.8	1.5	120	25	92	5	64,800	20,425	43,610	3,761
570	18.8	1.6	120	23	93	5	68,400	21,119	46,406	3,899
600	19.7	1.6	120	22	95	4	72,000	21,771	49,247	4,029
630	20.7	1.7	120	20	96	4	75,600	22,382	52,134	4,151
660	21.7	1.8	120	19	98	4	79,200	22,950	55,067	4,265
690	22.7	1.9	120	18	99	4	82,800	23,478	58,045	4,370
720	23.7	2.0	120	16	101	3	86,400	23,963	61,068	4,467

Production Forecast
Queen Reservoir Type Production Well
EV = 100.0%

Time			$Q_{i-100\%}$	$Q_{o-100\%}$	$Q_{w-100\%}$	$Q_{g-100\%}$	$W_{i-100\%}$	$N_{p-100\%}$	$W_{p-100\%}$	$G_{p-100\%}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	STB	STB	STB	MMSCF
30	1.0	0.1	120	66	47	13	3,650	2,008	1,427	0.4
61	2.0	0.2	120	64	49	13	7,300	3,949	2,928	0.8
91	3.0	0.3	120	62	52	12	10,950	5,823	4,504	1.2
122	4.0	0.3	120	59	54	12	14,600	7,629	6,155	1.5
152	5.0	0.4	120	57	57	11	18,250	9,368	7,880	1.9
183	6.0	0.5	120	55	59	11	21,900	11,039	9,680	2.2
213	7.0	0.6	120	53	62	11	25,550	12,643	11,554	2.5
243	8.0	0.7	120	51	64	10	29,200	14,179	13,504	2.8
274	9.0	0.8	120	48	67	10	32,850	15,648	15,527	3.1
304	10.0	0.8	120	46	69	9	36,500	17,050	17,626	3.4
335	11.0	0.9	120	44	71	9	40,150	18,384	19,799	3.7
365	12.0	1.0	120	42	74	8	43,800	19,651	22,046	3.9
395	13.0	1.1	120	39	76	8	47,450	20,850	24,369	4.2
426	14.0	1.2	120	37	79	7	51,100	21,982	26,766	4.4
456	15.0	1.3	120	35	81	7	54,750	23,048	29,236	4.6
487	16.0	1.3	120	32	85	6	58,400	24,015	31,816	4.8
517	17.0	1.4	120	30	87	6	62,050	24,915	34,469	5.0
548	18.0	1.5	120	27	90	5	65,700	25,737	37,209	5.1
578	19.0	1.6	120	26	92	5	69,350	26,519	39,993	5.3
608	20.0	1.7	120	24	93	5	73,000	27,264	42,819	5.4
639	21.0	1.8	120	23	94	5	76,650	27,972	45,685	5.6
669	22.0	1.8	120	22	95	4	80,300	28,646	48,589	5.7
700	23.0	1.9	120	21	97	4	83,950	29,288	51,528	5.8
730	24.0	2.0	120	20	98	4	87,600	29,898	54,503	6.0

The drilling program – Plan of Development – depicted below was considered:

Number of Rigs	2	Units
Drilling & Completion Time,	15.2	Days/Well
No. of Wells Drilled/Rig,	2	Units/Month
Total Wells Drilled,	4	Month
Drilling & Completion Cost	$190,000	xwell
Existing Well Tally	20	

DRILLING SCHEDULE

EV=80%		PRODUCERS														
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	STB/D
YEARS	DAYS																
0.1	30	106															106
0.2	61	102	106														208
0.3	91	99	102	106													306
0.3	122	95	99	102	106												401
0.4	152	91	95	99	102	106											493
0.5	183	88	91	95	99	102	106										581
0.6	213	84	88	91	95	99	102	106									665
0.7	243	81	84	88	91	95	99	102	106								746
0.8	274	77	81	84	88	91	95	99	102	106							823
0.8	304	74	77	81	84	88	91	95	99	102	106						897
0.9	335	70	74	77	81	84	88	91	95	99	102	106					967
1.0	365	67	70	74	77	81	84	88	91	95	99	102	106				1,034
1.1	395	63	67	70	74	77	81	84	88	91	95	99	102	106			1,097
1.2	426	60	63	67	70	74	77	81	84	88	91	95	99	102	106		1,156
1.3	456	56	60	63	67	70	74	77	81	84	88	91	95	99	102	106	1,212

DRILLING SCHEDULE

EV=80%		INJECTORS																	
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	34	38	40	STB/D
YEARS	DAYS																			
0.1	30	240																		240
0.2	61	240	240																	480
0.3	91	240	240	240																720
0.3	122	240	240	240	240															960
0.4	152	240	240	240	240	240														1,200
0.5	183	240	240	240	240	240	240													1,440
0.6	213	240	240	240	240	240	240	240												1,680
0.7	243	240	240	240	240	240	240	240	240											1,920
0.8	274	240	240	240	240	240	240	240	240	240										2,160
0.8	304	240	240	240	240	240	240	240	240	240	240									2,400
0.9	335	240	240	240	240	240	240	240	240	240	240	240								2,640
1.0	365	240	240	240	240	240	240	240	240	240	240	240	240							2880
1.1	395	240	240	240	240	240	240	240	240	240	240	240	240	240						3,120
1.2	426	240	240	240	240	240	240	240	240	240	240	240	240	240	240					3,360
1.3	456	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240				3,600
1.3	487	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480			4,080
1.4	517	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480		4,560
1.5	548	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040

DRILLING SCHEDULE

EV=80%		WATER PRODUCTION														
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	STB/D
YEARS	DAYS																
0.1	30	133															133
0.2	61	99	133														232
0.3	91	104	99	133													335
0.3	122	109	104	99	133												444
0.4	152	113	109	104	99	133											557
0.5	183	118	113	109	104	99	133										676
0.6	213	123	118	113	109	104	99	133									799
0.7	243	158	123	118	113	109	104	99	133								957
0.8	274	162	158	123	118	113	109	104	99	133							1,119
0.8	304	138	162	158	123	118	113	109	104	99	133						1,257
0.9	335	143	138	162	158	123	118	113	109	104	99	133					1,400
1.0	365	148	143	138	162	158	123	118	113	109	104	99	133				1,547
1.1	395	153	148	143	138	162	158	123	118	113	109	104	99	133			1,700
1.2	426	158	153	148	143	138	162	158	123	118	113	109	104	99	133		1,858
1.3	456	162	158	153	148	143	138	162	158	123	118	113	109	104	99	133	2,020

The drilling program described above assumed two drilling rigs drilling two well per month per rig. The resulting production profiles were used as input to the economic model.

Below are the basic considerations, CAPEX, OPEX, etc. used to estimate the economic yield – NPV, Cash Flow, IRR, oil price "Threshold Value ($/BBL) and pay-out time – for the proposed waterflood development program

PECOS COUNTY OILFIELD, Section 91-UNIT 1 (PHASE A) WATERFLOODING- PROJECT ECONOMICS

5-Spot Tally		$/Array	Total	Drilling Schedule	1st-Year	2nd-Year	3rd-Year
	30	34,815	1,044,446		24	6	

TOTAL CAPEX WATER SUPPLY = $1,085,000

CAPEX - Water Supply	Unit, $/ft	Feet	Total
Water Supply Lines	3.5	10,000	35,000.0
Labor			200,000.0

CAPITAL EXPENDITURES	Unit	Feet	Total
Production wells, $/Well	190,000.0		5,700,000
Injection Wells, $/Well	150,000.0		6,300,000
Water Facility			350,000

PETROLEUM PRICES	
Gas, $/MSCF=	2.73
WTI, $/BBL =	65
Liquids C_3-$C_{4,\ GPM,\ \$/G}$=	0.2
Number of Pumps	4
WELLS	
WELL TALLY$_{PROD}$ =	30
WELL TALLY$_{Inj}$ =	42

Field, Technical & Administrative Support	$/Well	Max/Month
Field Perssonel	300.0	20,000.0
Technical Support	150.0	8,000.0
Administrative Support	69.4	5,000.0
Financial & Accounting	27.8	2,000.0
Audits, Certifications, Misc.	8.3	600.0
Special Studies (Geoscience & Engineering)	69.4	5,000.0
Corporate	138.9	10,000.0

CAPITAL EXPENDITURES - 5-Spot	Unit, $/ft	Feet	Total
Electricity	6.75	467.0	3,152.3
Injector Lines	8.1	1,401.0	11,348.1
Flow Lines	3.5	467.0	1,634.5
Injection Pumps, Units	4.0	125,000.0	500,000.0
Labor	2.0	2,335.0	4,670.0
ROW/Estimated Impact	6.0	2,335.0	14,010.0

TOTAL CAPITAL EXPENDITURES		14,129,446
Effective CAPEX		10,729,446
PROJECTED LEASE OPERATING EXPENSES (LOE)		
Injection	$/BBL	$/Month
Chemicals Inj. Water	1.00	
Injection Water	0.50	
Water Disposal	0.35	
Electricity Inj. Pumps/Pump		1,500.0
Production		
Chemicals Production	1.50	
WORKOVER, $ =	8,000.0	Note: 2 Wells/Year

Liquids C_3-$C_{4, GPM}$=	8.653

Note: Water produced would be treated & reinjected. Option could be - once injectivity is assessed in the field - to drill disposal wells

ROYALTIES
24.97%

Note: The investment made sofar in wells, land, facilities, etc has been included in year 1 to estimate the IRR of the project

Investment made prior to waterflooding $0.0

Below are the production and economic data when considering E_V = 100% (Upper Bound)

Threshold Oil Price	@$/BBL
NPV(10%) = $0.0	$38.20

ECONOMIC INDICATORS (5 Years)				
10.0%	NPV(10%) =	$22,938,554	IRR =	N/A
15.0%	NPV(15%) =	$20,457,096	BT NET INCOME, $/WELL	
20.0%	NPV(20%) =	$18,356,782	892,122	

ECONOMIC INDICATORS (10 Years)				
10.0%	NPV(10%) =	$21,967,400	IRR =	N/A
15.0%	NPV(15%) =	$19,391,297	BT NET INCOME, $/WELL	
20.0%	NPV(20%) =	$17,709,384	892,122	

Year	OIL		GAS		LIQUIDS		WATER			
	Qo, STB/D	Np, STB	Qg, MSCF/D	Gp, MMSCF	Q_L,Gallon	Np, Gal	Qw_i, STB/D	W_i, STB/D	Qw, STB/D	Wp, STB
1	753	274,742	0.150	54.84	1.300	474,518	1,560.0	569,400	748.776	273,303
2	1248	455,697	0.249	90.96	2.156	787,051	4,500.0	1,642,500	2,221.817	810,963
3	655	239,111	0.131	47.73	1.131	412,978	5,040.0	1,839,600	2,936.388	1,071,782
4	362	132,137	0.072	26.37	0.625	228,218	5,040.0	1,839,600	3,226.845	1,177,798
5	261	95,187	0.052	19.00	0.450	164,401	5,040.0	1,839,600	3,324.294	1,213,367
6	222	80,965	0.044	16.16	0.383	139,838	5,040.0	1,839,600	3,373.747	1,231,418
7	184	67,229	0.037	13.42	0.318	116,115	5,040.0	1,839,600	3,406.200	1,243,263
8	147	53,494	0.029	10.68	0.253	92,391	5,040.0	1,839,600	3,428.689	1,251,471
9	109	39,758	0.022	7.94	0.188	68,668	5,040.0	1,839,600	3,445.339	1,257,549
10	71	26,022	0.014	5.19	0.123	44,944	5,040.0	1,839,600	3,458.096	1,262,205

Year	Sales - Income			CAPEX - CAPITAL EXPENDITURES			ROYALTIES
	Oil,	Gas, $	Liquids, $	WELLS	FACILITIES	MISC. (10%)	%
1	17,858,242	149,709	94,904	4,760,000	1,920,556	668,056	4,520,283
2	29,620,275	248,313	157,410	3,540,000	208,889	374,889	7,497,492
3	15,542,202	130,293	82,596	16,000		1,600	3,934,046
4	8,588,876	72,002	45,644	16,000		1,600	2,174,018
5	6,187,139	51,868	32,880	16,000		1,600	1,566,090
6	5,262,737	44,119	27,968	16,000		1,600	1,332,105
7	4,369,916	36,634	23,223	16,000		1,600	1,106,114
8	3,477,094	29,149	18,478	16,000		1,600	880,123
9	2,584,273	21,664	13,734	16,000		1,600	654,132
10	1,691,451	14,180	8,989	16,000		1,600	428,141

Year	OPEX				CASHFLOW, $	
	Lifting	Ad + Tec	Disp	Total (Inc. 5%)	YEAR	Cumulative
1	840,068	607,200	95,656	1,620,071	433,889	433,889
2	1,917,990	607,200	283,837	2,949,478	15,455,250	15,889,139
3	1,984,339	607,200	375,124	3,114,995	8,688,450	24,577,588
4	1,982,902	607,200	412,229	3,152,448	3,362,455	27,940,043
5	1,980,831	607,200	424,678	3,163,345	1,524,852	29,464,895
6	1,986,574	607,200	430,996	3,176,009	809,109	30,274,004
7	1,983,739	607,200	435,142	3,177,385	128,674	30,402,678
8	1,975,448	607,200	438,015	3,171,696	(544,697)	29,857,981
9	1,963,960	607,200	440,142	3,161,868	(1,213,929)	28,644,052
10	1,950,341	607,200	441,772	3,149,278	(1,880,399)	26,763,653

Below are the production and economic data when considering E_V = 80% (Lower Bound)

ECONOMIC INDICATORS (5 Years)				
10.0%	NPV (10%) =	$14,386,401	IRR =	465.5%
15.0%	NPV (15%) =	$12,705,763	BT NET INCOME, $/WELL	
20.0%	NPV (20%) =	$11,285,812	461,750	

ECONOMIC INDICATORS (10 Years)				
10.0%	NPV (10%) =	$12,209,512	IRR =	465.5%
15.0%	NPV (15%) =	$10,699,020	BT NET INCOME, $/WELL	
20.0%	NPV (20%) =	$9,934,624	461,750	

Year	OIL		GAS		LIQUIDS		WATER			
	Qo, STB/D	Np, STB	Qg, MSCF/D	Gp, MMSCF	Q_L, Gallon	Np, Gal	Qw_i, STB/D	W_i, STB/D	Qw, STB/D	Wp, STB
1	602	219,794	0.120	43.87	1.040	379,614	1,560.0	569,400	787.944	287,600
2	1012	369,234	0.202	73.70	1.747	637,719	4,500.0	1,642,500	2,231.609	814,537
3	543	198,234	0.108	39.57	0.938	342,378	5,040.0	1,839,600	2,936.388	1,071,782
4	301	109,997	0.060	21.96	0.520	189,980	5,040.0	1,839,600	3,226.845	1,177,798
5	213	77,806	0.043	15.53	0.368	134,383	5,040.0	1,839,600	3,324.294	1,213,367
6	166	60,461	0.033	12.07	0.286	104,425	5,040.0	1,839,600	3,373.747	1,231,418
7	136	49,683	0.027	9.92	0.235	85,810	5,040.0	1,839,600	3,406.200	1,243,263
8	115	41,935	0.023	8.37	0.198	72,427	5,040.0	1,839,600	3,428.689	1,251,471
9	99	36,082	0.020	7.20	0.171	62,319	5,040.0	1,839,600	3,445.339	1,257,549
10	88	32,084	0.018	6.40	0.152	55,414	5,040.0	1,839,600	3,458.096	1,262,205

Year	Sales - Income			CAPEX - CAPITAL EXPENDITURES			ROYALTIES
	Oil,	Gas, $	Liquids, $	WELLS	FACILITIES	MISC. (10%)	%
1	14,286,593	119,767	75,923	4,760,000	1,920,556	668,056	3,616,226
2	24,000,215	201,199	127,544	3,540,000	208,889	374,889	6,074,941
3	12,885,224	108,019	68,476	16,000		1,600	3,261,511
4	7,149,806	59,938	37,996	16,000		1,600	1,809,761
5	5,057,419	42,397	26,877	16,000		1,600	1,280,135
6	3,929,990	32,946	20,885	16,000		1,600	994,760
7	3,229,424	27,073	17,162	16,000		1,600	817,433
8	2,725,769	22,851	14,485	16,000		1,600	689,947
9	2,345,360	19,662	12,464	16,000		1,600	593,658
10	2,085,489	17,483	11,083	16,000		1,600	527,880

Year	OPEX				CASHFLOW, $	
	Lifting	Ad + Tec	Disp	Total (Inc. 5%)	YEAR	Cumulative
1	779,090	607,200	100,660	1,561,297	(2,223,852)	(2,223,852)
2	1,793,657	607,200	285,088	2,820,242	11,309,996	9,086,145
3	1,923,024	607,200	375,124	3,050,615	6,731,993	15,818,137
4	1,949,693	607,200	412,229	3,117,579	2,302,801	18,120,938
5	1,954,760	607,200	424,678	3,135,971	692,987	18,813,925
6	1,955,818	607,200	430,996	3,143,715	(172,255)	18,641,670
7	1,957,420	607,200	435,142	3,149,750	(711,123)	17,930,547
8	1,958,109	607,200	438,015	3,153,491	(1,097,933)	16,832,614
9	1,958,447	607,200	440,142	3,156,079	(1,389,851)	15,442,763
10	1,959,434	607,200	441,772	3,158,826	(1,590,251)	13,852,512

Boris P. Abad, MS, PhD
Petroleum & Natural Gas Engineering

Waterflooding the Pecos County

Section 91 Queen Reservoir

(Pressure Maintenance & Incremental Oil & Gas Production)

Amazing Energy

Antecedents

Mire & Associates, Inc. (MAI) evaluated the reserves as of July 31st, 2017 for Amazing Energy Oil and Gas, Co. (Amazing) interest in selected oil properties in Pecos County, Texas. Reserves and cash flows were generated for the AMAZING interests using SEC pricing ($48.71/ barrel and $3.01/ MMBTU). These estimates were done as per the Securities and Exchange Commission's standards as described in the December 2008 amendment of Section 210.4-10 of Regulation S – X. This report is provided to AMAZING to satisfy the requirements contained in Item 1202(a)(8) of U.S. Securities and Exchange Commission Regulation S-K.

"*As of July 31, 2017 we estimate the net proved reserves of* AMAZING *to be about 305,440 barrels of oil (305.4 MBO) and 1,143,170 thousand cubic feet of gas (1,143.2 MMCF). Projected future cash flows show a discounted net present value (NPV10%) of $7,052,380*[3]*".*

The AMAZING properties evaluated consisted of three sections S 91, B and C holding producing and undeveloped reserves in Pecos County, Texas. AMAZING operates 23 existing wells on those 3 active leases. Total production was about 35 BOPD & 240 MCFD. The company had active workover program and planned to complete two already drilled wells, recomplete 9 wells, and drill 7 additional wells in the next 18 months.

MAI conclusions – Certified Reserves – are summarized on the table below:

Amazing Energy Oil and Gas Co. *Page 2*

Reserve Class/Category	Gross Reserves		Net Reserves		Net Revenue	Expenses + Taxes	Investments	Non-disc Cashflow	Discounted Cashflow (10%)	Life
	Oil (MBO)	Gas (MMcf)	Oil (MBO)	Gas (MMcf)	M$	M$	M$	M$	M$	Years
Proved Producing	72	308	33	115	1,533	610	-	923	649	19.3
Proved Non-producing	189	625	116	393	6,235	1,944	463	3,827	2,767	17.0
Proved Undeveloped	202	1,010	156	635	8,623	2,426	1,225	4,972	3,637	15.2
Total Proved	463	1,943	305	1,143	16,391	4,980	1,688	9,723	7,052	19.3

Table 1: Reserves and Value Table as of 7/31/17

The macro net reserve volumes – attributable to the WI – depicted above have its support and explanation on the detailed report produced by MAI, sent to Amazing upon its completion, and sent by the company to the SEC to comply with its yearly legal and fiduciary obligations. The pertinent part of the "Economic One-Liners" table is presented below.

[3] These two paragraph have been taken verbatim from the Mire & Associates report as well as the table depicting the reserves as of 7/31/2017

Economic One-Liners
As of: 7/31/2017
SEC 1P Reserves

Oil Price, $/BBL = $48.71 Gas Price, $/MSCF = $3.01

Lease Name Risked/Unrisked	Reserve Category	Net Reserves Oil, MSTB	Net Reserves MMSCF	Net Revenue, M$ Oil	Net Revenue, M$ Gas	Net Revenue, M$ Total	Expense & Taxes, M$	Invest. M$
Grand Total	Total							
Proved Rsv Class	Total	307.5	1,143.19	$14,978.33	$3,441.00	$18,419.33	$5,021.46	$1,704.40
Producing Rsv Category	Total	33.2	115.2	$1,619.12	$346.84	$1,965.96	$611.57	$0.00
Non-Producing Rsv Category	Total	119.0	393.2	$5,796.49	$1,183.38	$6,979.87	$1,984.16	$479.40
Undeveloped Rsv Category	Total	155.3	634.8	$7,562.71	$1,910.78	$9,473.49	$2,425.73	$1,225.00
Proved Producing Rsv Class & Category								
WWJD B RC (A & B)	*PV-PD*	0.0	0	0	$0.00	$0.00	$0.00	$0.00
WWJD C	*PV-PD*	0.19	0	$9.25	$0.00	$9.25	$7.76	$0.00
WWJD Unit 1 (1 - 12)	*PV-PD*	17.3	58.74	$842.68	$176.81	$1,019.49	$356.91	$0.00
WWJD Unit 2 (13 - 15)	*PV-PD*	15.55	46.75	$757.44	$140.72	$898.16	$238.94	$0.00
WWJD Unit 3 (7, 10 21)	*PV-PD*	0.2	9.74	$9.74	$29.32	$39.06	$7.96	$0.00
Proved Non-Producing Rsv Class & Category								
WWJD 1 Reperf Refrac Equip	*PV-NP*	12.96	81.84	$631.28	$246.34	$877.62	$282.13	$45.00
WWJD 21 RC (A & B)	*PV-NP*	14.82	26.44	$721.88	$79.58	$801.47	$200.50	$45.00
WWJD 27	*PV-NP*	22.04	89.58	$1,073.57	$269.64	$1,343.20	$379.96	$80.00
WWJD 28	*PV-NP*	22.04	89.58	$1,073.57	$269.64	$1,343.20	$380.03	$80.00
WWJD 6 Reperf Refrac Equip	*PV-NP*	9.24	83.3	$450.08	$250.73	$700.81	$202.74	$45.00
WWJD 7 RC (A & B)	*PV-NP*	12.56	22.41	$611.80	$67.45	$679.25	$189.17	$45.00
WWJD B RC (A & B)	*PV-NP*	10.8	0	$526.07	$0.00	$526.07	$149.00	$59.40
WWJD C RC (A & B)	*PV-NP*	14.54	0	$708.24	$0.00	$708.24	$200.63	$80.00
Proved Undeveloped Rsv Class & Category								
WWJD 17	*PV-UD*	22.18	90.18	$1,080.39	$271.44	$1,351.83	$339.55	$175.00
WWJD 18	*PV-UD*	22.18	90.18	$1,080.39	$271.44	$1,351.83	$339.48	$175.00
WWJD 19	*PV-UD*	22.18	90.89	$1,080.39	$273.58	$1,353.97	$349.35	$175.00
WWJD 20	*PV-UD*	22.18	90.89	$1,080.39	$273.58	$1,353.97	$349.33	$175.00
WWJD 22	*PV-UD*	22.18	90.89	$1,080.39	$273.58	$1,353.97	$349.30	$175.00
WWJD 23	*PV-UD*	22.18	90.89	$1,080.39	$273.58	$1,353.97	$349.38	$175.00
WWJD 25	*PV-UD*	22.18	90.89	$1,080.39	$273.58	$1,353.97	$349.34	$175.00

The values reported are estimates based on evaluation of the information available and certain reasonable engineering assumptions, and above all, based on the plan of operations and development (POD) submitted by the company to MAI. The POD presented had three macro components, first the operation of three batteries in Section 91 and one battery in Sections A and one in Section B. The results of the forecasts are grouped under Class & Category termed "Proved[4] Producing R_{SV}" – 33.2 M (Net) & 71.62 MSTB (Gross). The table below depicts gross reserve estimates for all classes and categories.

The second class of proved reserves corresponds to "Proved-Non-Producing"; it has eight components and amounts to 119_{NET} MSTB (189_{GROSS} MMSTB). It considers six recompletions and the drilling of two new wells WWJD 27 & WWJD 28 (30)

The third class corresponds to "Proved Undeveloped"; it assumes the drilling of seven new wells. 155.3_{NET} MSTB (202_{GROSS} MSTB) were certified in this category. Total reserves were 307.5_{NET} MSTB (463_{GROSS} MSTB).

[4] Production forecasts were made for 15 years – Aug 2017 to July 2032.

Lease Name	Reserve	Gross Reserves	
Risked/Unrisked	Category	Oil, MSTB	MMSCF
Grand Total	Total		
Proved Rsv Class	Total	462.57	1,946.6

Producing Rsv Category	Total	71.62	307.87
Non-Producing Rsv Category	Total	188.97	628.78
Undeveloped Rsv Category	Total	201.98	1009.94
Proved Producing Rsv Class & Category			
WWJD Unit B RC (A & B, Wells 1 & 3) - Battery B	*PV-PD*	0	0
WWJD Unit C (Well 4) - Battery C	*PV-PD*	0.5	0
WWJD Unit 1 (5, 9, 16) - Battery 5	*PV-PD*	22.38	93.46
WWJD Unit 2 (13, 14, 15) - Battery 13	*PV-PD*	48.13	177.95
WWJD Unit 3 (7, 10, 21, 23) - Battery 21	*PV-PD*	0.61	36.46
Proved Non-Producing Rsv Class & Category			
WWJD 1 Reperf Refrac Equip	*PV-NP*	16.76	130.2
WWJD 21 RC (A & B)	*PV-NP*	19.16	42.06
WWJD 27	*PV-NP*	28.5	145.82
WWJD 30 (28)	*PV-NP*	28.5	142.52
WWJD 6 Reperf Refrac Equip	*PV-NP*	11.95	132.53
WWJD 7 RC (A & B)	*PV-NP*	16.24	35.65
WWJD B RC (A & B)	*PV-NP*	29.08	0
WWJD C RC (A & B)	*PV-NP*	38.78	0
Proved Undeveloped Rsv Class & Category			
WWJD 17	*PV-UD*	28.69	143.47
WWJD 18	*PV-UD*	28.69	143.47
WWJD 19	*PV-UD*	28.92	144.6
WWJD 20	*PV-UD*	28.92	144.6
WWJD 22	*PV-UD*	28.92	144.6
WWJD 23	*PV-UD*	28.92	144.6
WWJD 25	*PV-UD*	28.92	144.6

Analysis of the August 1st, 2017 – to – July 31st, 2018 shows that the field underperformed and that the forecasted production was not met in any of the proved reserves categories. Below is an explanation of the reasons.

Wells
WWJD 91-5, 9, 16
Wells SI
WWJD 91, 4, 6, 8, 1, 11, 12

IP, STB/D		
91-5	91-9	91-16
4	45	28

0.773125

FY	PRODUCTION SUMMARY WWJD # 5						
2017	BOPD	BOM	MCFD	GOR, SCF/STB	MCFM	BOEPD	BOEPM
Aug-16	10	295	60	6,322	1,865	20	606
Sep-16	9	266	46	5,211	1,386	17	497
Oct-16	9	267	192	22,292	5,952	41	1,259
Nov-16	9	258	91	10,636	2,744	24	715
Dec-16	17	518	53	3,149	1,631	25	790
Jan-17	18	548	45	2,544	1,394	25	780
Feb-17	2	44	38	24,295	1,069	8	222
Mar-17	15	470	32	2,130	1,001	21	637
Apr-17	18	538	85	4,738	2,549	32	963
May-17	10	301	127	13,056	3,930	31	956
Jun-17	16	471	109	6,941	3,269	34	1,016
Jul-17	15	458	157	10,646	4,876	41	1,271
TOTAL	12	**4,434**	87	**7,142**	**31,666**	27	9,712

Wells
WWJD B-1
Wells SI
WWJD B, 2, 3

IP, STB/D		
B - 1	B - 2	B - 3
8	5	2

0.371250

FY	PRODUCTION SUMMARY B					
2017	BOPD	BOM	MCFD	MCFM	BOEPD	BOEPM
Aug-16	0	3	-	-	0	3
Sep-16	0	12	-	-	0	12
Oct-16	0	14	-	-	0	14
Nov-16	0	14	-	-	0	14
Dec-16	0	13	-	-	0	13
Jan-17	0	12	-	-	0	12
Feb-17	0	13	-	-	0	13
Mar-17	1	16	-	-	1	16
Apr-17	0	8	-	-	0	8
May-17	0	12	-	-	0	12
Jun-17	0	9	-	-	0	9
Jul-17	0	12	-	-	0	12
TOTAL	0	**138**	-	**-**	0	138

Wells
WWJD C-4
Wells SI
WWJD C-1, 2, 3

IP, STB/D			
91-1	91-2	91-3	91-4
10	1.5	2.5	2

0.30

FY	PRODUCTION SUMMARY C					
2017	BOPD	BOM	MCFD	MCFM	BOEPD	BOEPM
Aug-16	0	6	-	-	0	6
Sep-16	0	13	-	-	0	13
Oct-16	0	13	-	-	0	13
Nov-16	3	92	-	-	3	92
Dec-16	2	48	-	-	2	48
Jan-17	1	31	-	-	1	31
Feb-17	0	6	-	-	0	6
Mar-17	1	31	-	-	1	31
Apr-17	1	31	-	-	1	31
May-17	1	16	-	-	1	16
Jun-17	0	12	-	-	0	12
Jul-17	0	15	-	-	0	15
TOTAL	1	**314**	-	**-**	1	314

Wells	IP, STB/D		
	91-13	91-14	91-15
WWJD 91-13, 14, 15	148	60	81
Wells SI			

Wells	IP, STB/D	
	91-21	91-23
WWJD 91-21, 23	4	45
Wells SI		
WWJD 91-7, 10		

usted Paydeck for Sell of WI 0.323125

FY	PRODUCTION SUMMARY WWJD#13						
2017	BOPD	BOM	MCFD	GOR, SCF/STB	MCFM	BOEPD	BOEPM
Aug-16	16	482	22	1,400	675	19	595
Sep-16	23	694	26	1,114	773	27	823
Oct-16	21	644	41	1,967	1,267	28	855
Nov-16	21	615	142	6,945	4,271	44	1,327
Dec-16	12	382	71	5,791	2,212	24	751
Jan-17	12	375	88	7,235	2,713	27	827
Feb-17	8	227	106	13,075	2,968	26	722
Mar-17	16	485	81	5,159	2,502	29	902
Apr-17	16	477	88	5,526	2,636	31	916
May-17	14	434	66	4,719	2,048	25	775
Jun-17	18	525	107	6,133	3,220	35	1,062
Jul-17	17	517	84	5,064	2,618	31	953
TOTAL	16	**5,857**	76	**4,764**	**27,903**	29	10,508

0.328678

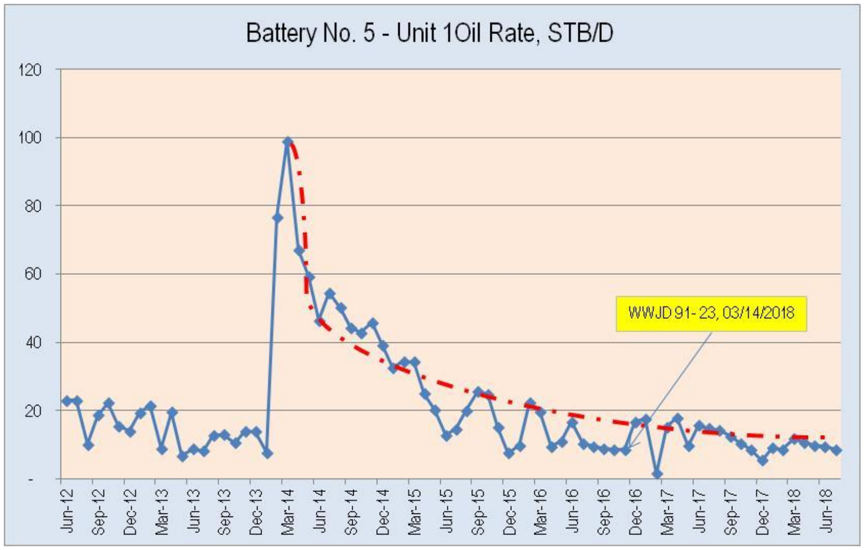
FY	PRODUCTION SUMMARY WWJD#21						
2017	BOPD	BOM	MCFD	GOR, SCF/STB	MCFM	BOEPD	BOEPM
Aug-16	-		-			-	-
Sep-16	-		-			-	-
Oct-16	-		-			-	-
Nov-16	-		-			-	-
Dec-16	-		-			-	-
Jan-17	-		-			-	-
Feb-17	4	100	45	12,720	1,272	11	312
Mar-17	1	46	119	80,435	3,700	21	663
Apr-17	2	58	95	49,172	2,852	18	533
May-17	1	26	71	85,154	2,214	13	395
Jun-17	1	33	27	24,485	808	6	168
Jul-17	1	37	45	37,676	1,394	9	269
TOTAL	1	**300**	34	40,800	**12,240**	6	2,340

Wells - Battery 5	Wells - Battery 13	Wells - Battery 21
WWJD 91-5, 9, 16	WWJD 91-13, 14, 15	WWJD 91-21, 23
Wells SI	Wells SI	Wells SI
WWJD 91, 4, 6, 8, 1, 11, 12		WWJD 91-7, 10

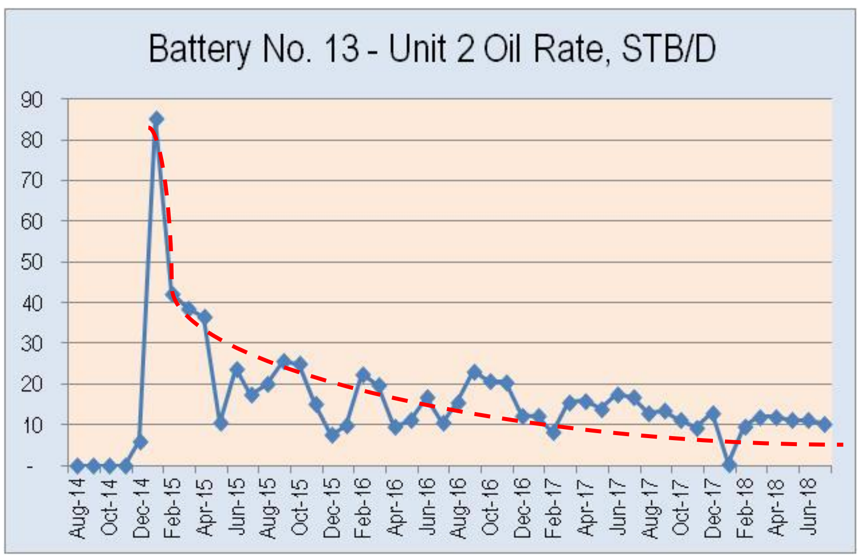
FY	Seccion 91 PRODUCTION SUMMARY TOTAL (Gross)						
2017	BOPD	BOM	MCFD	GOR, SCF/STB	MCFM	BOEPD	BOEPM
Aug-16	25	777	82	3,269	2,540	39	1,200
Sep-16	32	960	72	2,249	2,159	44	1,320
Oct-16	29	911	233	7,924	7,219	68	2,114
Nov-16	29	873	234	8,036	7,015	68	2,042
Dec-16	29	900	124	4,270	3,843	50	1,541
Jan-17	30	923	132	4,450	4,107	52	1,608
Feb-17	13	371	190	14,310	5,309	45	1,256
Mar-17	32	1,001	232	7,196	7,203	71	2,202
Apr-17	36	1,073	268	7,490	8,037	80	2,413
May-17	25	761	264	10,765	8,192	69	2,126
Jun-17	34	1,029	243	7,091	7,297	75	2,245
Jul-17	33	1,012	287	8,783	8,888	80	2,493
TOTAL	29	10,591	197	**6,780**	71,809	62	22,559

MAI forecasted production for the 08/01/2017 – 07/31/2018 fiscal year was 44.38 $KSTB_{NET}$ (88 $KSTB_{GROSS}$) based on the drilling workover and recompletion program presented by Amazing Energy. Actual production for the period was 5.6 $KSTB_{NET}$ (11.04 $KSTB_{GROSS}$), this is 12.6% of the forecasted production.

1. Proved, Producing reserves Differential: Units WWJD B and WWJD C have no forecasted production. Unit 1 – Battery 5, in spite of having incorporated Well WWJD 91-16 (first production on 11/21/2016) the overall production performance followed the observed decline after two months of increase due to the incorporation of well 16. Only three wells, 5, 9 and 16 are producing today. Cumulative gross oil production (June-12 to July-2018) was 47 KSTB & 295.4 MMSCF;

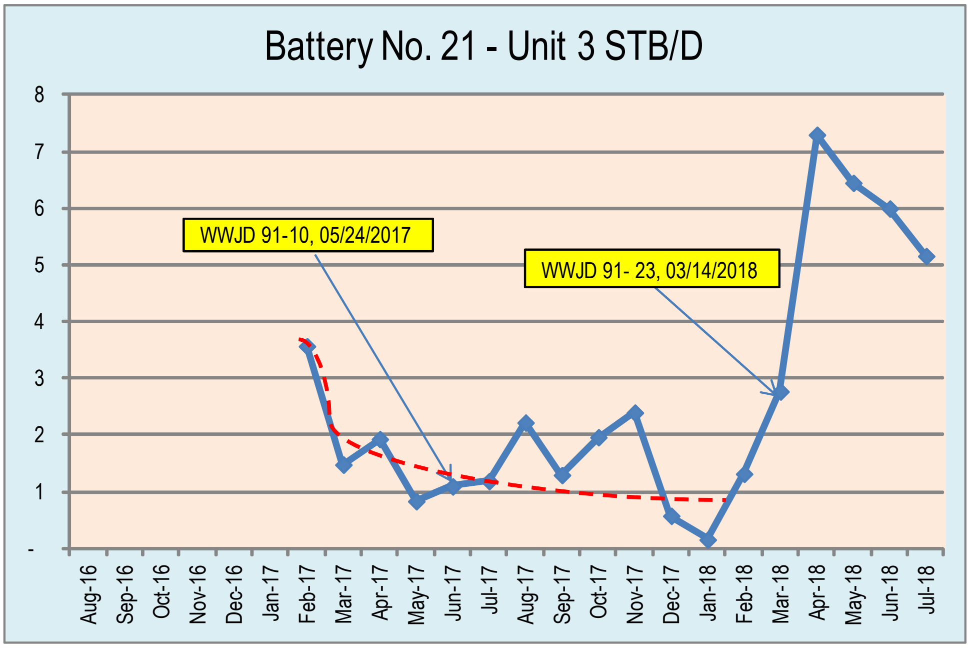


Unit 2 – Battery 13 gathers oil from three wells WWJD 91 13, 14 & 15. Wells tied to this unit have been producing since December 2014 and have produced 9.0 $KSTB_{NET}$ (23.4 $KSTB_{GROSS}$) until July 31st, 2018. Forecasted production for the 08/01/2017 – 07/31/2018 was 5.83 $KSTB_{NET}$ (18.0 $KSTB_{GROSS}$); however, actual production was 1.25 $KSTB_{NET}$ (3.85 $KSTB_{GROSS}$) from three wells, WWJD 13, 14 and 15.



Unit 3 – Battery 21 gathers oil from three wells WWJD 7, 10, 21, and from 23 since its incorporation on 03/14/2018[5]). Wells tied to this unit have been producing since February 2017 and have produced .475 $KSTB_{NET}$ (1.45 $KSTB_{GROSS}$) until July 31st, 2018. Forecasted production for the 08/01/2017 – 07/31/2018 was 0.483 $KSTB_{NET}$ (1.31 $KSTB_{GROSS}$); however, actual production was 0.388 $KSTB_{NET}$ (1.2 $KSTB_{GROSS}$) from three wells, WWJD 7, 10 21 and 23. This last well was not included in MAI forecast.

[5] Well WWJD 91 23 was not drilled during the 2017/2018 fiscal year. Its production would be part of the 2018/2019 forecast.



Average Net Interest for Sections 91, B & C =	51%
Net Interest Oil = 50.4%	Net Interest Gas = 52.2%

Wells
WWJD 91-5, 9, 16, 13, 14, 15, 21, 23, B1, C4
Wells SI
WWJD 91, 4, 6, 8, 1, 11, 12, 7, 10, B2, B3, C1, C2, C3

Wells
WWJD 91-5, 9, 16, 13, 14, 15, 21, 23, B1, C4
Wells SI
WWJD 91, 4, 6, 8, 1, 11, 12, 7, 10, B2, B3, C1, C2, C3

FY	PRODUCTION SUMMARY TOTAL (NET)						
2017	BOPD	BOM	MCFD	GOR, SCF/STB	MCFM	BOEPD	BOEPM
Aug-16	12	387	54	4,287	1,660	21	664
Sep-16	15	439	44	3,008	1,321	22	659
Oct-16	14	424	162	11,829	5,011	41	1,259
Nov-16	14	431	117	8,124	3,502	34	1,015
Dec-16	18	543	64	3,638	1,976	28	872
Jan-17	18	559	63	3,499	1,954	29	884
Feb-17	5	147	79	15,005	2,204	18	514
Mar-17	18	550	90	5,084	2,798	33	1,017
Apr-17	20	601	125	6,252	3,760	41	1,228
May-17	13	391	143	11,332	4,428	36	1,129
Jun-17	18	552	128	6,950	3,833	40	1,190
Jul-17	17	542	164	9,357	5,074	45	1,388
TOTAL	15	5,566	103	**6,741**	37,521	32	11,820

FY	PRODUCTION SUMMARY TOTAL (Gross)						
2017	BOPD	BOM	MCFD	GOR, SCF/STB	MCFM	BOEPD	BOEPM
Aug-16	25	786	82	3,232	2,540	39	1,209
Sep-16	33	985	72	2,193	2,160	45	1,345
Oct-16	30	938	233	7,697	7,220	69	2,141
Nov-16	33	979	234	7,169	7,019	72	2,149
Dec-16	31	961	124	4,001	3,845	52	1,602
Jan-17	31	966	133	4,253	4,108	53	1,651
Feb-17	14	390	190	13,615	5,310	46	1,275
Mar-17	34	1,048	232	6,875	7,205	73	2,249
Apr-17	37	1,112	268	7,229	8,038	82	2,452
May-17	25	789	264	10,384	8,193	69	2,154
Jun-17	35	1,050	243	6,950	7,298	76	2,266
Jul-17	34	1,039	287	8,555	8,889	81	2,520
TOTAL	30	11,043	197	**6,504**	71,824	63	23,014

2. Proved, Non-Producing Reserves Differential: The table below shows the well production forecasts comprised in this category. These reserves are a sizable – 40.85% - portion of the overall certified reserves. The 2017/2018 fiscal year forecasted net production was 5.67 KSTB (12.02 $KSTB_{GROSS}$). The planned recompletion and re-fracking jobs were not performed or yielded no positive results; well 27 was not drilled and well 28 (30) is being drilled now but its completion and first production would happen in the 2018/2019 fiscal year.

Lease Name Risked/Unrisked	Reserve Category	Gross Reserves Oil, MSTB	 MMSCF
Proved Non-Producing Rsv Class & Category			
WWJD 1 Reperf Refrac Equip	*PV-NP*	16.76	130.2
WWJD 21 RC (A & B)	*PV-NP*	19.16	42.06
WWJD 27	*PV-NP*	28.5	145.82
WWJD 30 (28)	*PV-NP*	28.5	142.52
WWJD 6 Reperf Refrac Equip	*PV-NP*	11.95	132.53
WWJD 7 RC (A & B)	*PV-NP*	16.24	35.65
WWJD B RC (A & B)	*PV-NP*	29.08	0
WWJD C RC (A & B)	*PV-NP*	38.78	0
Non-Producing Rsv Category	Total	188.97	628.78

3. Proved Undeveloped Reserves Differential: The table below shows the well production forecasts comprised in this category. The undeveloped reserves represent 43.66 % of the total estimated oil and 51.88% of the gas of the overall certified proved reserves. The 2017/2018 fiscal year forecasted net production was 27.63 KSTB (12.02 $KSTB_{GROSS}$). The planned recompletion and re-fracking jobs were not performed or yielded no results; well 27 was not drilled and well 28 (30) is being drilled now but its completion and first production would happen in the 2018/2019 fiscal year.

Proved Undeveloped Rsv Class & Category			
WWJD 17	*PV-UD*	28.69	143.47
WWJD 18	*PV-UD*	28.69	143.47
WWJD 19	*PV-UD*	28.92	144.6
WWJD 20	*PV-UD*	28.92	144.6
WWJD 22	*PV-UD*	28.92	144.6
WWJD 23	*PV-UD*	28.92	144.6
WWJD 25	*PV-UD*	28.92	144.6
Undeveloped Rsv Category	Total	201.98	1009.94

Analysis of the existing production data – sharp decline oil rates, increasing GOR_S and declining gas production – points to the existence of a solution gas drive reservoir with limited to negligible water influx – confined by structural or stratigraphic traps. Additionally, it's highly possible that the reservoir was saturated from day one or it reached saturation pressure early in the development. If drilling continues as it has been done since the reservoir was initially developed, depletion will be accelerated without the benefit of additional recovery. I question the commerciality of all the wells, except, maybe, well WWJD 91-13.

The petrophysical analyses conducted using information from the logs ran in the various wells, as well as the various studies conducted using core samples, confirm the existence of significant amounts of mobile (recoverable) hydrocarbons; however, it would be necessary to supplement the reservoir pressure and assist oil displacement via water injection to be followed, after having conducted appropriate feasibility studies, by CO_2 – miscible and/or huff & puff – flooding.

Designing and implementing a pressure maintenance – improved oil displacement process to the Queen Reservoir in Amazing Energy's property in Pecos County would allow the recovery of oil and gas in excess of the volumes booked and certified last year.

Introduction and Generalities

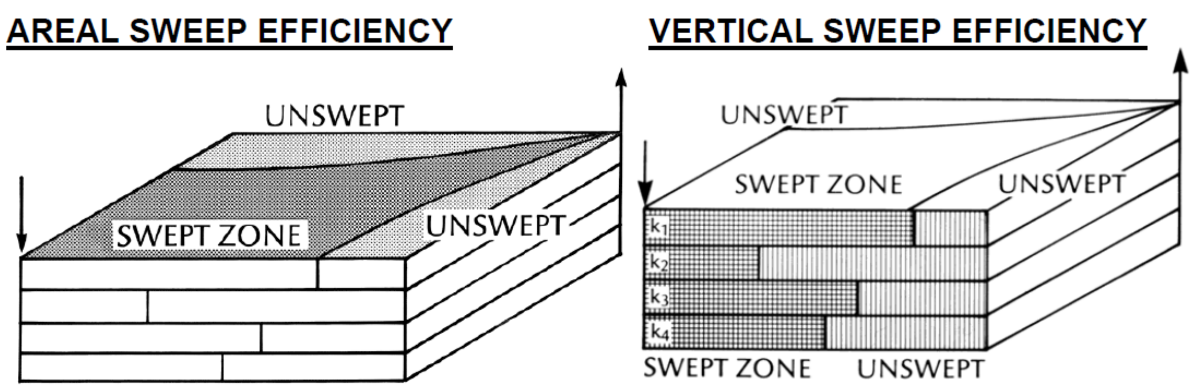
The need to maintain reservoir pressure and to improve the oil displacement efficiency to commercially produce, and to increase ultimate recovery of oil and gas in Amazing Energy's Pecos County Queen Reservoir (Queen – P) has been inferred from the analysis of eight years (June 2012 – July 2018) of oil & gas production from more than 30 wells drilled in Sections 91, B (1) and C (12). The evidence is pretty conclusive: the resources (oil & gas) are there but the reservoir, characterized as a saturated, solution gas reservoir, and lacks the energy to produce hydrocarbons in commercial (reserves) quantities.

Petrophysical analysis conducted in cores extracted from various wells drilled in the zone of interest, as well as information from neighboring leases – Walker and University – where successful waterflooding have been conducted, attest to the amiability of Queen – P to water injection.

Even though well interference tests have not been conducted, analysis of the drilling chronology and of the observed well initial conditions, as well as the similarities of the wells' production decline and GOR evolution suggest the presence of one common, stratified sandstone body, ergo, well connectivity.

Key Assumptions & Considerations

- Even though there is evidence that the reservoir is saturated ($P_R < P_{BP}$) and that there could be free gas phase in various points of the reservoir, a modification of the Buckley-Leverett frontal advance theory is applicable but subject to adjustment via history matching once water injection and oil/water production begins:
- Petrophysical analysis and the wells' production history show that there is "mobile" water in the reservoir[6]; however, the assumption made of one single mobile fluid (oil) in the reservoir ahead of the water front, corrected by a "Pseudo-relative permeability ratio (K_{ro}/k_{rw})" developed using the observed fluid saturations as "end points" and by observed initial $IP_{W,O}$ is a good approximation for designing and for economic analysis purposes;
- Areal and vertical sweep efficiencies will be considered in the estimation of oil recovery.



Areal and vertical sweep efficiencies in the of 82%-66% and 100%-80% respectively would be considered in the analysis;

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[6] Later in the report I'll present the summary of the reservoir rock and fluid properties as inferred from individual well, and core analysis when available.

- A 5[7] Acre Five-Spot (4-Injectors, 1-Producer) prototype would be used to estimate oil recovery. The hydrodynamic behavior would be assumed to be similar for all the "drillable" areas of the reservoir as defined by the geological model, but the individual "20-Acre-5-Spot" recovery and production profile would be modified by the local formation thickness, porosity and permeability, fluid saturation, relevant well IP in an attempt to take into consideration permeability distribution and flow capacity.
- Using PEGTOOLS® PVT Calculator based on a set of widely accepted and industry used empirical equations is reasonable in lieu of lab derived PVT oil, gas and water properties. Amazing Energy is in the process of conducting a PVT test using separator samples obtained from well WWJD 13 or 30;

Design & Economics

General Development Strategy

Below is a preliminary schedule – subject to revisions with operation and production engineering – for the design and implementation of the waterflood project.

WATERFLOODING AMAZING ENERGY PECOS COUNTY QUEEN RESERVOIR

ID	Task Name	Start	Finish	Duration	Schedule: 2018 (Q4), 2019 (Q1 Q2 Q3 Q4), 2020 (Q1 Q2 Q3 Q4), 2021 (Q1 Q2 Q3 Q4), 2022 (Q1 Q2 Q3 Q4), 2023 (Q1 Q2 Q3)
1	Design General Development Plan	9/7/2018	9/14/2018	6d	
2	Design & Implement Development Plan for Unit 1 – Phase 1	9/17/2018	7/31/2019	228d	
3	Design & Implement Development Plan for Unit 1 – Phase 2	8/1/2019	7/30/2021	522d	
4	Design & Implement Development Plan For Unit 2	8/3/2020	7/29/2022	520d	
5	Design & Implement Development Plan For Unit 3	8/1/2022	7/31/2023	261d	

ID	*Waterflooding Amazing Energy Queen Unit 1 – Phase 1 A & B*	Start	Finish	Duration	Schedule: Sep 2018 (9/9 9/16 9/23), Oct 2018 (9/30 10/7 10/14 10/21), Nov 2018 (10/28 11/4 11/11 11/18 11/25), Dec 2018 (12/2 12/9 12/16 12/23), Jan 2019 (12/30 1/6 1/13 1/20)
1	Design Development Plan & Economics	9/7/2018	9/28/2018	16d	
2	Reserve Certificcation	9/17/2018	10/8/2018	16d	
3	Facilities & Well Program Detailed Design & Engineering - EDP	10/31/2018	12/31/2018	44d	
4	Geological & Engineering Reviews – refinements Define well tally & locations – Geological Model	10/15/2018	11/15/2018	24d	
5	Facilities & Drilling Program	12/17/2018	1/15/2019	22d	

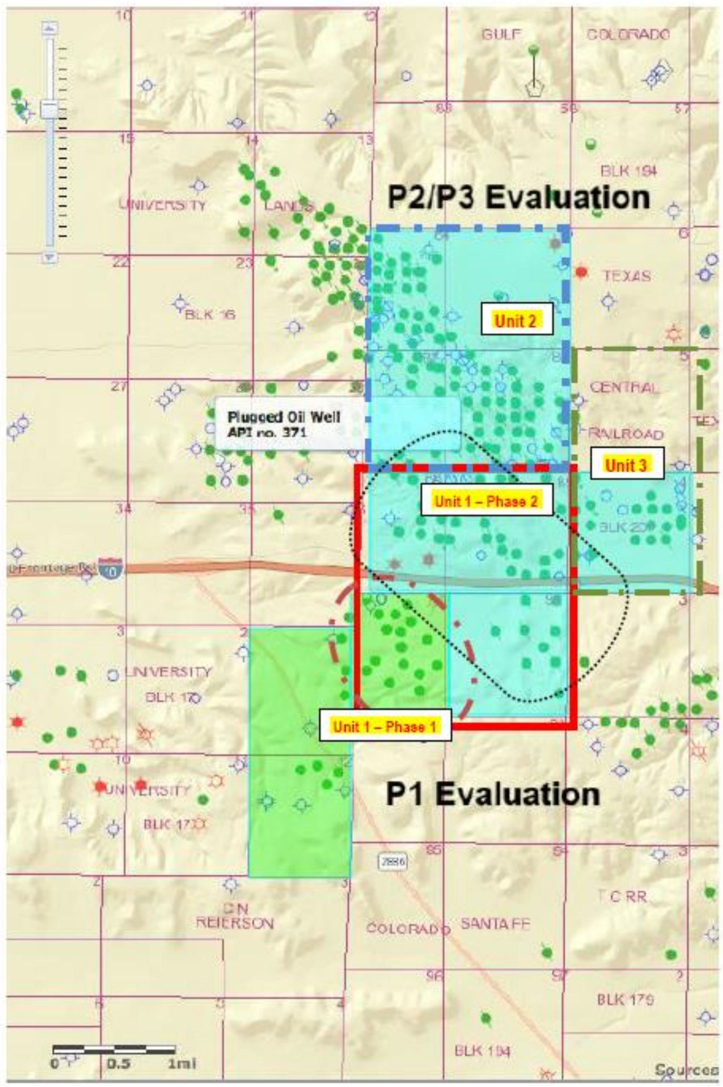
Amazing Energy 70K Pecos County Queen – P waterflood would be divided into three units comprising Sections 91, 90, 89 and 88, and Unit 1 (Section 91) would be further divided into Phase I, 30 5-Spot arrays, and Phase II, 40 additional 5-Spot arrays.

The reasons for the project partition described before are three fold; first Section 91 has been drilled and the presence of economically recoverable hydrocarbon resources has been established. Second, the presence of the existing wells ameliorates the economics of this phase since wells would be used as producers or injectors as deemed necessary; third, segmentation of the larger area would allow management to measure the practicality and economics of waterflooding the reservoir before committing to the full-flown

[7] I began the analysis considering a 20-Acre 5-Spot pattern; however, due to the low injectivity of the well-Queen sandstone system it was necessary to reduce the spacing to 5 acres.

extended project. The figure below shows a broad delimitation of the units. Refinements would be made once the geological model is completed. Forecasted oil recovery from Phase I would be claimed as P_1 reserves and recovery from Phase II could be considered P_2 type reserves. Potential recovery from Units 2 and 3 could be considered P_3.

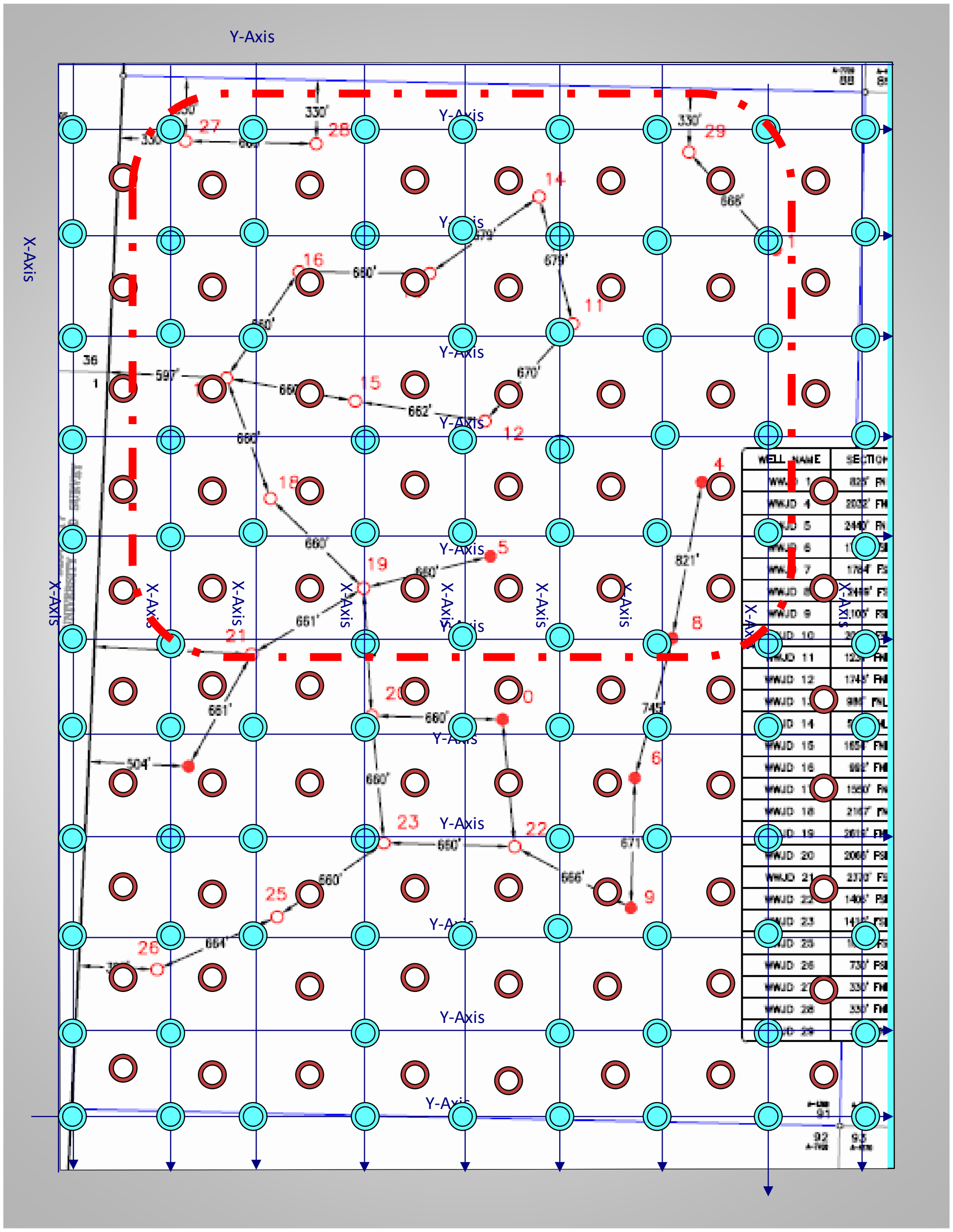
Amazing Energy Pecos County Queen Reservoir Waterflooding Units



Area & Well Tally

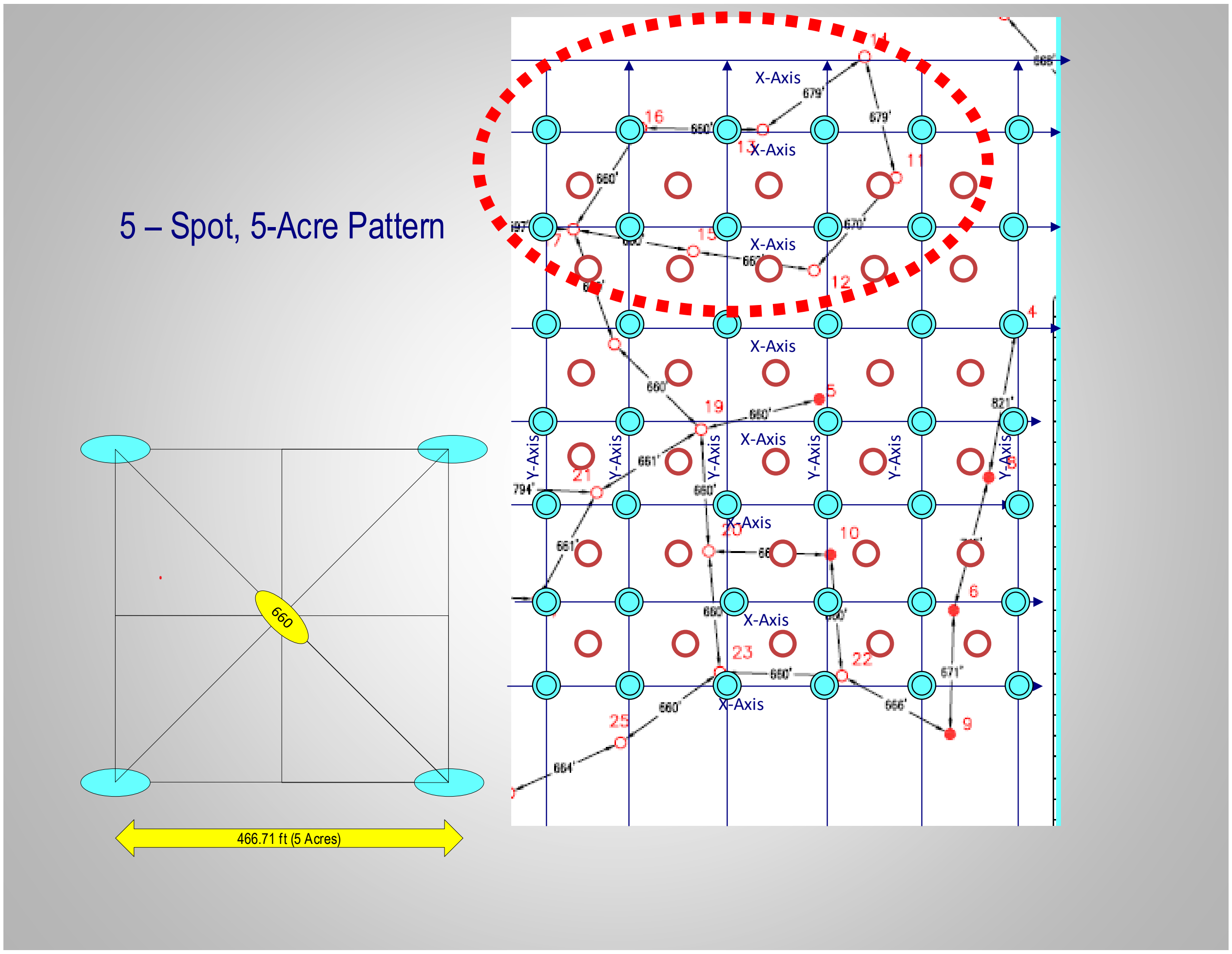
The proposed waterflood for Unit 1[8] – Phase 1 comprises 30 producers and 42 injectors, corresponding to 30, 5-Spot Patterns. The final well tally, their location and use as injectors or producers would be decided using the geological model as the driving guide and the mechanical and geological conditions of the existing wells. Below is an illustration of the 5-spot patterns superimposed on Section 91.

[8] Unit 1 would be developed in two sub-phases, A & B; A would have 30 producers and 42 Injectors. The dashed lane shows the area to be developed first ($P1H_A$)



Each pattern, when information available, would be redefined using the information from the reservoir defined by the well, or arithmetic averages from the wells. For example, Wells WWJD 4, 8, and 12 information would be use to define their respective patters, while wells WWJD 9 & 6, 5 & 10, 13 & 16 information would be use estimate averages applicable to the wells' corresponding patters. Neighboring pattern information would be used where no well information is available.

The graphic below shows the part of Section 91 (NW) comprising the patterns defined by wells WWJD 91 – 16, 13, 14 & 11. These two patters would be used to estimate the waterflood oil and gas recovery from Section 91.



Petrophysics

Below are summaries[9] of petrophysical analysis conducted in various wells

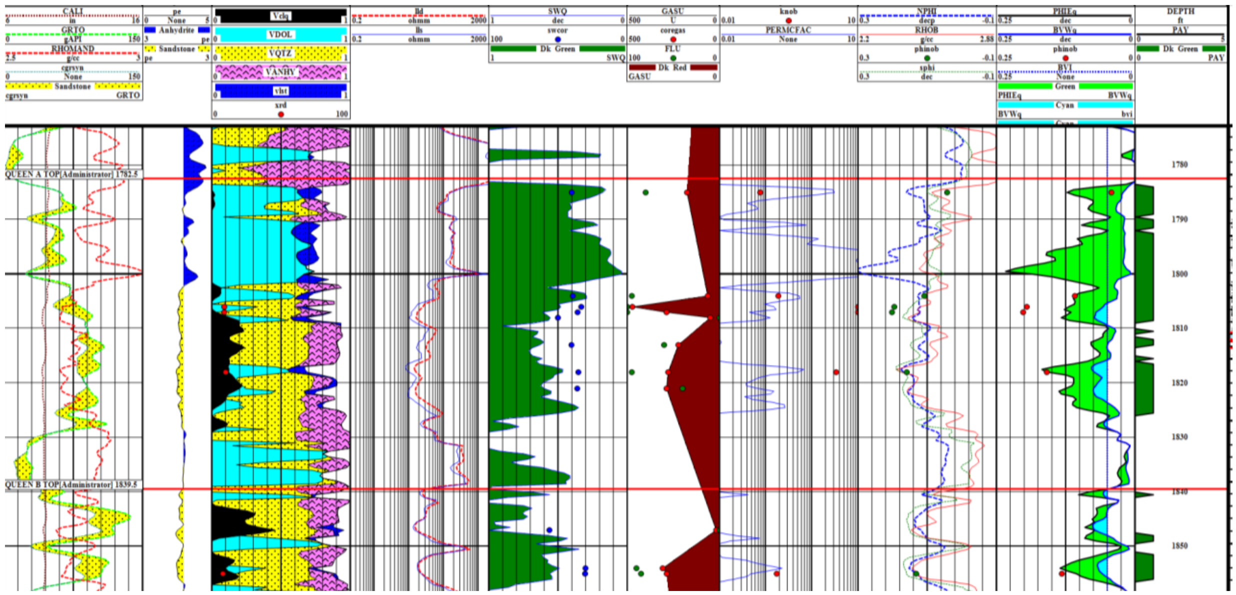
Parameters Used:

- R_W 0.174 at 77F
- M=n=1.8 Archie S_W model
- V_{CLAY} from GR, +/- 55 API clean 140 shale to match WWJD 31 core XRD
- Normalized density in upper anhydrite, WWJD 31 cored well used as reference well
- Net pay >7% porosity <65% S_W 50% V_{CLAY}

42-371-39681 WWJD #31 Queen ''A''

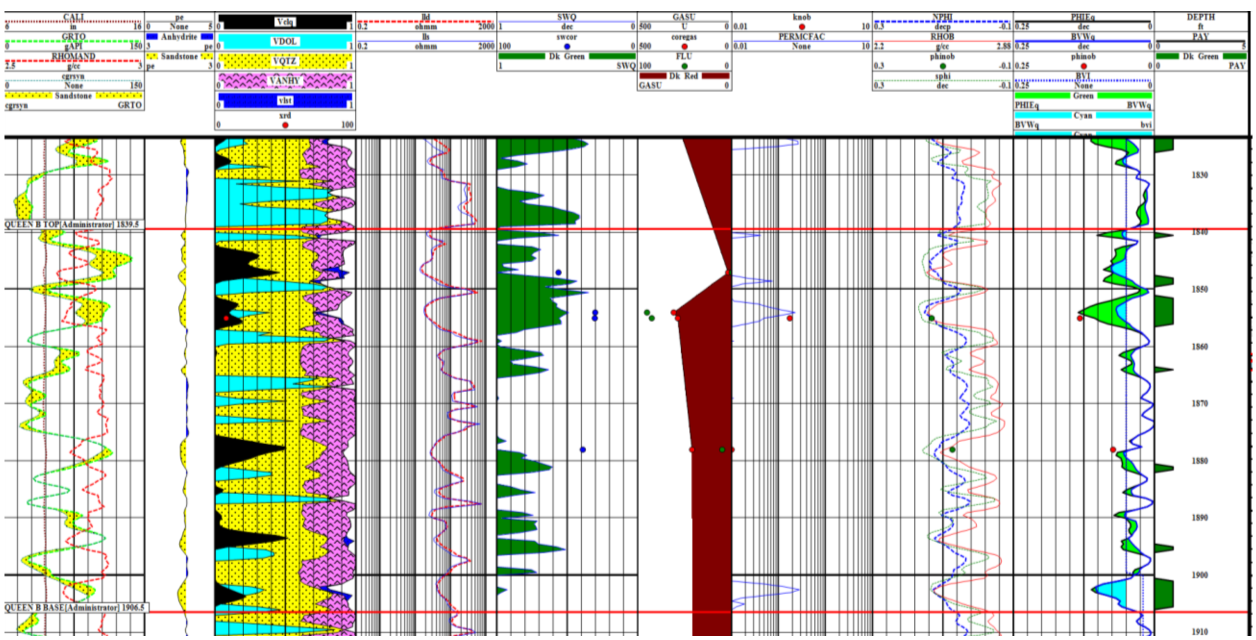
Zone	Top	Base	H	Porosity	Sw	BOIP Acre	BOIP 40 Ac	BOIP 15% RF	FVF
Queen "A"	1784	1825	32	0.118	0.345	17,286	691,449	103,717	1.11

[9] FILE: Wells/ Open Hole Tests/ Well Net Pays Summary/ WWJD 12, 31, 4, 23. 13 & Net Pay Summary



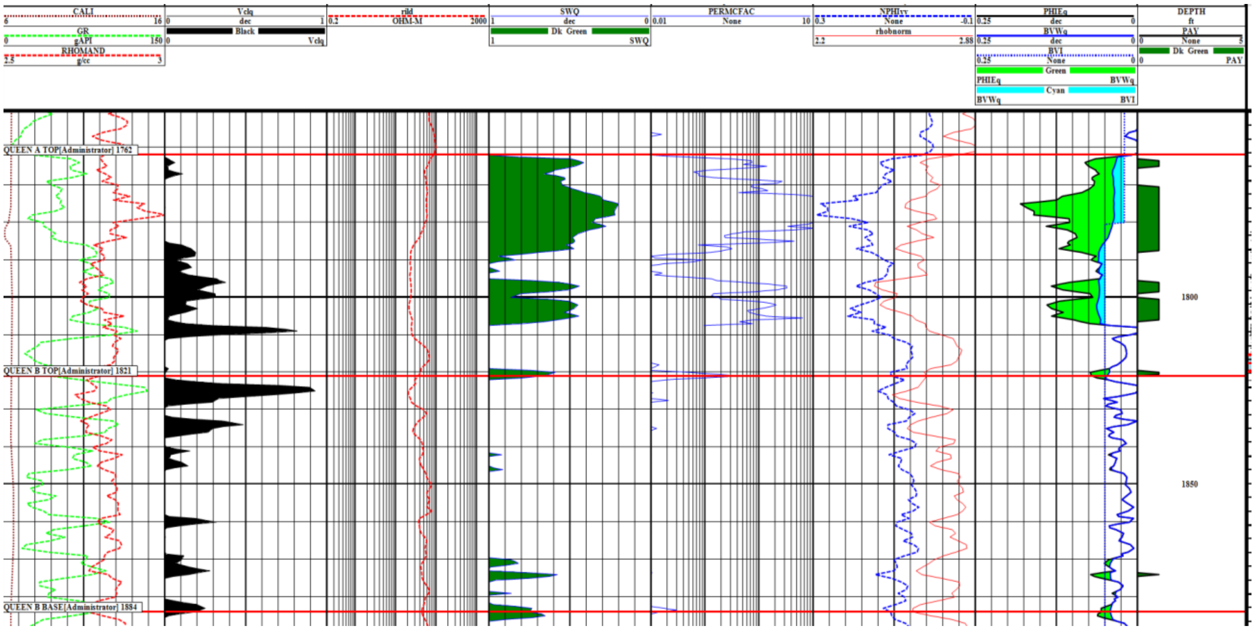
42-371-39681 WWJD #31 Queen ''B''

						BOIP	BOIP	BOIP	
Zone	Top	Base	H	Porosity	Sw	Acre	40 Ac	15% RF	FVF
Queen "B"	1840.5	1903.5	8.5	0.102	0.506	2,993	119,738	17,961	1.11



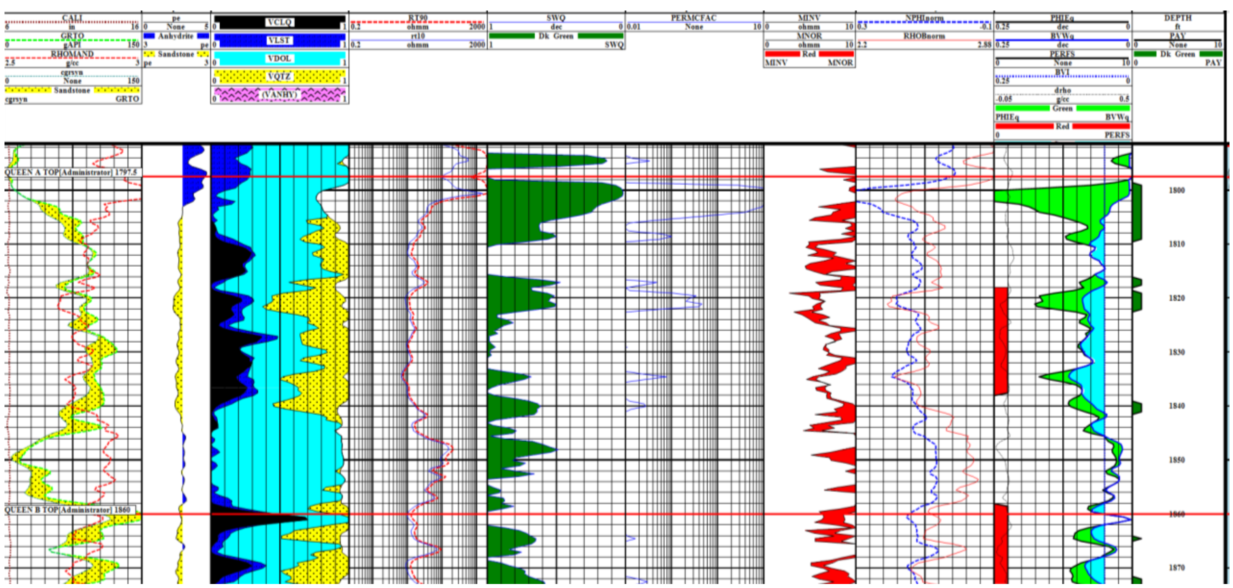
4237139277 JIL 91-13 Queen ''A' and ''B''

						BOIP	BOIP	BOIP	
Zone	Top	Base	H	Porosity	Sw	Acre	40 Ac	15% RF	FVF
Queen "A"	1763.5	1820.5	29.5	0.115	0.403	14,155	566,214	84,932	1.11
Queen "B"	1874	1939	5.5	0.093	0.304	2,488	99,527	14,929	1.11



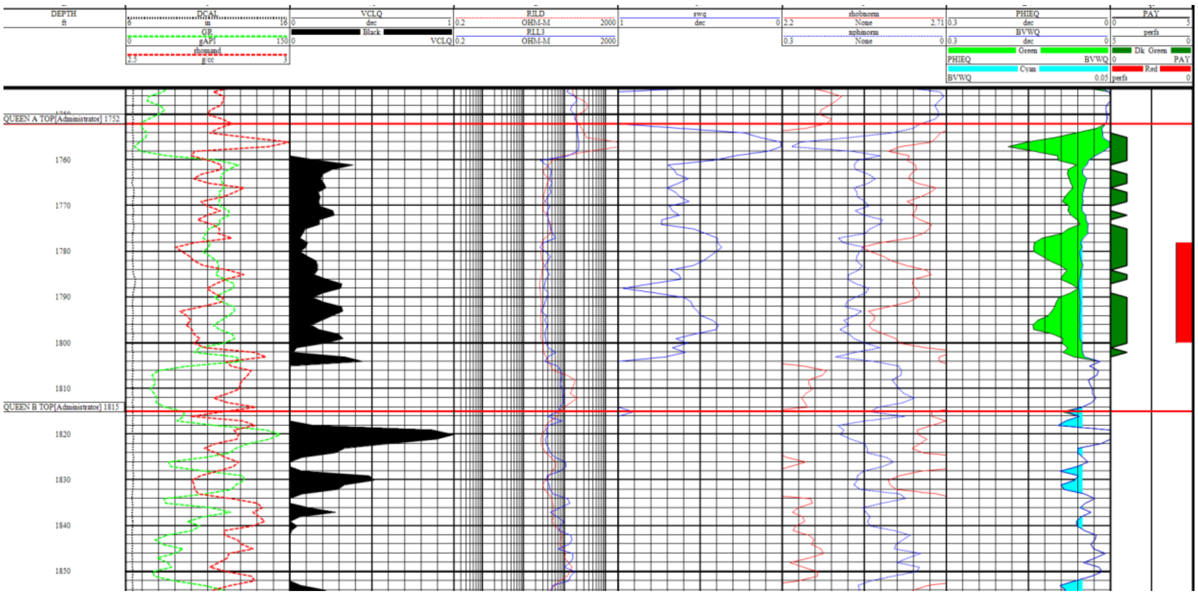
42-371-39620 WWJD #23 Queen ''A'' and ''B''

						BOIP	BOIP	BOIP	
Zone	**Top**	**Base**	**H**	**Porosity**	**Sw**	**Acre**	**40 Ac**	**15% RF**	**FVF**
Queen "A"	1799	1841	17.5	0.152	0.338	12,307	492,296	73,844	1.11
Queen "B"	1864.5	1883	3.5	0.092	0.589	925	36,999	5,550	1.11



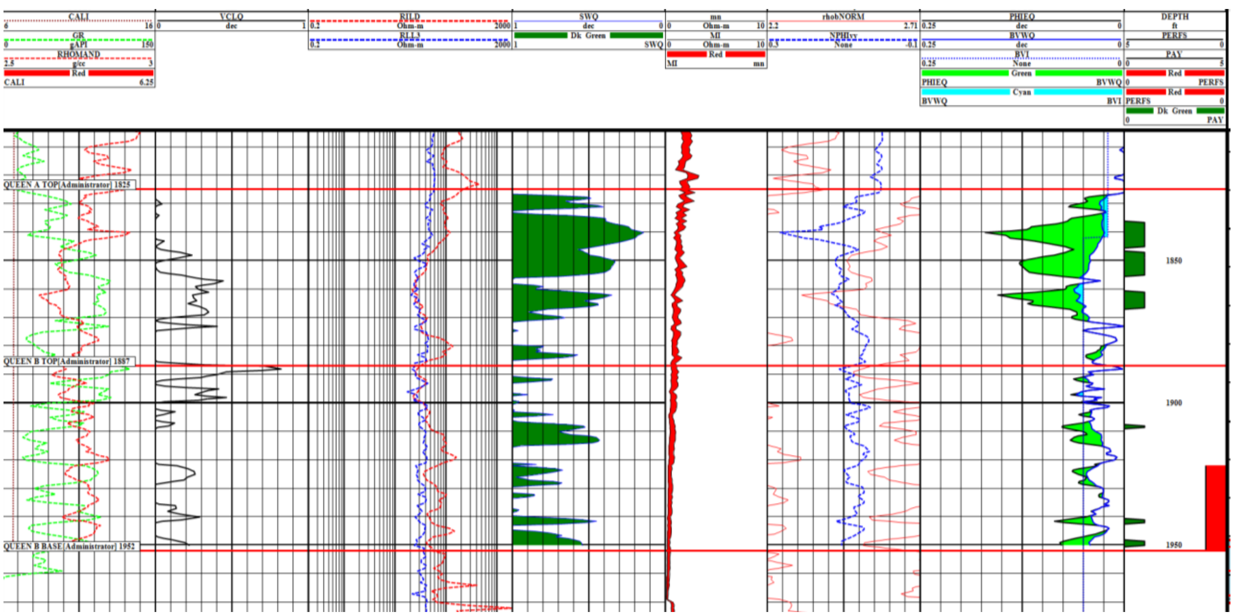
42-371-39199 WWJD #12 Queen ''A''

						BOIP	BOIP	BOIP	
Zone	**Top**	**Base**	**H**	**Porosity**	**Sw**	**Acre**	**40 Ac**	**15% RF**	**FVF**
Queen "A"	1755	1802	36	0.107	0.433	15,265	610,599	91,590	1.11



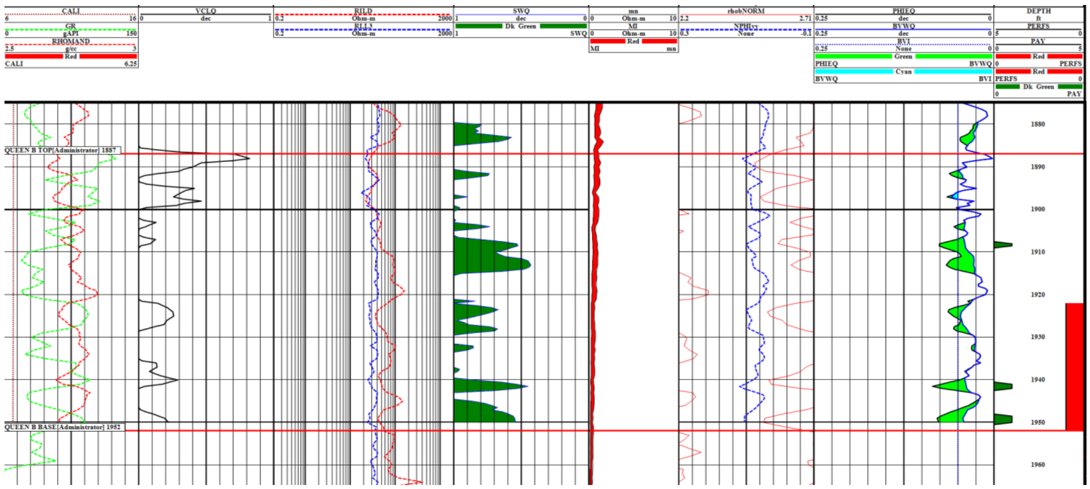
42-371-38880 WWJD #6 Queen "A" & "B"

						BOIP	BOIP	BOIP	
Zone	Top	Base	H	Porosity	Sw	Acre	40 Ac	15% RF	FVF
Queen "A"	1836.5	1866.5	23.5	0.115	0.35	12,277	491,095	73,664	1.11



42-371-38880 WWJD #6 Queen "B"

						BOIP	BOIP	BOIP	
Zone	Top	Base	H	Porosity	Sw	Acre	40 Ac	15% RF	FVF
Queen "B"	1908	1950	4.5	0.077	0.527	1,145	45,820	6,873	1.11



Petrophysics and Volumetric for Section 91, B & C Queen Reservoir Drained by Drilled Wells

Wells sorted by Completion Data and Lease							SECTION 91 , BATTERIES 5, 13 & 21			
Section 91 Battery	Well	First Production Test Date per TXRRC	IP				$N = 7758Ah\phi(1-S_w)/B_{oi}$			
			Oil, STB/D	Gas, MSCF	GOR, SCF/STB	Water, BSW	Np, STB	h, feet	ϕ, %	$(1-S_w)$
WWJD 5	WWJD 91-4	**9/1/2011**	10	100	10,000.0	0	3,751	28.5	10.23%	62.10%
WWJD 5	WWJD 91-5	1/3/2012	4	0	-	0	14,895	61	9.94%	62.40%
WWJD 5	WWJD 91-1	**6/8/2012**		200		150				
WWJD 5	WWJD 91-6	6/16/2013	11	122	11,090.9	15		42	10.23%	57.07%
WWJD 21	WWJD 91-7	7/2/2013	2.5	25	10,000.0	5		19	7.70%	65.20%
WWJD 5	WWJD 91-8	7/4/2013	13	135	10,384.6	15	1,243	49	10.29%	63.01%
WWJD 13	WWJD 91-13	1/31/2014	148	122	824.3	21	16,578	40.5	10.24%	64.18%
WWJD 5	WWJD 91-11	2/3/2014	82	180	2,195.1	0	1,390	27	11.10%	60.70%
WWJD 5	WWJD 91-9	2/4/2014	45	224	4,977.8	13	11,889	13	11.50%	64.60%
WWJD 5	WWJD 91-12	6/22/2014	38	105	2,763.2	14	1,126	36	10.70%	56.70%
WWJD 13	WWJD 91-15	6/19/2015	81	207	2,555.6	27	9,074	40.5	9.92%	55.20%
WWJD 21	WWJD 91-21	1/23/2016	37	130	3,513.5	20	3,119	8	9.20%	64.00%
WWJD 13	WWJD 91-16	11/21/2016	28	100	3,571.4	35	3,136	58	9.27%	65.80%
WWJD 13	WWJD 91-14	12/16/2016	60	118	1,966.7	50	6,724	23	11.10%	58.40%
WWJD 21	WWJD 91-10	5/24/2017	9	40	4,444.4	2	206	22	11.50%	56.70%
WWJD 21	WWJD 91-23	3/14/2018	45	139	3,088.9	5	238	21	14.20%	65.50%

Section 1							$N = 7758Ah\phi(1-S_w)/B_{oi}$			
Battery	Well	First Production Test Date per TXRRC	IP							
			Oil, STBD	Gas, MSCFD	GOR, SCF/STB	Water, BPD	Np, STB	h, feet	ϕ, %	$(1-S_w)$
WWJD B	WWJD 1-B1	9/18/2012	8	0		2	1,084	19	10.54%	65.08%
WWJD B	WWJD 1-B2 (SI)	7/2/2012	5	0		3				
WWJD B	WWJD 1-B3 (SI)	4/2/2013	2	48	24,000	20				

Section 12							$N = 7758Ah\phi(1-S_w)/B_{oi}$			
Battery	Well	First Production Test Date per TXRRC	IP							
			Oil, STBD	Gas, MSCFD	GOR, SCF/STB	Water, BPD	Np, STB	h, feet	ϕ, %	$(1-S_w)$
WWJD C	WWJD 12-C1 (SI)	10/8/2012	10	0	0	1				
WWJD C	WWJD 12-C2 (SI)	8/7/2014	1.5	7	4,667	3				
WWJD C	WWJD 12-C3 (SI)	8/19/2014	2.5	10	4,000	2				
WWJD C	WWJD 12-C4	8/21/2014	2	10	5,000	2	2,536	14	13.10%	57.00%

FILE: USB DISK (D :) AMAZING ENERGY TRANSFER FILES/TXRRC AMAZING PRODUCTION 7-25-2018

Wells sorted by Completion Data and Lease							SECTION 91 , BATTERIES 5, 13 & 21			
			IP				Area, Acres		Radius of Drainage, ft.	
							B_{oi}, BBL/STB		B_{oi}, BBL/STB	
Section 91 Battery	Well	First Production Test Date per TXRRC	Oil, STB/D	Gas, MSCF	GOR, SCF/STB	Water, BSW	1.4	1.16	1.4	1.16
WWJD 5	WWJD 91-4	9/1/2011	10	100	10,000.0	0	0.4	0.3	72.0	65.5
WWJD 5	WWJD 91-5	1/3/2012	4	0	-	0	0.7	0.6	99.2	90.3
WWJD 5	WWJD 91-1	6/8/2012		200		150				
WWJD 5	WWJD 91-6	6/16/2013	11	122	11,090.9	15	0.0	0.0		
WWJD 21	WWJD 91-7	7/2/2013	2.5	25	10,000.0	5	0.0	0.0		
WWJD 5	WWJD 91-8	7/4/2013	13	135	10,384.6	15	0.1	0.1	31.3	28.5
WWJD 13	WWJD 91-13	1/31/2014	148	122	824.3	21	1.1	0.9	124.8	113.6
WWJD 5	WWJD 91-11	2/3/2014	82	180	2,195.1	0	0.1	0.1	43.7	39.8
WWJD 5	WWJD 91-9	2/4/2014	45	224	4,977.8	13	2.2	1.8	175.5	159.8
WWJD 5	WWJD 91-12	6/22/2014	38	105	2,763.2	14	0.1	0.1	35.9	32.7
WWJD 13	WWJD 91-15	6/19/2015	81	207	2,555.6	27	0.7	0.6	101.2	92.1
WWJD 21	WWJD 91-21	1/23/2016	37	130	3,513.5	20	1.2	1.0	128.7	117.2
WWJD 13	WWJD 91-16	11/21/2016	28	100	3,571.4	35	0.2	0.1	47.1	42.9
WWJD 13	WWJD 91-14	12/16/2016	60	118	1,966.7	50	0.8	0.7	106.2	96.7
WWJD 21	WWJD 91-10	5/24/2017	9	40	4,444.4	2	0.0	0.0	19.0	17.3
WWJD 21	WWJD 91-23	3/14/2018	45	139	3,088.9	5	0.02	0.02	17.5	15.9

Wells sorted by Completion Data and Lease							SECTION 91 , BATTERIES 5, 13 & 21			
			IP				N, Estimated Oil in Place in 20 Acres		RF (%)- to date in 20 Acres	
							B_{oi}, BBL/STB		B_{oi}, BBL/STB	
Section 91 Battery	Well	First Production Test Date per TXRRC	Oil, STB/D	Gas, MSCF	GOR, SCF/STB	Water, BSW	1.4	1.16	1.4	1.16
WWJD 5	WWJD 91-4	9/1/2011	10	100	10,000.0	0	200,661	242,178	1.9%	1.5%
WWJD 5	WWJD 91-5	1/3/2012	4	0	-	0	419,327	506,084	7.4%	6.2%
WWJD 5	WWJD 91-1	6/8/2012		200		150				
WWJD 5	WWJD 91-6	6/16/2013	11	122	11,090.9	15				
WWJD 21	WWJD 91-7	7/2/2013	2.5	25	10,000.0	5				
WWJD 5	WWJD 91-8	7/4/2013	13	135	10,384.6	15	352,105	424,955	0.6%	0.5%
WWJD 13	WWJD 91-13	1/31/2014	148	122	824.3	21	294,989	356,022	8.3%	6.8%
WWJD 5	WWJD 91-11	2/3/2014	82	180	2,195.1	0	201,617	243,331	0.7%	0.6%
WWJD 5	WWJD 91-9	2/4/2014	45	224	4,977.8	13	107,035	129,180	5.9%	4.9%
WWJD 5	WWJD 91-12	6/22/2014	38	105	2,763.2	14	242,059	292,140	0.6%	0.5%
WWJD 13	WWJD 91-15	6/19/2015	81	207	2,555.6	27	245,786	296,639	4.5%	3.7%
WWJD 21	WWJD 91-21	1/23/2016	37	130	3,513.5	20	52,205	63,006	1.6%	1.3%
WWJD 13	WWJD 91-16	11/21/2016	28	100	3,571.4	35	392,090	473,212	1.6%	1.3%
WWJD 13	WWJD 91-14	12/16/2016	60	118	1,966.7	50	165,240	199,428	3.4%	2.8%
WWJD 21	WWJD 91-10	5/24/2017	9	40	4,444.4	2	158,985	191,878	0.1%	0.1%
WWJD 21	WWJD 91-23	3/14/2018	45	139	3,088.9	5	216,471	261,259	0.1%	0.1%

Oil in Place, STB							Recovery from Area (radius of Drainage)	
					B_{oi}, BBL/STB			
Section 91 Battery	Well	Nearest Well	$^1/_2$ Distance to nearest Well, Ft	Area, Acres	1.4	1.16	1.4	1.16
WWJD 5	WWJD 91-4	WWJD 91-8	410.5	12.15	121,933	147,161	3.1%	2.5%
WWJD 5	WWJD 91-5	WWJD 91-12	330	7.85	164,669	198,739	9.0%	7.5%
WWJD 5	WWJD 91-1	WWJD 91-11	524.5	19.84				
WWJD 5	WWJD 91-6	WWJD 91-9	290.5	6.09				
WWJD 21	WWJD 91-7	WWJD 91-21	330.5	7.88				
WWJD 5	WWJD 91-8	WWJD 91-10	368	9.77	171,949	207,525	0.7%	0.6%
WWJD 13	WWJD 91-13	WWJD 91-16	330	7.85	115,842	139,810	14.3%	11.9%
WWJD 5	WWJD 91-11	WWJD 91-12	335	8.09	81,592	98,473	1.7%	1.4%
WWJD 5	WWJD 91-9	WWJD 91-6	581	24.35	130,290	157,246	9.1%	7.6%
WWJD 5	WWJD 91-12	WWJD 91-15	331	7.90	95,633	115,420	1.2%	1.0%
WWJD 13	WWJD 91-15	WWJD 91-12	662	31.61	388,424	468,787	2.3%	1.9%
WWJD 21	WWJD 91-21	WWJD 91-7	661	31.51	82,252	99,269	3.8%	3.1%
WWJD 13	WWJD 91-16	WWJD 91-13	330	7.85	153,973	185,830	2.0%	1.7%
WWJD 13	WWJD 91-14	WWJD 91-13	330	7.85	64,890	78,315	10.4%	8.6%
WWJD 21	WWJD 91-10	WWJD 91-6	359	9.30	73,888	89,176	0.3%	0.2%
WWJD 21	WWJD 91-23	WWJD 91-10	456.5	15.03	162,673	196,329	0.1%	0.1%
Average Values Section 91			414	13	139,078	167,852	4.5%	3.7%
Total				228.36	1,947,087	2,349,933	3.77%	3.12%

The tables above summarize the reservoir rock properties, and depict OOIP estimates on a 20-Acre basis estimated using the observed properties and the small areas drained by the wells' modest oil production. Analysis of these data and the observed production profiles led to the recommendation to implement a waterflood to improve oil recovery.

Reservoir Fluids Properties

Pengtools.com® software has been used to develop a set of oil, gas and water properties at reservoir conditions[10].

pengtools.com 1.3.1 **PVT Tool**

PVT report

General parameters

Name	Black oil
Brief:	Queen reservoir - Pecos
Type of well:	Oil
System of units:	US oilfield units

Report prepared by

Name:	Boris Abad
Contact:	borispabad@yahoo.com
Company:	

Input parameters

Solution Gas-Oil Ratio	R_{sb}=330 scf/bbl
Specific Gravity Of Oil	SG_{oil}=31.7 API
Specific Gravity Of Gas	SG_{gas}=0.7 Sp.gr.
Specific Gravity Of Water	SG_{water}=1 Sp.gr.
Reservoir Temperature	T_{res}=120 F
Reservoir Pressure	P_{res}=840 psia

PVT correlations

Bubblepoint Pressure	Valco - McCain
Solution ratio	Velarde
Compressibility	Vasquez - Beggs
FVFactor	McCain
Density	McCain
Viscosity	Beggs - Robinson
ZFactor	Dranchuk

Oil PVT properties at reservoir conditions

Bubblepoint Pressure	P_b=1646 psia
Oil Density	ρ_{oil}=50.6 lbm/ft^3
Oil Formation Volume Factor	B_{oil}=1.107 bbl/bbl
Dead Oil Viscosity	$\mu_{oil\ dead}$=7.78 cP
Oil Viscosity	μ_{oil}=2.65 cP
Oil Compressibility	C_{oil}=1.19e-5 psia^{-1}
Oil Tension	σ_{oil}=14.2 dyn/cm

Gas PVT properties at reservoir conditions

Gas Density	ρ_{gas}=3.13 lbm/ft^3
Gas Formation Volume Factor	B_{gas}=0.017 scf/scf
Gas Viscosity	μ_{gas}=0.013 cP
Gas Compressibility	C_{gas}=1.35e-3 psia^{-1}

Water PVT properties at reservoir conditions

Water Density	ρ_{water}=61.6 lbm/ft^3
Water Formation Volume Factor	B_{water}=1.013 bbl/bbl
Water Viscosity	μ_{water}=0.61 cP
Water Compressibility	C_{water}=2.90e-6 psia^{-1}
Water Tension	σ_{water}=58.8 dyn/cm

Note: The full simulated PVT report (Using 330 SCF/BBL, 31.7 ^{O}API as oil gravity, and R_P = 840 psi) is attached as Annex I

Results for Oil

P_{res}, psia	T_{res}, F	R_s, scf/bbl	ρ_{oil}, lbm/ft^3	B_{oil}, bbl/bbl	μ_{oil}, cP	C_{oil}, psia^{-1}	σ_{oil}, dyn/cm
815.6	120	195.4	50.6	1.106	2.69	1.19E-5	14.5
840	120	199.6	50.6	1.107	2.65	1.19E-5	14.2
853.7	120	199.6	50.6	1.107	2.65	1.19E-5	14.2
891.8	120	199.6	50.6	1.107	2.65	1.19E-5	14.2
1646	120	199.6	50.6	1.107	2.65	1.19E-5	14.2

[10] The reservoir temperature was taken from logs and field reports.

Relative Permeability & Fractional Flow

SCAL, Inc.
SPECIAL CORE ANALYSIS LABORATORIES

Company: ***Jilpetco, Inc.*** ***API#:*** ***42-371-39681***
File: ***181761*** ***County:*** ***Pecos***
Well: ***WWJD #31*** ***State:*** ***Texas***

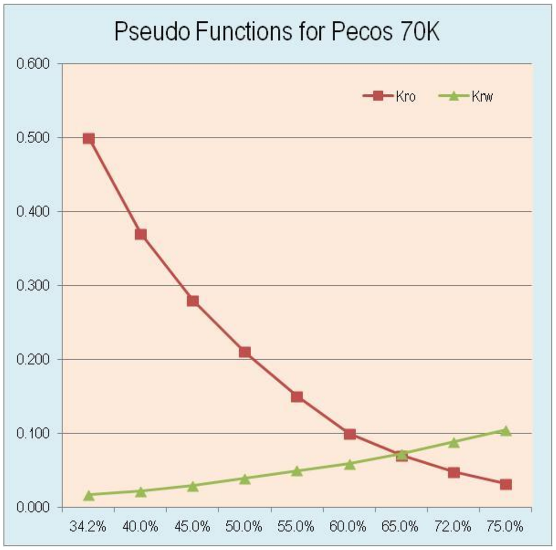
Fluid	Density g/cc	Surface Tension dynes/cm	T, °F	Density Corrected g/cc	API
Water	0.9960	70.80	77		
Oil	0.8314	21.57	77	0.8347	38.01
Oil	0.867	21.57	77	0.8705	31.05
Gas	0.6384				

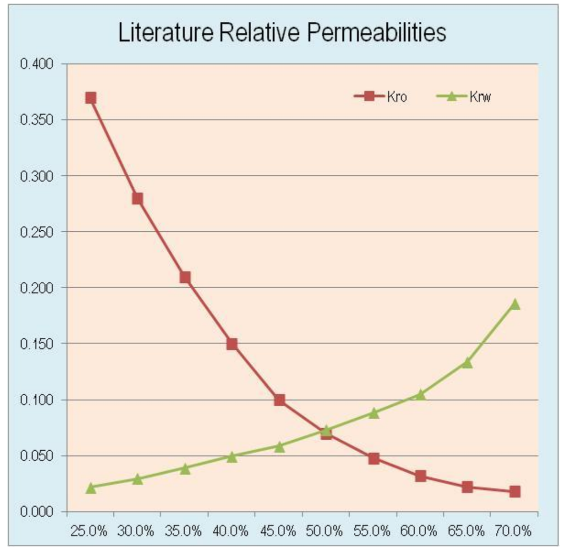
Sample Number	Depth ft	Air Permeability mD	Klinkenberg Permeability mD	Porosity %	Grain Density g/cc	Sw %	So %	Gas Units	Fluorescence %	Fluorescence Description	Wettability Index Contact Angle Oil	Contact Angle Water	Imbibition Oil	Imbibition Water
9	1,807.00	19.1	16.0	20.18%	2.68	35.8	17.7	287	100	yl	83.5	16.5	89.7	10.3
12	1,818.00	4.62	3.37	15.91%	2.71	35.3	18.2	278	95	yl	82.4	17.6	80.0	20.0
Average		11.9	9.7	18.05%	2.7	35.5	18.0	282.5						

Pecos County 70K-Acres Property - Section 91

Wells	IP_{oil}, STBD	IP_{water}, STBD	S_{wi}, %	Water Cut, %	S_{oi}, %	S_{oirr}, %	S_{odisp}, %
WWJD 91-11	82	0	36.81%	0.00%	63.19%	18.05%	45%
WWJD 91-12	38	14	43.70%	26.92%	56.30%	18.05%	38.26%
WWJD 91-13	148	21	35.82%	12.43%	64.18%	18.05%	46.14%
WWJD 91-14	60	50	40.20%	45.45%	59.80%	18.05%	41.76%
WWJD 91-15	81	27	37.39%	25.00%	62.61%	18.05%	44.57%
WWJD 91-16	28	35	34.20%	55.56%	65.80%	18.05%	47.76%
Average	72.8	24.5	38.02%	27.56%	61.98%	18.05%	43.94%
Maximum	148	50	43.70%	55.56%	65.80%	18.05%	47.76%
Minimum	28.0	0.0	34.20%	0.00%	56.30%	18.05%	38.26%

	Literature			Pseudo Functions for Pecos 70K			
S_W	K_{ro}	K_{rw}	K_{ro}/K_{rw}	S_W	K_{ro}	K_{rw}	K_{ro}/K_{rw}
25.0%	0.500	0.017	30.062	25.0%	0.730	0.008	91.259
30.0%	0.370	0.022	16.938	30.0%	0.620	0.012	51.631
35.0%	0.280	0.029	9.544	34.2%	0.500	0.017	30.062
40.0%	0.210	0.039	5.377	40.0%	0.370	0.022	16.938
45.0%	0.150	0.050	3.030	45.0%	0.280	0.029	9.544
50.0%	0.100	0.059	1.707	50.0%	0.210	0.039	5.377
55.0%	0.070	0.073	0.962	55.0%	0.150	0.050	3.030
60.0%	0.048	0.089	0.542	60.0%	0.100	0.059	1.707
65.0%	0.032	0.105	0.305	65.0%	0.070	0.073	0.962
70.0%	0.022	0.134	0.172	72.0%	0.048	0.089	0.542
75.0%	0.018	0.186	0.097	75.0%	0.032	0.105	0.305

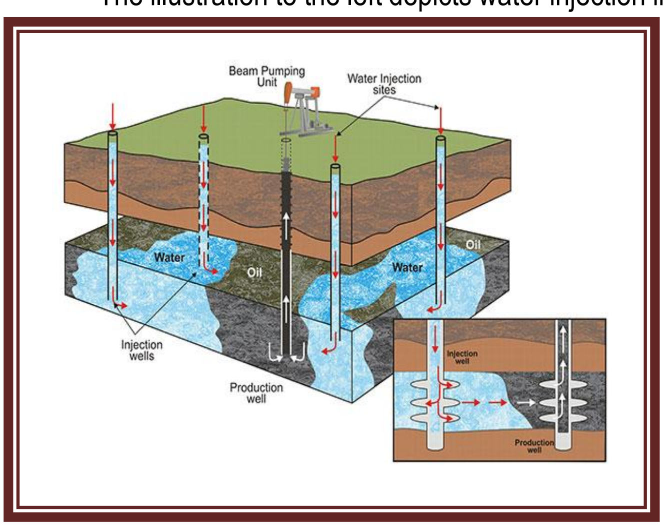




Relative Permeability vs. Water Saturation											
S_W	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%	75.0%
K_{ro}/K_{rw}	30.23	17.00	9.56	5.38	3.02	1.70	0.96	0.54	0.30	0.17	0.10
K_{ro}/K_{rw}	30.06	16.94	9.54	5.38	3.03	1.71	0.96	0.54	0.31	0.17	0.10
$\ln(K_{ro}/K_{rw})$	3.408835	2.83321334	2.25758773	1.6826884	1.105257	0.53062825	-0.04082	-0.61619	-1.203973	-1.77196	-2.30259
ln(intercept)	6.271725										
Intercept	529.3898										
Slope	-11.4739										

Pseudo-Relative Permeability vs. Water Saturation								
34.2%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%	75.0%
30.23	17.00	9.56	5.38	3.02	1.70	0.96	0.54	0.30
32.00	16.53	9.35	5.29	2.99	1.69	0.96	0.54	0.31
3.408835	2.833213	2.257588	1.682688	1.105257	0.530628	-0.04082	-0.61619	-1.20397
7.361592								
1574.34								
-11.3916								

The illustration to the left depicts water injection into a reservoir using four injectors to supply energy (pressure) and fluid displacement into a producing well. This would be the 5-Spot pattern proposed for waterflooding the Queen Reservoir.

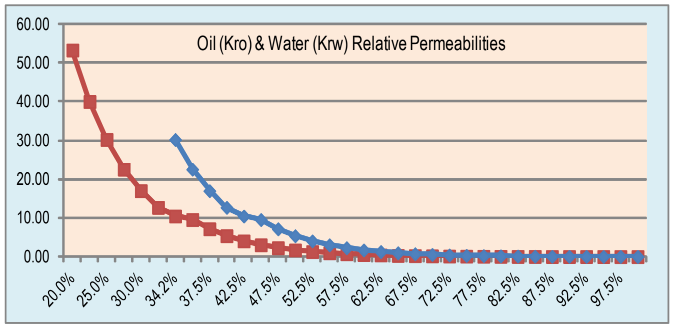


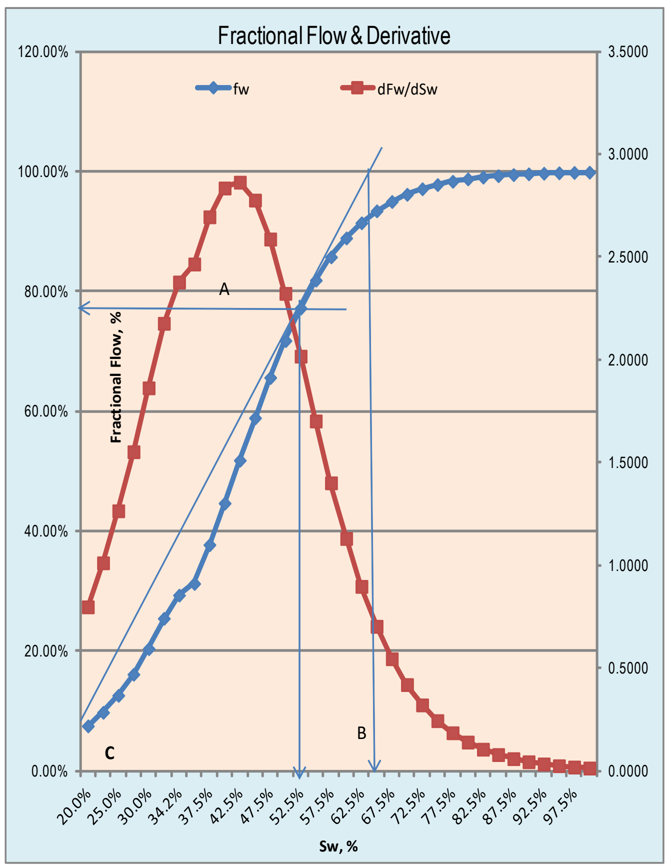
In an ideal situation a water front would displace an oil bank until water breakthrough at the production well happens. Until then, only oil would flow ahead of the water front. Oil & water according with their properties at reservoir conditions, the ratio of their relative permeabilities and the fractional flow equation would flow behind the water front.

Modification to Buckley & Leverett Water Displacement Model

Below are the fractional flow (f_w) it derivative (df_W/dS_W) as a function of water saturation calculations[11] and the estimation of water saturation at water breakthrough and the average water saturation in the advancing water bank. The Buckley & Leverett frontal advance theory – water front displacing an "oil bank" where the water saturation is the connate water saturation, S_{WC} and water begins to flow into the producing well at water breakthrough and after was modified to honor the Queen reservoir $S_{wi} > S_{WC}$. Reservoir oil & water were displaced by the incoming "water injected front" as per their mobility ratios (*M*) K_{ro}/μ_o and K_{rw}/μ_w. The net result is the reduction in the oil rate due to the presence of "mobile water".

S_W	K_{ro}/K_{rw}	$(K_{ro}/K_{rw})_{PSD}$	f_w	dF_w/dS_w
20.0%	53.35		7.53%	0.7989
22.5%	40.049		9.79%	1.0129
25.0%	30.230		12.63%	1.2658
27.5%	22.565		16.14%	1.5533
30.0%	17.000		20.41%	1.8640
32.5%	12.714		25.47%	2.1779
34.2%	10.461	30.23	29.34%	2.3788
35.0%	9.560	22.57	31.28%	2.466423
37.5%	7.164	17.00	37.75%	2.6963
40.0%	5.380	12.71	44.69%	2.8361
42.5%	4.036	10.46	51.84%	2.8646
45.0%	3.020	9.56	58.91%	2.7773
47.5%	2.274	7.16	65.64%	2.5879
50.0%	1.700	5.38	71.79%	2.3237
52.5%	1.281	4.04	77.22%	2.0182
55.0%	0.960	3.02	81.87%	1.7029
57.5%	0.722	2.27	85.75%	1.4021
60.0%	0.540	1.70	88.91%	1.1314
62.5%	0.407	1.28	91.44%	0.8983
65.0%	0.300	0.96	93.43%	0.7040
67.5%	0.229	0.72	94.99%	0.5462
70.0%	0.170	0.54	96.19%	0.4204
72.5%	0.129	0.41	97.11%	0.3217
75.0%	0.100	0.30	97.82%	0.2450
77.5%	0.073	0.23	98.35%	0.1859
80.0%	0.055	0.17	98.76%	0.1407
82.5%	0.041	0.13	99.07%	0.1063
85.0%	0.031	0.10	99.30%	0.0801
87.5%	0.023	0.07	99.47%	0.0604
90.0%	0.017	0.05	99.60%	0.0454
92.5%	0.013	0.04	99.70%	0.0342
95.0%	0.010	0.03	99.78%	0.0257
97.5%	0.007	0.02	99.83%	0.0193
100.0%	0.006	0.02	99.87%	0.0145





[11] FILE: BPA/ USB DISK (D :) WATERFLOODING PREDICTIVE METHODS.XLSX

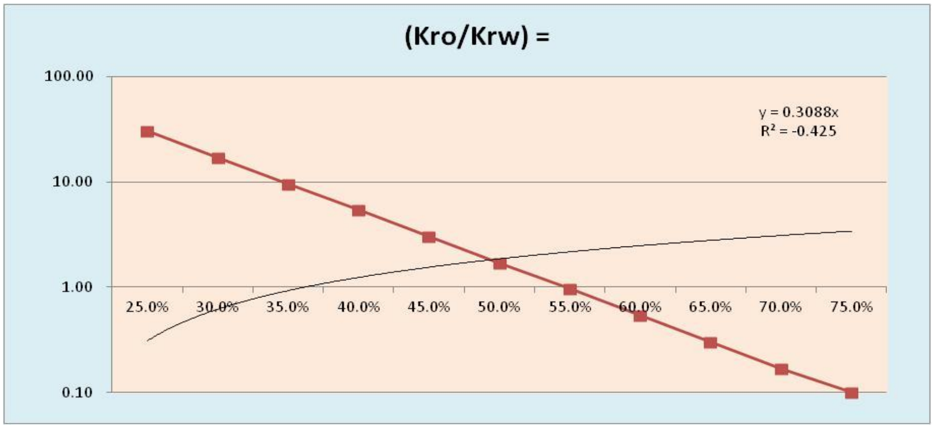
OIL RECOVERY ESTIMATES USING WATERFLOODING PREDICTIVE MODELS

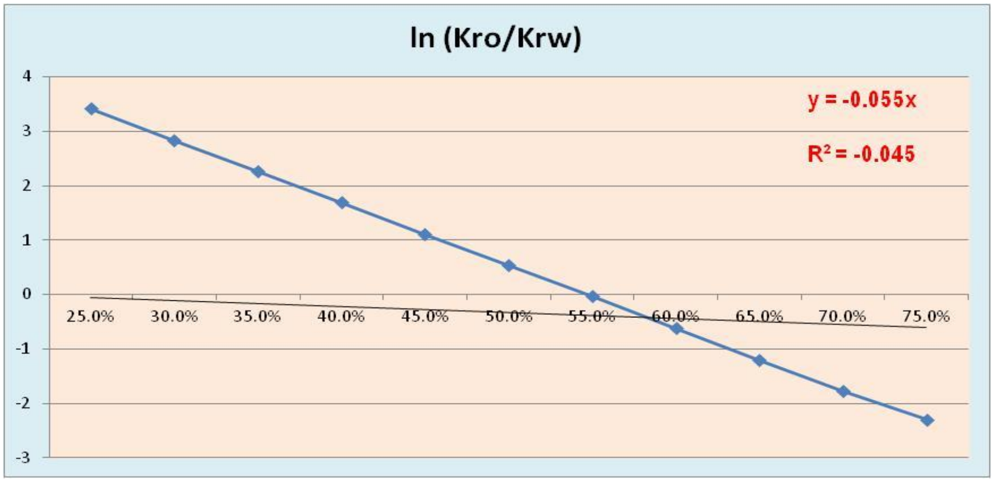
INITIAL WATER INJECTION TO WATER BREAKTHROUGH - BUCKLEY-LEVERETT

D_{p-i-p}	d_{i-p}	D_{p-p}	$Pattern_{AREA}$
1320	660.0	933.4	20
933.4	466.7	660.0	10
660.0	330.0	466.7	5

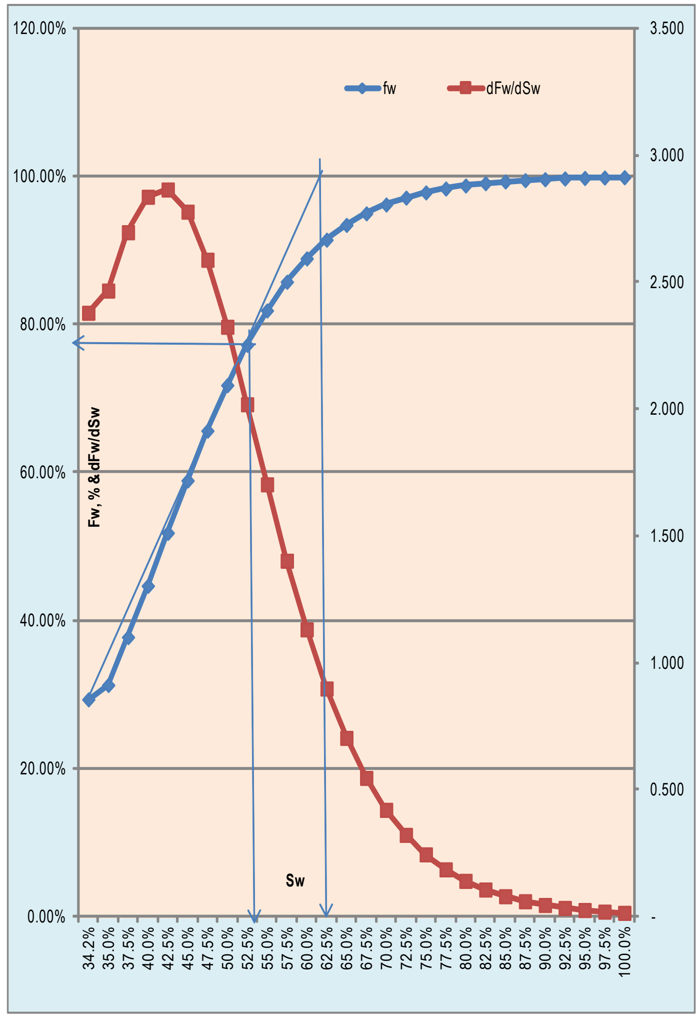
RESERVOIR ROCK & FLUIDS PROPERTIES							
WELLS CONSIDERED IN THE ANALYSIS		WWJD-11	WWJD-12	WWJD-13	WWJD-14	WWJD-15	WWJD-16
Oil Formation Volume Factor, BBL/STB, β_O	1.107						
Water Formation Volume Factor, BBL/STB, β_w	1.013						
Formation Thickness (h), ft	33	27	36	32	23	41	39
Cross sectional area (A), ft^2	21,780						
Porosity, (ϕ)	11.1%	11.1%	10.7%	11.5%	11.1%	11.1%	11.1%
Injection Rate, BBL/Day (i_w)	120						
Distance between producer and injector (L), ft	330						
Oil Viscosity, cp, (μ_o)	2.65						
Water Viscosity, cp, (μ_w)	0.61						
Dip Angle, (α)	0						
Connate water saturation, (S_{wc})	20.0%						
Initial water saturation, (S_{wi})	37.99%	36.81%	43.47%	35.82%	40.27%	37.39%	34.20%
Residual oil saturation, (S_{or})	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%
Mobile oil saturation, (S_{or})	43.96%	45.15%	38.49%	46.14%	41.69%	44.57%	47.76%

Relative Permeability vs. Water Saturation											
S_W	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%	75.0%
K_{ro}/K_{rw}	30.23	17.00	9.56	5.38	3.02	1.70	0.96	0.54	0.30	0.17	0.10



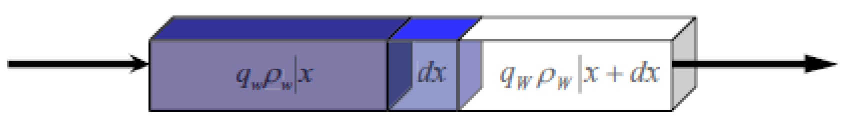


S_W	$(K_{ro}/K_{rw})_{PSD}$	f_w	dF_w/dS_w
34.2%	10.461	29.34%	2.379
35.0%	9.560	31.28%	2.466
37.5%	7.164	37.75%	2.696
40.0%	5.380	44.69%	2.836
42.5%	4.036	51.84%	2.865
45.0%	3.020	58.91%	2.777
47.5%	2.274	65.64%	2.588
50.0%	1.700	71.79%	2.324
52.5%	1.281	77.22%	2.018
55.0%	0.960	81.87%	1.703
57.5%	0.722	85.75%	1.402
60.0%	0.540	88.91%	1.131
62.5%	0.407	91.44%	0.898
65.0%	0.300	93.43%	0.704
67.5%	0.229	94.99%	0.546
70.0%	0.170	96.19%	0.420
72.5%	0.129	97.11%	0.322
75.0%	0.100	97.82%	0.245
77.5%	0.073	98.35%	0.186
80.0%	0.055	98.76%	0.141
82.5%	0.041	99.07%	0.106
85.0%	0.031	99.30%	0.080
87.5%	0.023	99.47%	0.060
90.0%	0.017	99.60%	0.045
92.5%	0.013	99.70%	0.034
95.0%	0.010	99.78%	0.026
97.5%	0.007	99.83%	0.019
100.0%	0.006	99.87%	0.015

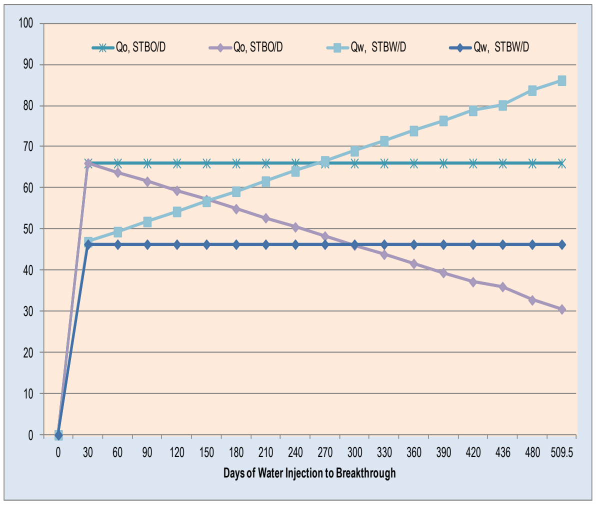


The table and graphic above depict the fractional flow (and its derivative) when mobile water is considered. The modification made accounts for the movement of water along with the "oil bank" considered in the Buckley & Leverett method. The volume of fluid entering the reservoir (injected water) displaces both, oil and water (fluid leaving the reservoir as production) and injection water replaces both oil and formation water in the reservoir conserving mass and honoring the theory for further estimation of the oil and water production utilizing Buckley & Leverett up to water breakthrough. Welge[12] method – uses the fractional flow curve to forecast oil and water production after breakthrough.

"In a differential element of porous media, the frontal advance theory maintains that mass is conserved: Volume of fluid entering – Volume of fluid leaving = Change in fluid volume"



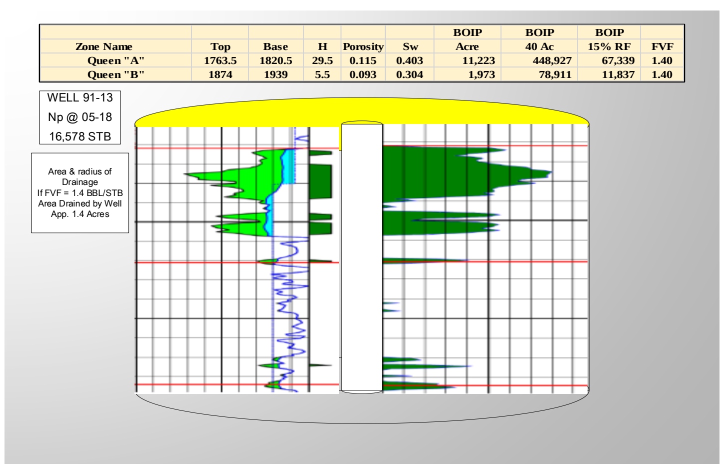
[12] Welge, H.J., *"A Simplified Method for Computing Oil Recovery by Gas or Water Drive", Trans. AIME* 1952



t, days	W_{inj}	Q_o, STBO/D	Q_w, STBW/D	Q_o, STBO/D	Q_w, STBW/D
0	0	0	0	0	0
30	3,600	66	46	66	47
60	7,200	66	46	64	49
90	10,800	66	46	62	52
120	14,400	66	46	59	54
150	18,000	66	46	57	57
180	21,600	66	46	55	59
210	25,200	66	46	53	62
240	28,800	66	46	51	64
270	32,400	66	46	48	67
300	36,000	66	46	46	69
330	39,600	66	46	44	71
360	43,200	66	46	42	74
390	46,800	66	46	39	76
420	50,400	66	46	37	79
436	52,320	66	46	36	80
480	57,600	66	46	33	84
509.5	61,146	66	46	30.6	86

Water Injectivity

Production statistics show that wells WWJD 91 13[13], 14 & 15 had the highest IPs and have had the largest cumulative production of the wells drilled in Section 91. It's possible that well WWJD 91-13[14] is the best well drilled so far. The table below depicts some of the reservoir rock and oil properties – I have reservations with the value estimated for the oil formation factor (β_o), I believe is too high. I have used a lower value, 1.106 BBL/STB – encountered by well WWJD 91-13. Low porosity and sandstone – shale intercalation seems to be a characteristic of the Queen Reservoir rock. This suggest low formation capacity (Kh) and, consequently, low injectivity.



Zone Name	Top	Base	H	Porosity	Sw	BOIP Acre	BOIP 40 Ac	BOIP 15% RF	FVF
Queen "A"	1763.5	1820.5	29.5	0.115	0.403	11,223	448,927	67,339	1.40
Queen "B"	1874	1939	5.5	0.093	0.304	1,973	78,911	11,837	1.40

I considered three possible well spacing initially, 20, 10 and 5-acre arrays; however, after having analyzed the alternatives I settled for 5-spot, 5-acre patterns. The reason being low well injectivity due to the low permeabilities observed and measured in the wettability tests.

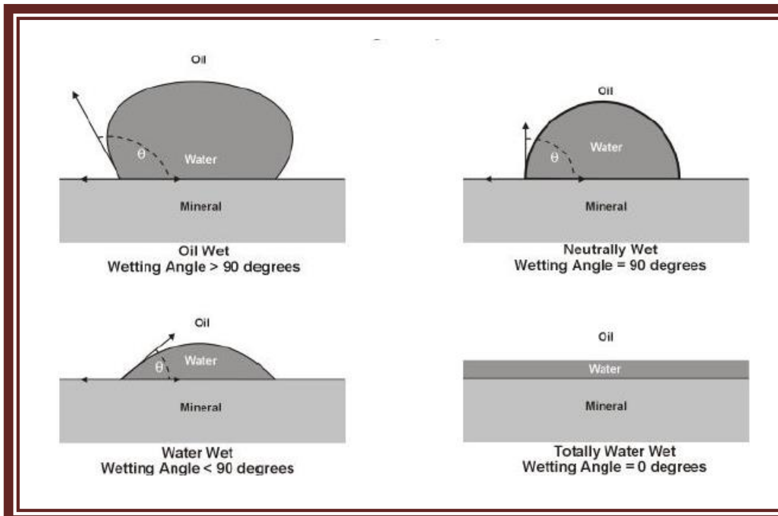
[13] These wells produce into Battery 13 (Unit 2)
[14] Since production is reported by battery and no well production tests have been conducted it's not straightforward to assess individual oil production. I estimated individual oil production using the wells' IP and the average decline of the reported battery and section production.

SCAL, Inc.
SPECIAL CORE ANALYSIS LABORATORIES

Company: Jilpetco, Inc. ***API#: 42-371-39681***
File: 181761 ***County: Pecos***
Well: WWJD #31 ***State: Texas***

Fluid	Density g/cc	Surface Tension dynes/cm	T, ºF	Density Corrected g/cc	API
Water	0.9960	70.80	77		
Oil	0.8314	21.57	77	0.8347	38.01
Oil	0.867	21.57	77	0.8705	31.05
Gas	0.6384				

Sample Number	Depth ft	Air Permeability mD	Klinkenberg Permeability mD	Porosity %	Grain Density g/cc	Sw %	So %	Gas Units	Fluorescence %	Fluorescence Description	Wettability Index Contact Angle Oil	Wettability Index Contact Angle Water	Wettability Index Imbibition Oil	Wettability Index Imbibition Water
9	1,807.00	19.1	16.0	20.18%	2.68	35.8	17.7	287	100	yl	83.5	16.5	89.7	10.3
12	1,818.00	4.62	3.37	15.91%	2.71	35.3	18.2	278	95	yl	82.4	17.6	80.0	20.0
Average		11.9	9.7	18.05%	2.7	35.5	18.0	282.5						



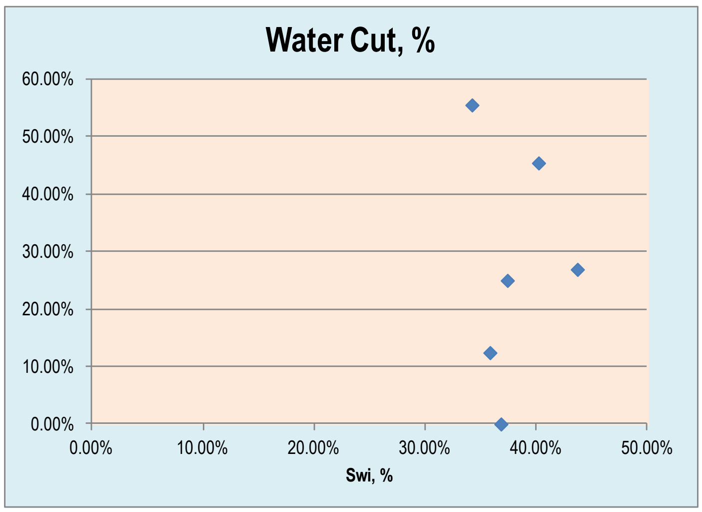
The tests suggest that the Queen Reservoir is "water-wet", meaning that the rock would be "oil-phobic" favoring the oil-by-water displacement; however, the tests also show the low permeability of the formation. This is the most serious hindrance to water injectivity.

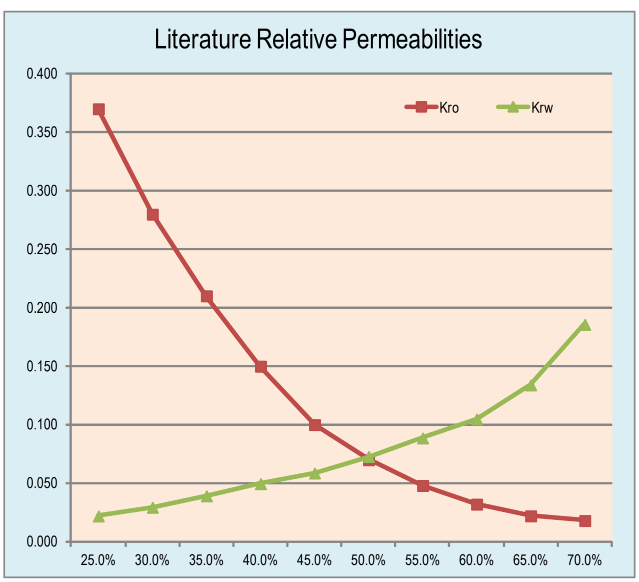
The tables below depict the development of a set of "pseudo relative and effective permeabilities" used in the assessment of oil recovery by waterflooding the Section 91Queen Reservoir.

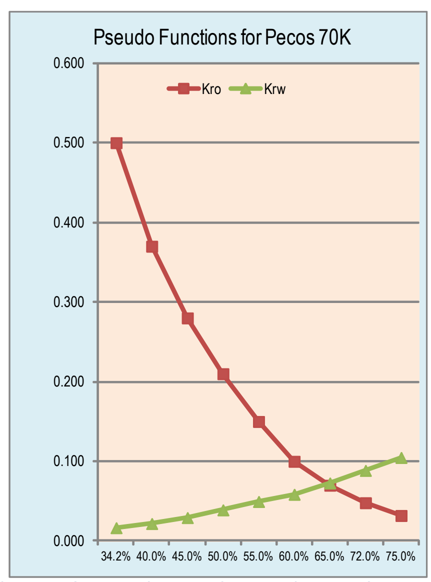
Relative Permeability vs. Water Saturation											
S_W	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%	75.0%
K_{ro}/K_{rw}	30.23	17.00	9.56	5.38	3.02	1.70	0.96	0.54	0.30	0.17	0.10
K_{ro}/K_{rw}	30.06	16.94	9.54	5.38	3.03	1.71	0.96	0.54	0.31	0.17	0.10
$\ln(K_{ro}/K_{rw})$	3.408835	2.83321334	2.25758773	1.6826884	1.105257	0.53062825	-0.04082	-0.61619	-1.203973	-1.7719568	-2.30259
ln(intercept)	6.271725										
Intercept	529.3898										
Slope	-11.4739										

Pseudo-Relative Permeability vs. Water Saturation									
34.2%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%	75.0%	80.0%
30.23	17.00	9.56	5.38	3.02	1.70	0.96	0.54	0.30	0.055
32.00	16.53	9.35	5.29	2.99	1.69	0.96	0.54	0.31	0.17
3.408835	2.833213	2.257588	1.682688	1.105257	0.530628	-0.04082	-0.61619	-1.20397	-2.90737
7.361592									
1574.34									
-11.3916									

Pecos County 70K-Acres Property - Section 91							
Wells	IP_{oil}, STBD	IP_{water}, STBD	S_{wi}, %	Water Cut, %	S_{oi}, %	S_{oirr}, %	S_{odisp}, %
WWJD 91-11	82	0	36.81%	0.00%	63.19%	18.05%	45%
WWJD 91-12	38	14	43.70%	26.92%	56.30%	18.05%	38.26%
WWJD 91-13	148	21	35.82%	12.43%	64.18%	18.05%	46.14%
WWJD 91-14	60	50	40.20%	45.45%	59.80%	18.05%	41.76%
WWJD 91-15	81	27	37.39%	25.00%	62.61%	18.05%	44.57%
WWJD 91-16	28	35	34.20%	55.56%	65.80%	18.05%	47.76%
Average	72.8	24.5	38.02%	27.56%	61.98%	18.05%	43.94%
Maximum	148	50	43.70%	55.56%	65.80%	18.05%	47.76%
Minimum	28.0	0.0	34.20%	0.00%	56.30%	18.05%	38.26%

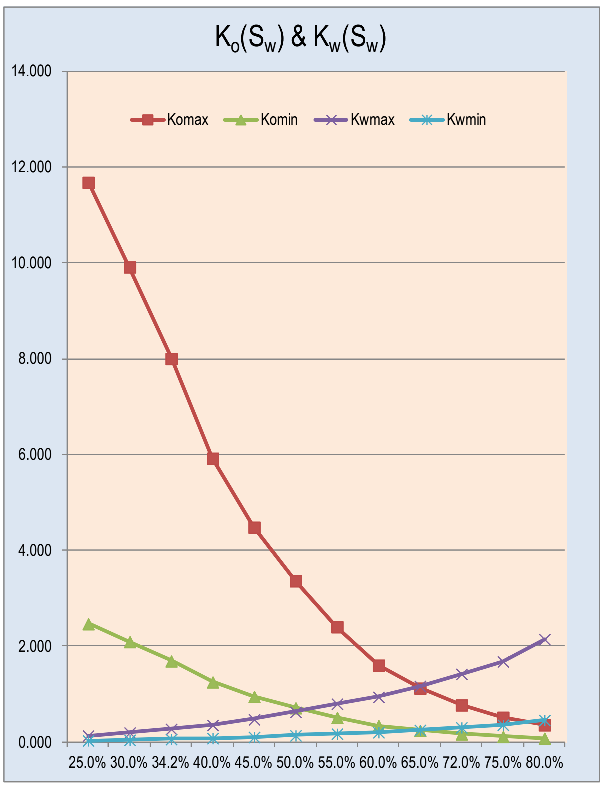






	Literature			Pseudo Functions for Pecos 70K			
S_W	K_{ro}	K_{rw}	K_{ro}/K_{rw}	S_W	K_{ro}	K_{rw}	K_{ro}/K_{rw}
25.0%	0.500	0.017	30.062	25.0%	0.730	0.008	91.259
30.0%	0.370	0.022	16.938	30.0%	0.620	0.012	51.631
35.0%	0.280	0.029	9.544	34.2%	0.500	0.017	30.062
40.0%	0.210	0.039	5.377	40.0%	0.370	0.022	16.938
45.0%	0.150	0.050	3.030	45.0%	0.280	0.029	9.544
50.0%	0.100	0.059	1.707	50.0%	0.210	0.039	5.377
55.0%	0.070	0.073	0.962	55.0%	0.150	0.050	3.030
60.0%	0.048	0.089	0.542	60.0%	0.100	0.059	1.707
65.0%	0.032	0.105	0.305	65.0%	0.070	0.073	0.962
70.0%	0.022	0.134	0.172	72.0%	0.048	0.089	0.542
75.0%	0.018	0.186	0.097	75.0%	0.032	0.105	0.305
80.0%	0.010	0.183	0.055	80.0%	0.022	0.134	0.164

Pseudo Functions for Pecos 70K				
K, md	16.0	3.37	16.0	3.4
S_W	K_{omax}	K_{omin}	K_{wmax}	K_{wmin}
25.0%	11.683	2.463	0.128	0.027
30.0%	9.915	2.090	0.192	0.040
34.2%	8.001	1.687	0.266	0.056
40.0%	5.921	1.248	0.350	0.074
45.0%	4.481	0.945	0.469	0.099
50.0%	3.361	0.708	0.625	0.132
55.0%	2.400	0.506	0.792	0.167
60.0%	1.600	0.337	0.937	0.198
65.0%	1.120	0.236	1.165	0.246
72.0%	0.768	0.162	1.417	0.299
75.0%	0.512	0.108	1.677	0.354
80.0%	0.352	0.074	2.142	0.452



MOBILITY RATIO FOR THE QUEEN RESERVOIR FLUIDS

Oil Viscosity, cp, (μ_o) = 2.65

Water Viscosity, cp, (μ_w) = 0.61

	S_W	K_{omax}	K_{omin}	K_{wmax}	K_{wmin}
S_{wi}	34.2%	8.001	1.687	0.266	0.056
$1-S_{or}$	80.0%	0.352	0.074	2.142	0.452
	M				
	1.163				

	S_W	K_{omax}	K_{omin}	K_{wmax}	K_{wmin}
S_{wi}	25.0%	11.683	2.463	0.128	0.027
$1-S_{or}$	75.0%	0.512	0.108	1.677	0.354
	M				
	0.624				

	λ_W & λ_O			
S_W	S_{wi}	S_{or}	S_{wi}	S_{or}
	34.2%	20.0%	25.0%	25.0%
λ_w	3.512		2.749	
λ_o	3.019		4.409	

Values for Mobile water in the oil Bank		
Swi	$(K_{ro}/K_{rw})_{PSD}$	$f_{woilbank}$
37.99%	6.769	39.09%

Estimated Well Injectivity – Queen Reservoir Waterflood

Basic Assumptions:

- Free gas is present in the reservoir, S_{gi} = 0.75%
- Flow regime would be radial until water front interference

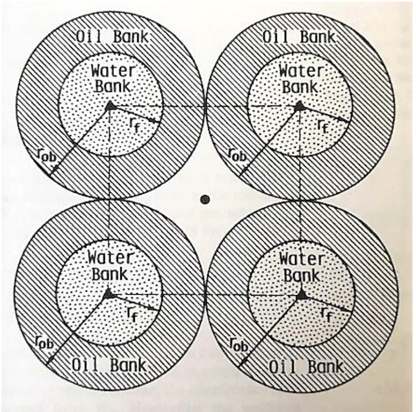


Fig. 6.16—Interference of oil banks in the waterflood of a five-spot pattern that has a uniform initial gas saturation (after Prats et al.[10]).

INJECTION RATE ACCOUNTING FOR M OTHER THAN 1

$$i=\frac{3.541\lambda_o h(p_{wi}-p_{wp})}{\left(\frac{1}{M}-1\right)\ln\left(\sqrt{\frac{r_f}{r_w}}\right)+\ln\frac{a}{r_w}+1.571\frac{d}{a}-1.927}, \quad \ldots\ldots(6.32)$$

where $r_f \le a/2$, and

$$r_f=\sqrt{\frac{2daE_A}{\pi}}.$$

INJECTION RATE DURING FILL-UP

WATERFLOOD DESIGN

Eq. 6.33 describes the injection rate during fill-up to the interference point for a five-spot when the flow resistance is neglected ahead of the oil bank.

$$i=\frac{2\pi\lambda_o(p_{wi}-p_{wp})}{\frac{1}{M}\ln\left(\frac{r_f}{r_w}\right)+\ln\left(\frac{r_{ob}}{r_f}\right)}, \quad \ldots\ldots(6.33)$$

where

r_{ob} = radius of the oil bank, $r_w \le r_{ob} \le d/\sqrt{2}$, and
r_f = radius of the flood-front saturation.

Both r_{ob} and r_f may be defined by a material balance on the injected water.

$$W_i=\pi(r_f^2-r_w^2)(\bar{S}_w-S_{iw})h\phi. \quad \ldots\ldots(6.34)$$

Solving for r_f gives

$$r_f=\sqrt{\frac{W_i}{\pi\phi h(\bar{S}_w-S_{iw})}+r_w^2}. \quad \ldots\ldots(6.35)$$

The volume of water injected to fill-up is equal to the volume of gas displaced by the oil bank as the initial gas saturation, S_{gi}, is reduced to the trapped-gas saturation, S_{gt}. A material balance yields Eq. 6.36 for r_{ob}:

- Water production reports are not accurate; however, water has been produced and observed fluid saturation data suggests that water is mobile in the reservoir. Observed oil & Water IPs suggest WOR = 29.3%. Reported oil Production (June 2018) was 80,000 BBL of oil approximately, and then 33,000 BBL of water may have been produced. Total Fluid production would be 110,000 BBL approximately.

ESTIMATED WELL INJECTIVITY

QUEEN RESERVOIR WATERFLOOD

Distance between Injector & producer

d = sqrt(Area x 43,560 ft^2/Acre / 2)

d = 466.6905 ft.

Interference @ r_{ob} = d/sqrt(2)

r_{ob} = 330 ft.

Volume of water injected @ interference

$W_{ii} = \pi \times d^2/2 \times \phi \times h \times (Sgi)$

W_{ii} = 18,798 ft^3

W_{ii} = 3,348 bbl

radius of flood front saturation

r_{ob} = sqrt[(W_i X 5.615)/($\pi \times \phi \times h \times (S_{wf} - S_{iw})$)] + r_w^2)

r_f = 59 ft

Estimated Injectivity (filed units) for:

M = 1.163

M = 0.624

From the Fractional Flow Curve, $f_w = f_w(S_w)$

S_{wf} = 71.8%

Inj. Pressure $_{@Wellhead}$ = 1000 psi

Reservoir Pressure = 840 psi

Pseudo Functions for Pecos 70K			
S_W	Kro	Krw	Kro/Krw
25.0%	0.730	0.008	91.259
30.0%	0.620	0.012	51.631
34.2%	0.500	0.017	30.062
40.0%	0.370	0.022	16.938
45.0%	0.280	0.029	9.544
50.0%	0.210	0.039	5.377
55.0%	0.150	0.050	3.030
60.0%	0.100	0.059	1.707
65.0%	0.070	0.073	0.962
72.0%	0.048	0.089	0.542
75.0%	0.032	0.105	0.305
80.0%	0.022	0.134	0.164

r_f = sqrt[5.615 x W_{ii}/(π x ϕ xh x (S_{wf} - S_{wi}) + r_w^2]

INJECTION RATES TO INTERFERENCE				
W i	***r f***	***r ob***	***i***	***Time***
(BBL)	(ft)	(ft)	(B/D)	(days)
12	3.5	16.1	1,344	0.01
223	15	69.4	217.6	1.03
446	21	98.2	181.5	2.46
670	26	120.3	165.5	4.05
893	30	138.9	155.7	5.73
1,116	34	155.3	148.9	7.50
1,339	37	170.1	143.7	9.32
1,562	40	183.7	139.7	11.19
1,786	42	196.4	136.3	13.10
2,009	45	208.3	133.5	15.05
2,232	47	219.6	131.1	17.03
2,455	50	230.3	128.9	19.04
2,678	52	240.5	127.1	21.08
2,902	54	250.4	125.4	23.14
3,125	56	259.8	123.9	25.23
3,348	59	330	118.0	28.37

RESERVOIR ROCK & FLUIDS PROPERTIES							
WELLS CONSIDERED IN THE ANALYSIS		WWJD-11	WWJD-12	WWJD-13	WWJD-14	WWJD-15	WWJD-16
Oil Formation Volume Factor, BBL/STB, β_O	1.107						
Water Formation Volume Factor, BBL/STB, β_w	1.013						
Formation Thickness (h), ft	33	27	36	32	23	41	39
Cross sectional area (A), ft^2	?						
Porosity, (ϕ)	11.1%	11.1%	10.7%	11.5%	11.1%	11.1%	11.1%
Injection Rate, BBL/Day (i_w)	?						
Distance between producer and injector (L), ft	?						
Oil Viscosity, cp, (μ_o)	2.65						
Water Viscosity, cp, (μ_w)	0.61						
Dip Angle, (α)	0						
Connate water saturation, (S_{wc})	20.0%						
Initial water saturation, (S_{wi})	37.99%	36.81%	43.47%	35.82%	40.27%	37.39%	34.20%
Residual oil saturation, (S_{or})	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%
Assumed gas saturation, (S_{gi})	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%	0.75%
Mobile oil saturation, (S_{or})	43.21%	44.40%	37.74%	45.39%	40.94%	43.82%	47.01%

S_{wi}	i	k_b	(k_{ro}/μ_o)	h	p_{wi}	p_{wp}	M	r_f	r_w	r_{ob}
34.2%	118.0	16.003	0.1887	33	1840	840	1.163	59	0.417	330
25.0%	64.5	9.688	0.2755	33	1840	840	0.624	59	0.417	330

Volume of water injected to fill-up

$W_{if} = 2 \times d^2 \times \phi \times h \times S_{gi}$

$W_{if} =$ 2,131 *BBL*

radius of the water bank at fill-up

$r_f = \text{sqrt}[(W_{if} \times 5.615)/(\pi \times \phi \times h \times (S_{Wf} - S_{iw})] + r_w^2)$

$r_f =$ 47 *ft*

Maximum Value of r_f

$r_f = d/\text{sqrt}(2)$

$r_f =$ 330 *ft*

$W_i = \pi \times (d^2 - r_w^2) \times \phi \times h \times (S_{wf} - S_{iw})$

$W_i =$ 60,929

Inj. rate for 2,131 $<= W_i <=$ 60,929

$i_f =$ 81.2 *B/D*

Injection rate for 4,263 $<= W_i <=$ 121,859

Well head pressure (Texas regulations) would be limited to 1000 – 1200 psi considering the average depth of the Queen in Section 91 and surroundings. I considered 1000 psi wellhead pressure and 120 STB_W/D. This injectivity limitation dictated the resizing of the 20-Acre spacing originally thought as applicable (20 Acres) to 5-acres. It's possible that the ideal spacing maybe 10 Acres; however, 5-Acre spacing could be considered a conservative estimate of the waterflooding applicability.

Time to water breakthrough

Pore volume (PV) is given by:

$$PV = \frac{\phi A L}{5.615}$$

$$t_{BT} = \left[\frac{(PV)}{i_W}\right]\left(\frac{1}{\frac{df_W}{dS_W}}\right)_{S_{Wf}}$$

$$OOIP = Np = \frac{PV(1-S_{wi})}{B_o}$$

Estimated Cumulative water injected at breakthrough (W_{iBT})

$$W_{iBT} = i_W t_{BT}$$

Estimated total PV of water injected at breakthrough (Q_{iBT})

$$Q_{iBT} = \frac{1}{\left(\frac{df_W}{dS_W}\right)_{S_{wf}}}$$

Surface WOR at breakthrough (WORs)

$$WOR_s = \frac{B_o f_w}{B_w(1-f_w)}$$

RESERVOIR ROCK & FLUIDS PROPERTIES							
WELLS CONSIDERED IN THE ANALYSIS		WWJD-11	WWJD-12	WWJD-13	WWJD-14	WWJD-15	WWJD-16
Oil Formation Volume Factor, BBL/STB, β_O	1.107						
Water Formation Volume Factor, BBL/STB, β_w	1.013						
Formation Thickness (h), ft	33	27	36	32	23	41	39
Cross sectional area (A), ft^2	21,780						
Porosity, (ϕ)	11.1%	11.1%	10.7%	11.5%	11.1%	11.1%	11.1%
Injection Rate, BBL/Day (i_w)	120						
Distance between producer and injector (L), ft	330						
Oil Viscosity, cp, (μ_o)	2.65						
Water Viscosity, cp, (μ_w)	0.61						
Dip Angle, (α)	0						
Connate water saturation, (S_{wc})	20.0%						
Initial water saturation, (S_{wi})	37.99%	36.81%	43.47%	35.82%	40.27%	37.39%	34.20%
Residual oil saturation, (S_{or})	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%
Mobile oil saturation, (S_{or})	43.96%	45.15%	38.49%	46.14%	41.69%	44.57%	47.76%

Relative Permeability vs. Water Saturation											
S_W	25.0%	30.0%	35.0%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%	75.0%
K_{ro}/K_{rw}	30.23	17.00	9.56	5.38	3.02	1.70	0.96	0.54	0.30	0.17	0.10

AREA =	5	Acres
Pore Volume, BBL =	142,084	BBL
t_{BT} =	509.5	Days
W_{iBT} =	61,146	BBL
Q_{iBT} =	0.43035	PV
WOR =	2.781	

Conditions at WBT			
Sw	(K_{ro}/K_{rw})	f_w	dF_w/dS_w
50.0%	1.707	71.8%	2.324
OOIP =		79,586	STB
E_V =		100.00%	80.00%
Oil Recovery @ BT =		30.80%	24.73%
Oil Recovery @ 5-Y =		52.46%	41.99%
WOR_{BT} =	2.781		
OW_MIP =		25,238	STB_W

$PV_{150Acres}$	$OOIP_{Ac-ft}$
4,262,519	861

$OOIP_{150Acres}$	$OOIP_{Ac-ft}$
2,387,575	482

t, days	W_{inj}	Np+w = W_{inj}/Bo	Np = W_{inj}/Bo	Q_o, STBO/D	$f_{woilbank}$	WOR	Q_w	Q_w, STBW/D	Q_o, STBO/D	Q_w, STBW/D
0	0	0	0	0	39.09%	0	0	0	0	0
30	3,600	3,370	1,981	66	39.09%	0.701	1,389	46	66	47
60	7,200	6,740	3,962	66	39.09%	0.701	2,778	46	64	49
90	10,800	10,110	5,943	66	39.09%	0.701	4,167	46	62	52
120	14,400	13,480	7,923	66	39.09%	0.701	5,557	46	59	54
150	18,000	16,850	9,904	66	39.09%	0.701	6,946	46	57	57
180	21,600	20,220	11,885	66	39.09%	0.701	8,335	46	55	59
210	25,200	23,590	13,866	66	39.09%	0.701	9,724	46	53	62
240	28,800	26,960	15,847	66	39.09%	0.701	11,113	46	51	64
270	32,400	30,330	17,828	66	39.09%	0.701	12,502	46	48	67
300	36,000	33,700	19,808	66	39.09%	0.701	13,892	46	46	69
330	39,600	37,070	21,789	66	39.09%	0.701	15,281	46	44	71
360	43,200	40,440	23,770	66	39.09%	0.701	16,670	46	42	74
390	46,800	43,810	25,751	66	39.09%	0.701	18,059	46	39	76
420	50,400	47,180	27,732	66	39.09%	0.701	19,448	46	37	79
436	52,320	48,977	28,788	66	39.09%	0.701	20,189	46	35	81
480	57,600	53,920	31,693	66	39.09%	0.701	22,226	46	32	85
509.5	61,146	57,239	33,644	66	39.09%	2.781	23,595	46.3	30	87.2

Reservoir	5	Acres Performance after Water Breakthrough (Weldge)					E_V =	100.00%				
1	2	3	4	5	6	7	8	9	10	11	12	13
S_{w2}	f_{w2}	dF_w/dS_w	$S_{w2average}$	$E_d = E_A \cdot E_V$	N_{p+w}	Q_i	W_{inj}	t	W_p	WOR	Q_o	Q_w
50.0%	71.8%	2.324	62.1%	38.9%	57,239	0.430	61,146	510	43,975	2.781	30.6	87.2
53.0%	78.2%	1.955	64.1%	42.2%	44,206	0.512	72,677	606	52,225	3.924	23.6	92.7
54.0%	80.1%	1.828	64.9%	43.4%	45,452	0.547	77,709	648	56,034	4.401	21.6	94.9
55.0%	81.9%	1.703	65.6%	44.6%	46,746	0.587	83,439	695	60,476	4.936	19.6	97.0
56.0%	83.5%	1.580	66.4%	45.9%	48,083	0.633	89,941	750	65,625	5.536	17.9	98.9
57.0%	85.0%	1.460	67.2%	47.2%	49,458	0.685	97,303	811	71,569	6.209	16.2	100.7
58.0%	86.4%	1.345	68.1%	48.5%	50,867	0.743	105,621	880	78,401	6.964	14.7	102.4
59.0%	87.7%	1.235	68.9%	49.9%	52,307	0.809	115,004	958	86,232	7.810	13.3	103.9
60.0%	88.9%	1.131	69.8%	51.3%	53,774	0.884	125,577	1,046	95,184	8.760	12.0	105.3
61.0%	90.0%	1.034	70.7%	52.7%	55,266	0.968	137,478	1,146	105,395	9.825	10.9	106.6
62.0%	91.0%	0.942	71.6%	54.2%	56,778	1.062	150,865	1,257	117,020	11.020	9.8	107.8
63.0%	91.9%	0.856	72.5%	55.6%	58,311	1.168	165,914	1,383	130,234	12.359	8.8	108.8
64.0%	92.7%	0.777	73.4%	57.1%	59,860	1.287	182,823	1,524	145,234	13.862	7.9	109.8
65.0%	93.4%	0.704	74.3%	58.6%	61,424	1.420	201,815	1,682	162,239	15.547	7.1	110.7
66.0%	94.1%	0.637	75.3%	60.1%	63,003	1.570	223,140	1,859	181,497	17.437	6.4	111.5
67.0%	94.7%	0.575	76.2%	61.6%	64,593	1.739	247,080	2,059	203,287	19.558	5.7	112.2
68.0%	95.3%	0.519	77.1%	63.1%	66,194	1.928	273,950	2,283	227,919	21.935	5.1	112.8
69.0%	95.7%	0.467	78.1%	64.7%	67,805	2.140	304,103	2,534	255,744	24.602	4.6	113.4
70.0%	96.2%	0.420	79.1%	66.2%	69,425	2.378	337,939	2,816	287,154	27.593	4.1	113.9
71.0%	96.6%	0.378	80.0%	67.8%	71,052	2.646	375,902	3,133	322,591	30.948	3.7	114.4
72.0%	96.9%	0.340	81.0%	69.3%	72,686	2.945	418,492	3,487	362,547	34.711	3.3	114.8
72.2%	97.0%	0.332	81.2%	69.7%	73,014	3.010	427,614	3,563	371,128	35.517	3.2	114.9
73.0%	97.3%	0.305	82.0%	70.9%	74,327	3.282	466,272	3,886	407,577	38.931	3.0	115.2
74.0%	97.6%	0.273	82.9%	72.5%	75,972	3.659	519,870	4,332	458,304	43.664	2.6	115.6
75.0%	97.8%	0.245	83.9%	74.1%	77,623	4.082	579,994	4,833	515,425	48.973	2.4	115.9
76.0%	98.0%	0.219	84.9%	75.6%	79,278	4.557	647,435	5,395	579,722	54.927	2.1	116.1
77.0%	98.3%	0.196	85.9%	77.2%	80,936	5.089	723,083	6,026	652,073	61.605	1.9	116.4
78.0%	98.4%	0.176	86.9%	78.8%	82,599	5.686	807,934	6,733	733,462	69.095	1.7	116.6
79.0%	98.6%	0.157	87.8%	80.4%	84,264	6.356	903,106	7,526	824,994	77.496	1.5	116.8
80.0%	98.8%	0.141	88.8%	82.0%	85,932	7.107	1,009,855	8,415	927,906	86.918	1.3	117.0

Production Forecast

Queen Reservoir Type Production Well

Pattern =	5 - Spot	Solution GOR, SCF/STB =	199.6
Area, Acres =	5	Solution GOR, SCF/STB =	
		$S_{wi} = S_{wc}$	$S_{wi} > S_{wc}$
Injection Rate, STB/D =	120	BT_{Key} = 1	0

Time			Q_i	Q_o	Q_w	Q_g	Slope Q_o/t	WOR	$Slope_{WOR}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	ΔSTBD/Δt	BBL/STB	ΔSTB/Δt
30	1.0	0.1	120	66	47	13.2		0.701	
60	2.0	0.2	120	64	49	12.7	113	0.701	
90	3.0	0.2	120	62	52	12.3	113	0.701	
120	4.0	0.3	120	59	54	11.9	114	0.701	
150	5.0	0.4	120	57	57	11.4	114	0.701	
180	5.9	0.5	120	55	59	11.0	114	0.701	
210	6.9	0.6	120	53	62	10.5	114	0.701	
240	7.9	0.7	120	51	64	10.1	115	0.701	
270	8.9	0.7	120	48	67	9.6	115	0.701	
300	9.9	0.8	120	46	69	9.2	115	0.701	
330	10.9	0.9	120	44	71	8.8	115	0.701	
360	11.9	1.0	120	42	74	8.3	116	0.701	
390	12.9	1.1	120	39	76	7.9	116	0.701	
420	13.9	1.2	120	37	79	7.4	116	0.701	
436	14.4	1.2	120	35	81	7.0	116	0.701	
480	15.8	1.3	120	32	85	6.3	117	0.701	
510	16.8	1.4	120	29.6	87	5.9	117	2.781	
540	17.8	1.5	120	27.4	90	5.5	117	3.166	
570	18.8	1.6	120	26.1	91	5.2	117	3.545	
600	19.8	1.6	120	24.8	93	5.0	117	3.924	0.01263
630	20.8	1.7	120	23.6	94	4.7	117	4.261	
660	21.8	1.8	120	22.5	95	4.5	118	4.598	
690	22.8	1.9	120	21.4	96	4.3	118	4.936	0.01125
720	23.8	2.0	120	20.4	97	4.1	118	5.236	
750	24.8	2.1	120	19.4	98	3.9	118	5.536	0.01000
780	25.7	2.1	120	18.5	100	3.7	118	5.872	
810	26.7	2.2	120	17.6	101	3.5	118	6.209	0.01122
840	27.7	2.3	120	16.8	101	3.3	118	6.586	
870	28.7	2.4	120	16.0	102	3.2	118	6.964	0.01258
900	29.7	2.5	120	15.2	103	3.0	118	7.282	
930	30.7	2.5	120	14.5	104	2.9	118	7.600	
960	31.7	2.6	120	13.8	105	2.8	119	7.918	0.01060
990	32.7	2.7	120	13.1	105	2.6	119	8.236	
1020	33.7	2.8	120	12.5	106	2.5	119	8.554	
1050	34.7	2.9	120	11.9	107	2.4	119	8.872	0.01060
1080	35.6	3.0	120	11.3	107	2.3	119	9.190	
1110	36.6	3.0	120	10.8	108	2.2	119	9.508	
1140	37.6	3.1	120	10.3	109	2.1	119	9.826	0.01060
1170	38.6	3.2	120	9.8	109	2.0	119	10.144	
1200	39.6	3.3	120	9.7	109	1.9	119	10.462	
1230	40.6	3.4	120	9.6	109	1.9	119	10.780	
1260	41.6	3.5	120	9.5	110	1.9	119	11.098	0.01060
1290	42.6	3.5	120	9.4	110	1.9	119	11.416	
1320	43.6	3.6	120	9.3	110	1.8	119	11.734	
1350	44.6	3.7	120	9.2	110	1.8	119	12.052	
1380	45.5	3.8	120	9.1	110	1.8	119	12.370	0.01060
1410	46.5	3.9	120	8.9	110	1.8	119	12.688	
1440	47.5	3.9	120	8.8	110	1.8	119	13.006	
1470	48.5	4.0	120	8.7	110	1.7	119	13.324	

Production Forecast
Queen Reservoir Type Production Well

Pattern =	5 - Spot	Solution GOR, SCF/STB =	199.6
Area, Acres =	5	Solution GOR, SCF/STB =	
		$S_{wi} = S_{wc}$	$S_{wi} > S_{wc}$
Injection Rate, STB/D =	120	BT_{Key} = 1	0

Time			Q_i	Q_o	Q_w	Q_g	Slope Q_o/t	WOR	$Slope_{WOR}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	ΔSTBD/Δt	BBL/STB	ΔSTB/Δt
1470	48.5	4.0	120	8.7	110	1.7	119	13.324	
1500	49.5	4.1	120	8.6	110	1.7	119	13.642	
1530	50.5	4.2	120	8.5	111	1.7	119	13.960	0.01060
1560	51.5	4.3	120	8.4	111	1.7	119	14.278	
1590	52.5	4.4	120	8.3	111	1.7	119	14.596	
1620	53.5	4.4	120	8.2	111	1.6	119	14.914	
1650	54.5	4.5	120	8.1	111	1.6	119	15.232	
1680	55.4	4.6	120	8.0	111	1.6	119	15.550	0.01060
1710	56.4	4.7	120	7.9	111	1.6	119	15.868	
1740	57.4	4.8	120	7.8	111	1.6	119	16.186	
1770	58.4	4.8	120	7.7	111	1.5	119	16.504	
1800	59.4	4.9	120	7.6	112	1.5	119	16.822	
1830	60.4	5.0	120	7.5	112	1.5	119	17.140	
1860	61.4	5.1	120	7.4	112	1.5	119	17.458	0.01060
1890	62.4	5.2	120	7.3	112	1.4	119	17.776	
1920	63.4	5.3	120	7.2	112	1.4	119	18.094	
1950	64.4	5.3	120	7.1	112	1.4	119	18.412	
1980	65.3	5.4	120	6.9	112	1.4	119	18.730	
2010	66.3	5.5	120	6.8	112	1.4	119	19.048	
2040	67.3	5.6	120	6.7	113	1.3	119	19.367	
2070	68.3	5.7	120	6.6	113	1.3	119	19.685	0.01060
2100	69.3	5.8	120	6.5	113	1.3	119	20.003	
2130	70.3	5.8	120	6.4	113	1.3	119	20.321	
2160	71.3	5.9	120	6.3	113	1.3	119	20.639	
2190	72.3	6.0	120	6.2	113	1.2	119	20.957	
2220	73.3	6.1	120	6.1	113	1.2	119	21.275	
2250	74.3	6.2	120	6.0	113	1.2	119	21.593	
2280	75.2	6.2	120	5.9	113	1.2	119	21.911	0.01060
2310	76.2	6.3	120	5.8	114	1.2	119	22.229	
2340	77.2	6.4	120	5.7	114	1.1	119	22.547	
2370	78.2	6.5	120	5.6	114	1.1	119	22.865	
2400	79.2	6.6	120	5.5	114	1.1	119	23.183	
2430	80.2	6.7	120	5.4	114	1.1	119	23.501	
2460	81.2	6.7	120	5.3	114	1.0	119	23.819	
2490	82.2	6.8	120	5.2	114	1.0	119	24.137	
2520	83.2	6.9	120	5.0	114	1.0	119	24.455	0.01060
2550	84.2	7.0	120	4.9	115	1.0	119	24.773	

Production Forecast

Queen Reservoir Type Production Well

Pattern = 5 - Spot

Area, Acres = 5

Injection Rate, STB/D = 120

Solution GOR, SCF/STB = 199.6

Solution GOR, SCF/STB =

BT_{Key} = 1 ($S_{wi} = S_{wc}$) 0 ($S_{wi} > S_{wc}$)

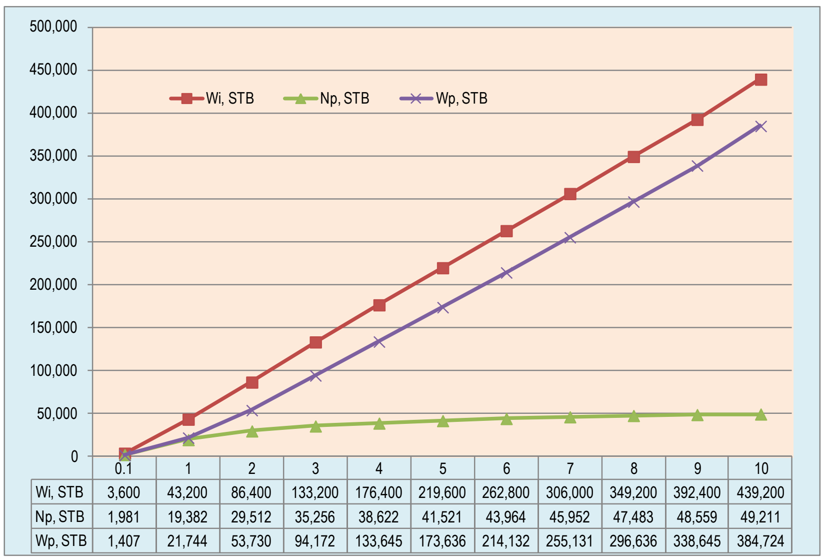
Time			Q_i	Q_o	Q_w	Q_g	Slope Q_o/t	WOR	$Slope_{WOR}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	$\Delta STBD/\Delta t$	BBL/STB	$\Delta STB/\Delta t$
2550	84.2	7.0	120	4.9	115	1.0	119	24.773	
2580	85.1	7.1	120	4.8	115	1.0	119	25.091	
2610	86.1	7.2	120	4.7	115	0.9	119	25.409	
2640	87.1	7.2	120	4.6	115	0.9	120	25.727	
2670	88.1	7.3	120	4.5	115	0.9	120	26.045	
2700	89.1	7.4	120	4.4	115	0.9	120	26.363	
2730	90.1	7.5	120	4.3	115	0.9	120	26.681	
2760	91.1	7.6	120	4.2	115	0.8	120	26.999	
2790	92.1	7.6	120	4.1	115	0.8	120	27.317	
2820	93.1	7.7	120	4.0	116	0.8	120	27.635	0.01060
2850	94.1	7.8	120	3.9	116	0.8	120	27.953	
2880	95.0	7.9	120	3.8	116	0.8	120	28.271	
2910	96.0	8.0	120	3.7	116	0.7	120	28.589	
2940	97.0	8.1	120	3.6	116	0.7	120	28.907	
2970	98.0	8.1	120	3.5	116	0.7	120	29.225	
3000	99.0	8.2	120	3.4	116	0.7	120	29.543	
3030	100.0	8.3	120	3.3	116	0.6	120	29.861	
3060	101.0	8.4	120	3.1	117	0.6	120	30.179	
3090	102.0	8.5	120	3.0	117	0.6	120	30.497	
3120	103.0	8.5	120	2.9	117	0.6	120	30.815	0.01060
3150	104.0	8.6	120	2.8	117	0.6	120	31.133	
3180	105.0	8.7	120	2.7	117	0.5	120	31.451	
3210	105.9	8.8	120	2.6	117	0.5	120	31.769	
3240	106.9	8.9	120	2.5	117	0.5	120	32.087	
3270	107.9	9.0	120	2.4	117	0.5	120	32.405	
3300	108.9	9.0	120	2.3	117	0.5	120	32.723	
3330	109.9	9.1	120	2.2	118	0.4	120	33.041	
3360	110.9	9.2	120	2.1	118	0.4	120	33.359	
3390	111.9	9.3	120	2.0	118	0.4	120	33.677	
3420	112.9	9.4	120	1.9	118	0.4	120	33.995	
3450	113.9	9.5	120	1.8	118	0.4	120	34.313	
3480	114.9	9.5	120	1.7	118	0.3	120	34.632	0.01060
3510	115.8	9.6	120	1.6	118	0.3	120	34.950	
3540	116.8	9.7	120	1.5	118	0.3	120	35.268	
3570	117.8	9.8	120	1.4	119	0.3	120	35.586	
3600	118.8	9.9	120	1.2	119	0.2	120	35.904	
3630	119.8	9.9	120	1.1	119	0.2	120	36.222	
3660	120.8	10.0	120	1.0	119	0.2	120	36.540	

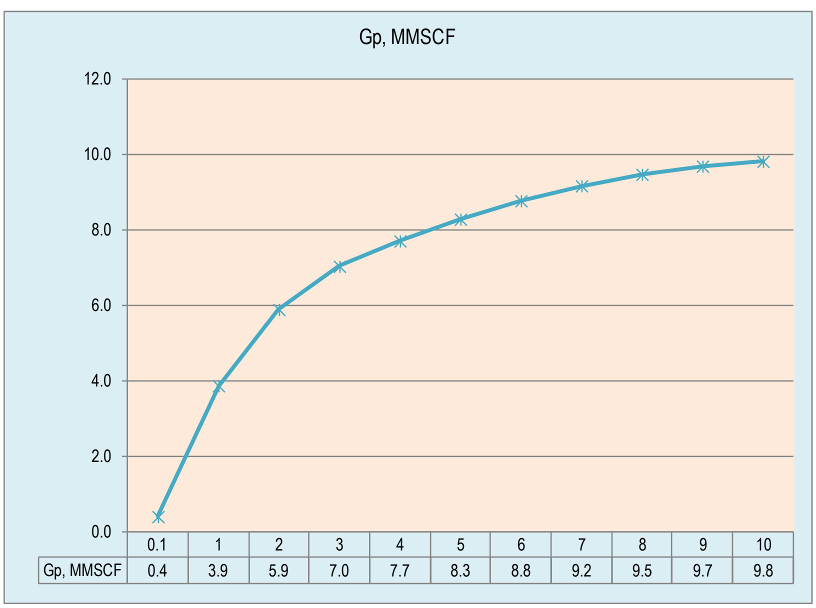
Time			Cumulative Production & Water Injection			
Days	Months	Years	Wi, STB	N_p, STB	W_p, STB	G_p, MMSCF
30	1.0	0.1	3600	1,981	1,407	0.4
60	2.0	0.2	7,200	3,895	2,888	0.8
90	3.0	0.2	10,800	5,743	4,442	1.1
120	4.0	0.3	14,400	7,524	6,070	1.5
150	5.0	0.4	18,000	9,239	7,772	1.8
180	5.9	0.5	21,600	10,888	9,547	2.2
210	6.9	0.6	25,200	12,470	11,396	2.5
240	7.9	0.7	28,800	13,985	13,319	2.8
270	8.9	0.7	32,400	15,434	15,315	3.1
300	9.9	0.8	36,000	16,816	17,384	3.4
330	10.9	0.9	39,600	18,132	19,528	3.6
360	11.9	1.0	43,200	19,382	21,744	3.9
390	12.9	1.1	46,800	20,565	24,035	4.1
420	13.9	1.2	50,400	21,681	26,399	4.3
436	14.4	1.2	52,320	22,242	27,698	4.4
480	15.8	1.3	57,600	23,640	31,430	4.7
510	16.8	1.4	61,146	24,515	34,008	4.9
540	17.8	1.5	64,800	25,348	36,740	5.1
570	18.8	1.6	68,400	26,130	39,475	5.2
600	19.8	1.6	72,000	26,874	42,251	5.4
630	20.8	1.7	75,600	27,583	45,066	5.5
660	21.8	1.8	79,200	28,257	47,919	5.6
690	22.8	1.9	82,800	28,900	50,808	5.8
720	23.8	2.0	86,400	29,512	53,730	5.9
750	24.8	2.1	90,000	30,095	56,685	6.0
780	25.7	2.1	93,600	30,650	59,671	6.1
810	26.7	2.2	97,200	31,178	62,686	6.2
840	27.7	2.3	100,800	31,681	65,729	6.3
870	28.7	2.4	104,400	32,161	68,798	6.4
900	29.7	2.5	108,000	32,617	71,893	6.5
930	30.7	2.5	111,600	33,051	75,012	6.6
960	31.7	2.6	115,200	33,465	78,154	6.7
990	32.7	2.7	118,800	33,859	81,318	6.8
1020	33.7	2.8	122,400	34,235	84,502	6.8
1050	34.7	2.9	126,000	34,592	87,707	6.9
1080	35.6	3.0	129,600	34,932	90,930	7.0
1110	36.6	3.0	133,200	35,256	94,172	7.0
1140	37.6	3.1	136,800	35,565	97,430	7.1
1170	38.6	3.2	140,400	35,858	100,705	7.2
1200	39.6	3.3	144,000	36,149	103,983	7.2
1230	40.6	3.4	147,600	36,436	107,265	7.3
1260	41.6	3.5	151,200	36,721	110,550	7.3
1290	42.6	3.5	154,800	37,002	113,839	7.4
1320	43.6	3.6	158,400	37,280	117,131	7.4
1350	44.6	3.7	162,000	37,555	120,427	7.5
1380	45.5	3.8	165,600	37,826	123,726	7.6
1410	46.5	3.9	169,200	38,095	127,029	7.6
1440	47.5	3.9	172,800	38,360	130,335	7.7
1470	48.5	4.0	176,400	38,622	133,645	7.7

Time			Cumulative Production & Water Injection			
Days	Months	Years	Wi, STB	N_p, STB	W_p, STB	G_p, MMSCF
1470	48.5	4.0	176,400	38,622	133,645	7.7
1500	49.5	4.1	180,000	38,881	136,959	7.8
1530	50.5	4.2	183,600	39,137	140,275	7.8
1560	51.5	4.3	187,200	39,390	143,596	7.9
1590	52.5	4.4	190,800	39,639	146,919	7.9
1620	53.5	4.4	194,400	39,885	150,247	8.0
1650	54.5	4.5	198,000	40,129	153,578	8.0
1680	55.4	4.6	201,600	40,369	156,912	8.1
1710	56.4	4.7	205,200	40,605	160,250	8.1
1740	57.4	4.8	208,800	40,839	163,591	8.2
1770	58.4	4.8	212,400	41,070	166,936	8.2
1800	59.4	4.9	216,000	41,297	170,284	8.2
1830	60.4	5.0	219,600	41,521	173,636	8.3
1860	61.4	5.1	223,200	41,742	176,991	8.3
1890	62.4	5.2	226,800	41,960	180,350	8.4
1920	63.4	5.3	230,400	42,175	183,713	8.4
1950	64.4	5.3	234,000	42,386	187,079	8.5
1980	65.3	5.4	237,600	42,594	190,448	8.5
2010	66.3	5.5	241,200	42,800	193,821	8.5
2040	67.3	5.6	244,800	43,002	197,197	8.6
2070	68.3	5.7	248,400	43,201	200,577	8.6
2100	69.3	5.8	252,000	43,396	203,960	8.7
2130	70.3	5.8	255,600	43,589	207,347	8.7
2160	71.3	5.9	259,200	43,778	210,738	8.7
2190	72.3	6.0	262,800	43,964	214,132	8.8
2220	73.3	6.1	266,400	44,147	217,529	8.8
2250	74.3	6.2	270,000	44,327	220,930	8.8
2280	75.2	6.2	273,600	44,504	224,334	8.9
2310	76.2	6.3	277,200	44,677	227,742	8.9
2340	77.2	6.4	280,800	44,848	231,154	9.0
2370	78.2	6.5	284,400	45,015	234,568	9.0
2400	79.2	6.6	288,000	45,179	237,987	9.0
2430	80.2	6.7	291,600	45,340	241,409	9.0
2460	81.2	6.7	295,200	45,498	244,834	9.1
2490	82.2	6.8	298,800	45,652	248,263	9.1
2520	83.2	6.9	302,400	45,803	251,696	9.1
2550	84.2	7.0	306,000	45,952	255,131	9.2

Time			Cumulative Production & Water Injection			
Days	Months	Years	Wi, STB	N_p, STB	W_p, STB	G_p, MMSCF
2550	84.2	7.0	306,000	45,952	255,131	9.2
2580	85.1	7.1	309,600	46,097	258,571	9.2
2610	86.1	7.2	313,200	46,239	262,014	9.2
2640	87.1	7.2	316,800	46,377	265,460	9.3
2670	88.1	7.3	320,400	46,513	268,910	9.3
2700	89.1	7.4	324,000	46,645	272,364	9.3
2730	90.1	7.5	327,600	46,775	275,821	9.3
2760	91.1	7.6	331,200	46,901	279,281	9.4
2790	92.1	7.6	334,800	47,023	282,745	9.4
2820	93.1	7.7	338,400	47,143	286,212	9.4
2850	94.1	7.8	342,000	47,260	289,683	9.4
2880	95.0	7.9	345,600	47,373	293,158	9.5
2910	96.0	8.0	349,200	47,483	296,636	9.5
2940	97.0	8.1	352,800	47,590	300,117	9.5
2970	98.0	8.1	356,400	47,694	303,602	9.5
3000	99.0	8.2	360,000	47,795	307,091	9.5
3030	100.0	8.3	363,600	47,893	310,583	9.6
3060	101.0	8.4	367,200	47,987	314,078	9.6
3090	102.0	8.5	370,800	48,078	317,577	9.6
3120	103.0	8.5	374,400	48,166	321,080	9.6
3150	104.0	8.6	378,000	48,251	324,586	9.6
3180	105.0	8.7	381,600	48,333	328,095	9.6
3210	105.9	8.8	385,200	48,412	331,608	9.7
3240	106.9	8.9	388,800	48,487	335,125	9.7
3270	107.9	9.0	392,400	48,559	338,645	9.7
3300	108.9	9.0	396,000	48,628	342,168	9.7
3330	109.9	9.1	399,600	48,694	345,695	9.7
3360	110.9	9.2	403,200	48,757	349,226	9.7
3390	111.9	9.3	406,800	48,817	352,760	9.7
3420	112.9	9.4	410,400	48,873	356,297	9.8
3450	113.9	9.5	414,000	48,926	359,838	9.8
3480	114.9	9.5	417,600	48,977	363,383	9.8
3510	115.8	9.6	421,200	49,023	366,931	9.8
3540	116.8	9.7	424,800	49,067	370,483	9.8
3570	117.8	9.8	428,400	49,108	374,038	9.8
3600	118.8	9.9	432,000	49,145	377,596	9.8
3630	119.8	9.9	435,600	49,180	381,158	9.8
3660	120.8	10.0	439,200	49,211	384,724	9.8

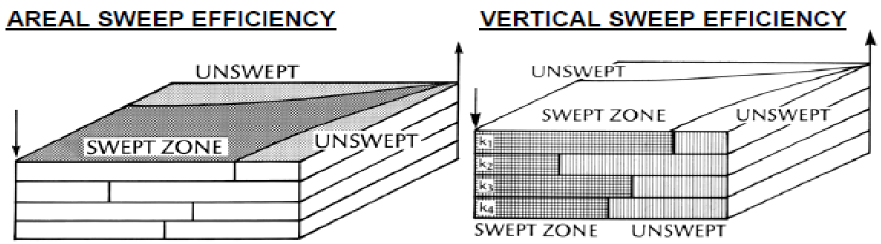
Years	Wi, STB	N_p, STB	W_p, STB	G_p, MMSCF
0.1	3,600	1,981	1,407	0.4
1	43,200	19,382	21,744	3.9
2	86,400	29,512	53,730	5.9
3	133,200	35,256	94,172	7.0
4	176,400	38,622	133,645	7.7
5	219,600	41,521	173,636	8.3
6	262,800	43,964	214,132	8.8
7	306,000	45,952	255,131	9.2
8	349,200	47,483	296,636	9.5
9	392,400	48,559	338,645	9.7
10	439,200	49,211	384,724	9.8





Sweep Efficiency

"In practice, areal and vertical sweep efficiencies typically range from 70% to 100% and 40% to 80%, respectively (World Oil 1966)"



$$Wp = \frac{Winj - (Sw2ave - Swi) \times (PV) \times E_A \times E_V}{B_W}$$

Four properties of the reservoir – fluids system impact the effectiveness of oil displacement by water, the fluid viscosity ratio (μ_o/μ_w), the anisotropy (K_v, K_h) of the reservoir rock, the capillary forces – rock porosity relationship (wettability and fluid distribution in the reservoir) and the reservoir stratification (degree of homogeneity or heterogeneity). The presence of these factors would ameliorate or deteriorate the efficiency of the displacement process. Relative and effective oil and water permeabilities are dependent functions of the absolute permeability and the fluid saturation (percentage of porous space occupied by the fluid) the Areal (E_A) and Vertical (E_V) Sweep Efficiencies are dimensionless macro-manifestations of the combination of the properties and physical forces described before.

SCAL, Inc.
SPECIAL CORE ANALYSIS LABORATORIES

Company: ***Jilpetco, Inc.*** ***API#:*** ***42-371-39681***
File: ***181761*** ***County:*** ***Pecos***
Well: ***WWJD #31*** ***State:*** ***Texas***

The oil and gas recovery estimated using the Buckley & Leverett frontal displacement theory corrected for the presence of mobile water in the "oil bank" assumed E_V = 100%. Statistics – based on several hundred waterflood projects worldwide – suggest vertical sweep efficiencies to range from 80% to 40%. Even though there are various, reliable log- based porosity, fluid saturation and net-to-gross measurements, there are only two permeability measurements reported (cores taken in well *WWJD #31*, *API 42-371-39681*[15]) The insert below depicting net thickness and N/G ratios show that the Queen A Reservoir is 28' thick (net) and the net-to-gross ratio is 52% approximately. Assuming that the entire Net_ϕ interval is open to water injection one could safely assume that the vertical sweep efficiency would be 100%; however, because of the capillary and viscous forces[16] this would be too optimistic.

Well WWJD 91-31

						BOIP	BOIP	BOIP	
Zone	**Top**	**Base**	**H**	**Porosity**	**Sw**	**Acre**	**40 Ac**	**15% RF**	**FVF**
Queen "A"	**1763.5**	**1820.5**	**29.5**	**0.115**	**0.403**	**14,155**	**566,214**	**84,932**	**1.11**
Queen "B"	**1874**	**1939**	**5.5**	**0.093**	**0.304**	**2,488**	**99,527**	**14,929**	**1.11**

[15] This well was supped on 2/20/2018, was cored, logged but there are no completion, testing or production records – Oil API was 38°

[16] These forces are not too strong; the viscosity ratio at reservoir conditions (μ_o/μ_w) is 2 approximately.

Considering all the existing uncertainties surrounding the reservoir characterization (definition) and the moderate-to-low mobility ratios, it was decided to use vertical sweep efficiencies ranging from:

$$80\%.0 < E_V < 100.0\%$$

Well Name	Well Number	Net	Net/Gross
WWJD	1	13	24%
WWJD	2		
WWJD	3		
WWJD	4	19	36%
WWJD	5	36	54%
WWJD	6	28	57%
WWJD	7	52	96%
WWJD	8	49	100%
WWJD	9	13	28%
WWJD	10	22	51%
WWJD	11	27	53%
WWJD	12	36	86%
WWJD	13	32	67%
WWJD	14	23	43%
WWJD	15	41	93%
WWJD	16	39	91%
WWJD	17		
WWJD	18		
WWJD	19		
WWJD	20		
WWJD	21	19	45%
WWJD	22		
WWJD	23	17.5	39%
WWJD	24		
WWJD	25		
WWJD	26		
WWJD	27		
WWJD	28		
WWJD	29		
WWJD	30		
WWJD	31	28	52%
WWJD	B1	10	23%
WWJD	B2	34	81%
WWJD	B3	21	78%
WWJD	C1	21	55%
WWJD	C2	25	53%
WWJD	C3	35	90%
WWJD	C4	14	27%
$Average_T$		27.3	59.2%
$Average_{91}$		29.2	60.1%

MOBILITY RATIO FOR THE QUEEN RESERVOIR FLUIDS					
Oil Viscosity, cp, (μ_o) =	2.65				
Water Viscosity, cp, (μ_w) =	0.61				
	S_W	K_{omax}	K_{omin}	K_{wmax}	K_{wmin}
S_{wi}	34.2%	8.001	1.687	0.266	0.056
$1-S_{or}$	80.0%	0.352	0.074	2.142	0.452
	M				
	1.163				
	S_W	K_{omax}	K_{omin}	K_{wmax}	K_{wmin}
S_{wi}	25.0%	11.683	2.463	0.128	0.027
$1-S_{or}$	75.0%	0.512	0.108	1.677	0.354
	M				
	0.624				
	λ_W & λ_O				
	S_W	S_{wi}	S_{or}	S_{wi}	S_{or}
		34.2%	20.0%	25.0%	25.0%
	λ_w	3.512		2.749	
	λ_o	3.019		4.409	

Water injectivity was the dominant variable in the design of a 5-Acre, 5-spot waterflooding pattern, and the low rock permeability – form two observations only – severely restrict the formation flow capacity forcing the reduction of the size o the pattern. It could be considered a conservative view of the evaluation of the reservoir waterflooding potential. The development program (well drilling and completion schedule) would allow for the enhancement of the pattern size if larger permeabilities, manifested by higher water injectivity, were present.

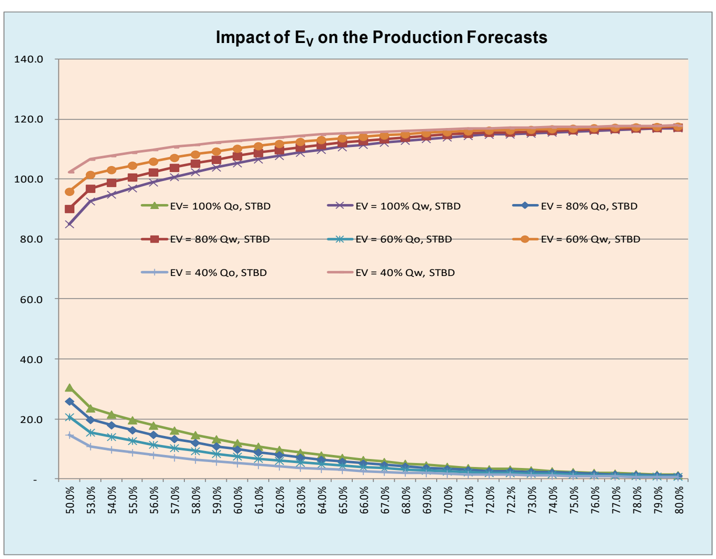
Below are the production forecasts obtained when considering E_V = 80.0%. These forecasts would be considered the low bound of the forecast range – the upper case being the forecasts obtained with E_V = 100.0% I decided to use these values because the average-weighted-porosity (ϕ_{91AVG}) for Section 91 estimated by Mr. Bruce Miller, the geologist commissioned to develop the geological model is 13.85% versus the average value (ϕ = 11.1%) obtained from wells WJD 91-11, 12, 13, 14, 15 and 16 and used in these waterflooding production forecasts estimates. This consideration reduces the overall sweep efficiency (E_D)[17] by 24.77%

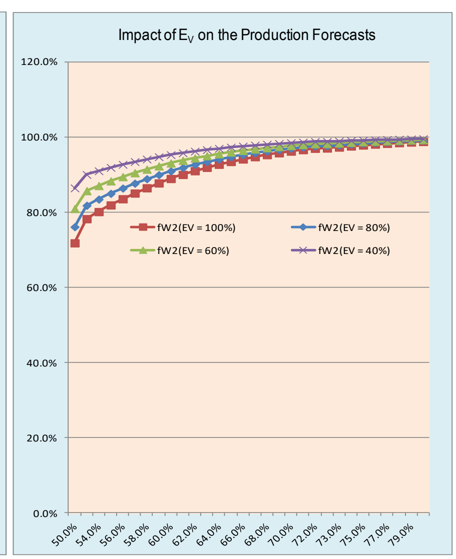
[17] Please note that the estimated water breakthrough time (t) would be slightly shorter when considering E_V = 80.0%; however, because this does not impact the forecasts significantly because of the presence of mobile water in the reservoir.

Reservoir	5	Acres Performance after Water Breakthrough (Weldge)					E_V =	100.00%				
1	2	3	4	5	6	7	8	9	10	11	12	13
S_{w2}	f_{w2}	dF_w/dS_w	$S_{w2average}$	$E_d = E_A \cdot E_V$	N_{p+w}	Q_i	W_{inj}	t	W_p	WOR	Q_o	Q_w
50.0%	71.8%	2.324	62.1%	52.7%	57,239	0.430	61,146	510	38,196	2.781	30.6	85.0
53.0%	78.2%	1.955	64.1%	55.2%	70,583	0.512	72,677	606	46,205	3.924	23.6	92.7

Accounting for Vertical Sweep Efficiency

				E_V =			80.0%					
1	2	3	4	5	6	7	8	9	10	11	12	13
S_{w2}	f_{w2}	dF_w/dS_w	$S_{w2average}$	$E_d = E_A \cdot E_V$	N_{p+w}	Q_i	W_{inj}	t	W_p	WOR	Q_o	Q_w
50.0%	71.8%	232.4%	62.1%	31.2%	45,791	0.430	61,146	510	47,252	3.476	25.9	90.1
53.0%	78.2%	195.5%	64.1%	33.7%	35,365	0.512	72,677	606	56,129	4.905	19.8	96.9
54.0%	80.1%	182.8%	64.9%	34.7%	36,362	0.547	77,709	648	60,169	5.501	18.0	98.8
55.0%	81.9%	170.3%	65.6%	35.7%	37,397	0.587	83,439	695	64,854	6.170	16.3	100.6
56.0%	83.5%	158.0%	66.4%	36.7%	38,466	0.633	89,941	750	70,258	6.920	14.8	102.3
57.0%	85.0%	146.0%	67.2%	37.7%	39,566	0.685	97,303	811	76,466	7.761	13.4	103.8
58.0%	86.4%	134.5%	68.1%	38.8%	40,694	0.743	105,621	880	83,574	8.705	12.1	105.2
59.0%	87.7%	123.5%	68.9%	39.9%	41,846	0.809	115,004	958	91,691	9.763	10.9	106.5
60.0%	88.9%	113.1%	69.8%	41.0%	43,019	0.884	125,577	1,046	100,940	10.950	9.8	107.7
61.0%	90.0%	103.4%	70.7%	42.2%	44,212	0.968	137,478	1,146	111,459	12.281	8.9	108.8
62.0%	91.0%	94.2%	71.6%	43.3%	45,423	1.062	150,865	1,257	123,402	13.774	8.0	109.8
63.0%	91.9%	85.6%	72.5%	44.5%	46,648	1.168	165,914	1,383	136,944	15.449	7.2	110.6
64.0%	92.7%	77.7%	73.4%	45.7%	47,888	1.287	182,823	1,524	152,282	17.327	6.4	111.4
65.0%	93.4%	70.4%	74.3%	46.9%	49,140	1.420	201,815	1,682	169,636	19.434	5.8	112.2
66.0%	94.1%	63.7%	75.3%	48.1%	50,402	1.570	223,140	1,859	189,253	21.797	5.2	112.8
67.0%	94.7%	57.5%	76.2%	49.3%	51,675	1.739	247,080	2,059	211,411	24.447	4.6	113.4
68.0%	95.3%	51.9%	77.1%	50.5%	52,956	1.928	273,950	2,283	236,422	27.419	4.2	113.9
69.0%	95.7%	46.7%	78.1%	51.7%	54,244	2.140	304,103	2,534	264,635	30.753	3.7	114.4
70.0%	96.2%	42.0%	79.1%	53.0%	55,540	2.378	337,939	2,816	296,444	34.492	3.3	114.8
71.0%	96.6%	37.8%	80.0%	54.2%	56,842	2.646	375,902	3,133	332,288	38.685	3.0	115.2
72.0%	96.9%	34.0%	81.0%	55.5%	58,149	2.945	418,492	3,487	372,662	43.389	2.7	115.5
72.2%	97.0%	33.2%	81.2%	55.7%	58,411	3.010	427,614	3,563	381,328	44.396	2.6	115.6
73.0%	97.3%	30.5%	82.0%	56.7%	59,461	3.282	466,272	3,886	418,120	48.664	2.4	115.9
74.0%	97.6%	27.3%	82.9%	58.0%	60,778	3.659	519,870	4,332	469,283	54.580	2.1	116.1
75.0%	97.8%	24.5%	83.9%	59.2%	62,098	4.082	579,994	4,833	526,850	61.216	1.9	116.4
76.0%	98.0%	21.9%	84.9%	60.5%	63,422	4.557	647,435	5,395	591,603	68.659	1.7	116.6
77.0%	98.3%	19.6%	85.9%	61.8%	64,749	5.089	723,083	6,026	664,419	77.007	1.5	116.8
78.0%	98.4%	17.6%	86.9%	63.0%	66,079	5.686	807,934	6,733	746,283	86.369	1.4	117.0
79.0%	98.6%	15.7%	87.8%	64.3%	67,411	6.356	903,106	7,526	838,298	96.870	1.2	117.1
80.0%	98.8%	14.1%	88.8%	65.6%	68,746	7.107	1,009,855	8,415	941,704	108.647	1.1	117.3





Production Forecast, E_V = 80%

Queen Reservoir Type Production Well

Pattern =	5 - Spot	Solution GOR, SCF/STB =	199.6
Area, Acres =	**5**	Solution GOR, SCF/STB =	
		$S_{wi} = S_{wc}$	$S_{wi} > S_{wc}$
Injection Rate, STB/D =	120	BT_{Key} = 1	0

Time			Q_i	Q_o	Q_w	Q_g	Slope Q_o/t	WOR	$Slope_{WOR}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	ΔSTBD/Δt	BBL/STB	ΔSTB/Δt
30	1.0	0.1	120	53	66	10.5		0.701	
60	2.0	0.2	120	51	68	10.2		0.701	
90	3.0	0.2	120	49	70	9.8		0.701	
120	4.0	0.3	120	48	72	9.5		0.701	
150	5.0	0.4	120	46	74	9.1		0.701	
180	5.9	0.5	120	44	75	8.8		0.701	
210	6.9	0.6	120	42	77	8.4		0.701	
240	7.9	0.7	120	40	79	8.1		0.701	
270	8.9	0.7	120	39	81	7.7		0.701	
300	9.9	0.8	120	37	83	7.4		0.701	
330	10.9	0.9	120	35	84	7.0		0.701	
360	11.9	1.0	120	33	86	6.7		0.701	
390	12.9	1.1	120	32	88	6.3		0.701	
420	13.9	1.2	120	30	89	5.9		0.701	
436	14.4	1.2	120	28	89	5.6		0.701	
480	15.8	1.3	120	25	90	5.1		0.701	
510	16.8	1.4	120	26	90.1	5.2	(0.0561)	3.476	0.01742
540	17.8	1.5	120	24.5	91.7	4.9		5.018	
570	18.8	1.6	120	23.1	93.2	4.6		6.537	
600	19.8	1.6	120	21.7	94.7	4.3		8.057	
630	20.8	1.7	120	20.4	96.2	4.1		9.576	
660	21.8	1.8	120	19.0	97.7	3.8		11.095	
690	22.8	1.9	120	17.6	99.3	3.5		12.614	
720	23.8	2.0	120	16.2	100.8	3.2		14.133	
750	24.8	2.1	120	14.8	102.3	3.0	(0.0463)	6.920	0.05064
780	25.7	2.1	120	14.1	103.1	2.8		7.688	
810	26.7	2.2	120	13.4	103.8	2.7	(0.0233)	7.761	0.02559
840	27.7	2.3	120	12.9	104.4	2.6		7.761	
870	28.7	2.4	120	12.4	104.9	2.5		8.705	
900	29.7	2.5	120	11.9	105.5	2.4		9.244	
930	30.7	2.5	120	11.4	106.0	2.3		9.784	
960	31.7	2.6	120	10.9	106.5	2.2	(0.0167)	9.763	0.01798
990	32.7	2.7	120	10.5	106.9	2.1		10.155	
1020	33.7	2.8	120	10.2	107.3	2.0		10.547	
1050	34.7	2.9	120	9.8	107.7	2.0	(0.0122)	10.950	0.01306
1080	35.6	3.0	120	9.5	108.1	1.9		11.307	
1110	36.6	3.0	120	9.2	108.4	1.8		11.663	

Production Forecast, E_V = 80%
Queen Reservoir Type Production Well

Pattern = 5 - Spot
Area, Acres = **5**
Injection Rate, STB/D = 120

Solution GOR, SCF/STB = 199.6
Solution GOR, SCF/STB =

	$S_{wi} = S_{wc}$	$S_{wi} > S_{wc}$
BT_{Key} =	1	0

Time			Q_i	Q_o	Q_w	Q_g	Slope Q_o/t	WOR	$Slope_{WOR}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	ΔSTBD/Δt	BBL/STB	ΔSTB/Δt
1110	36.6	3.0	120	9.2	108.4	1.8		11.663	
1140	37.6	3.1	120	8.9	108.8	1.8	(0.0100)	12.281	0.01189
1170	38.6	3.2	120	8.7	109.1	1.7		12.634	
1200	39.6	3.3	120	8.5	109.5	1.7		12.987	
1230	40.6	3.4	120	8.2	109.8	1.6		13.340	
1260	41.6	3.5	120	8.0	110.2	1.6	(0.0075)	13.774	0.01176
1290	42.6	3.5	120	7.8	110.3	1.6		13.885	
1320	43.6	3.6	120	7.6	110.4	1.5		13.995	
1350	44.6	3.7	120	7.4	110.5	1.5		14.106	
1380	45.5	3.8	120	7.2	110.6	1.4	(0.0067)	15.449	0.00369
1410	46.5	3.9	120	7.1	110.8	1.4		15.449	
1440	47.5	3.9	120	6.9	110.9	1.4		15.449	
1470	48.5	4.0	120	6.8	111.1	1.4		15.449	
1500	49.5	4.1	120	6.6	111.2	1.3		15.449	
1530	50.5	4.2	120	6.5	111.4	1.3		17.327	
1560	51.5	4.3	120	6.4	111.5	1.3		17.479	
1590	52.5	4.4	120	6.2	111.7	1.2		17.631	
1620	53.5	4.4	120	6.1	111.8	1.2		17.783	
1650	54.5	4.5	120	5.9	112.0	1.2		17.935	
1680	55.4	4.6	120	5.8	112.2	1.2	(0.0047)	19.434	0.00506
1710	56.4	4.7	120	5.7	112.3	1.1		19.542	
1740	57.4	4.8	120	5.6	112.4	1.1		19.651	
1770	58.4	4.8	120	5.5	112.5	1.1		19.759	
1800	59.4	4.9	120	5.4	112.6	1.1		19.868	
1830	60.4	5.0	120	5.3	112.7	1.1		19.976	
1860	61.4	5.1	120	5.2	112.8	1.0	(0.0033)	21.797	0.00362
1890	62.4	5.2	120	5.1	112.9	1.0		21.797	
1920	63.4	5.3	120	5.1	113.0	1.0		21.797	
1950	64.4	5.3	120	5.0	113.0	1.0		21.797	
1980	65.3	5.4	120	4.9	113.1	1.0		21.797	
2010	66.3	5.5	120	4.8	113.2	1.0		21.797	
2040	67.3	5.6	120	4.8	113.3	1.0		21.797	
2070	68.3	5.7	120	4.7	113.4	0.9		24.447	
2100	69.3	5.8	120	4.6	113.4	0.9		24.527	
2130	70.3	5.8	120	4.6	113.5	0.9		24.606	
2160	71.3	5.9	120	4.5	113.6	0.9		24.686	
2190	72.3	6.0	120	4.4	113.7	0.9		24.766	

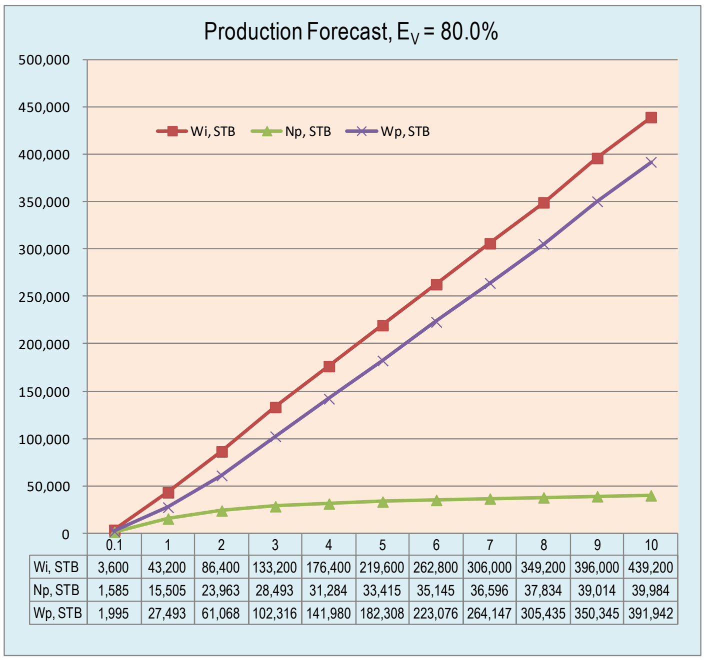
Time			Q_i	Q_o	Q_w	Q_g	Slope Q_o/t	WOR	$Slope_{WOR}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	ΔSTBD/Δt	BBL/STB	ΔSTB/Δt
2190	72.3	6.0	120	4.4	113.7	0.9		24.766	
2220	73.3	6.1	120	4.3	113.8	0.9		24.845	
2250	74.3	6.2	120	4.3	113.8	0.9		24.925	
2280	75.2	6.2	120	4.20	113.9	0.8	(0.0024)	27.419	0.00266
2310	76.2	6.3	120	4.2	114.0	0.8		27.419	
2340	77.2	6.4	120	4.1	114.0	0.8		27.419	
2370	78.2	6.5	120	4.1	114.1	0.8		27.419	
2400	79.2	6.6	120	4.0	114.1	0.8		27.419	
2430	80.2	6.7	120	4.0	114.2	0.8		27.419	
2460	81.2	6.7	120	3.9	114.2	0.8		27.419	
2490	82.2	6.8	120	3.9	114.3	0.8		27.419	
2520	83.2	6.9	120	3.8	114.3	0.8		30.753	
2550	84.2	7.0	120	3.8	114.4	0.7		30.803	
2580	85.1	7.1	120	3.7	114.4	0.7		30.853	
2610	86.1	7.2	120	3.7	114.5	0.7		30.903	
2640	87.1	7.2	120	3.6	114.5	0.7		30.954	
2670	88.1	7.3	120	3.6	114.6	0.7		31.004	
2700	89.1	7.4	120	3.5	114.6	0.7		31.054	
2730	90.1	7.5	120	3.5	114.7	0.7		31.104	
2760	91.1	7.6	120	3.4	114.7	0.7		31.154	
2790	92.1	7.6	120	3.4	114.8	0.7		31.204	
2820	93.1	7.7	120	3.3	114.8	0.7	(0.0017)	34.492	0.00167
2850	94.1	7.8	120	3.3	114.9	0.7		34.492	
2880	95.0	7.9	120	3.2	114.9	0.6		34.492	
2910	96.0	8.0	120	3.2	114.9	0.6		34.492	
2940	97.0	8.1	120	3.2	115.0	0.6		34.492	
2970	98.0	8.1	120	3.2	115.0	0.6		34.492	
3000	99.0	8.2	120	3.1	115.0	0.6		34.492	
3030	100.0	8.3	120	3.1	115.1	0.6		34.492	
3060	101.0	8.4	120	3.1	115.1	0.6		34.492	
3090	102.0	8.5	120	3.1	115.1	0.6		34.492	
3120	103.0	8.5	120	3.0	115.2	0.6		38.685	
3150	104.0	8.6	120	3.0	115.2	0.6		38.718	
3180	105.0	8.7	120	3.0	115.2	0.6		38.751	
3210	105.9	8.8	120	2.9	115.3	0.6		38.784	
3240	106.9	8.9	120	2.9	115.3	0.6		38.817	
3270	107.9	9.0	120	2.9	115.3	0.6		38.850	
3300	108.9	9.0	120	2.9	115.4	0.6		38.883	
3330	109.9	9.1	120	2.8	115.4	0.6		38.917	
3360	110.9	9.2	120	2.8	115.4	0.6		38.950	
3390	111.9	9.3	120	2.8	115.5	0.6		38.983	
3420	112.9	9.4	120	2.8	115.5	0.5		39.016	
3450	113.9	9.5	120	2.7	115.5	0.5		39.049	
3480	114.9	9.5	120	2.7	115.5	0.5	(0.0009)	43.389	0.00110
3510	115.8	9.6	120	2.7	115.6	0.5		43.389	
3540	116.8	9.7	120	2.7	115.6	0.5		43.389	
3570	117.8	9.8	120	2.6	115.6	0.5		44.396	
3600	118.8	9.9	120	2.6	115.6	0.5		44.419	
3630	119.8	9.9	120	2.6	115.7	0.5		44.442	
3660	120.8	10.0	120	2.6	115.7	0.5		44.464	
3886	128.3	10.6	120	2.4	115.9	0.5	(0.0007)	48.664	0.0008

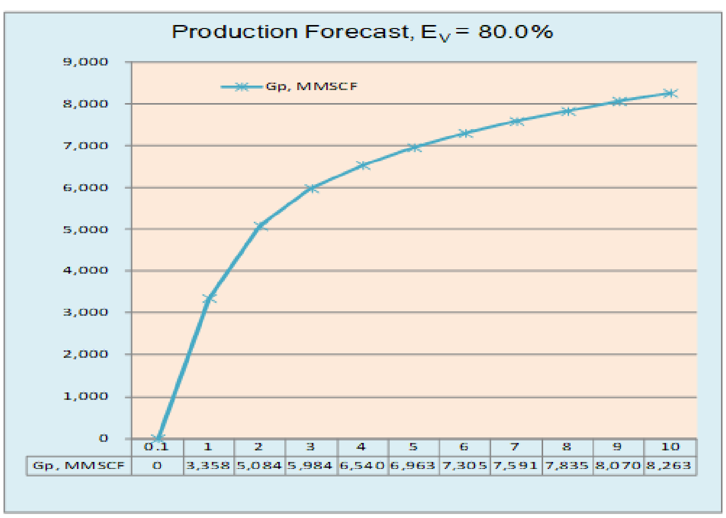
EV = 80.0%

Time			Cumulative Production & Water Injection			
Days	Months	Years	Wi, STB	N_p, STB	W_p, STB	G_p, MMSCF
30	1.0	0.1	3,600	1,585	1,995	0.3
60	2.0	0.2	7,200	3,116	4,043	306
90	3.0	0.2	10,800	4,594	6,146	601
120	4.0	0.3	14,400	6,020	8,302	886
150	5.0	0.4	18,000	7,391	10,512	1,159
180	5.9	0.5	21,600	8,710	12,777	1,423
210	6.9	0.6	25,200	9,976	15,095	1,675
240	7.9	0.7	28,800	11,188	17,467	1,917
270	8.9	0.7	32,400	12,347	19,892	2,149
300	9.9	0.8	36,000	13,453	22,372	2,369
330	10.9	0.9	39,600	14,506	24,906	2,579
360	11.9	1.0	43,200	15,505	27,493	2,779
390	12.9	1.1	46,800	16,452	30,134	2,968
420	13.9	1.2	50,400	17,345	32,791	3,146
436	14.4	1.2	52,320	17,793	34,213	3,236
480	15.8	1.3	57,600	18,912	38,156	3,459
510	16.8	1.4	61,146	19,678	40,819	3,612
540	17.8	1.5	64,800	20,425	43,610	3,761
570	18.8	1.6	68,400	21,119	46,406	3,899
600	19.8	1.6	72,000	21,771	49,247	4,029
630	20.8	1.7	75,600	22,382	52,134	4,151
660	21.8	1.8	79,200	22,950	55,067	4,265
690	22.8	1.9	82,800	23,478	58,045	4,370
720	23.8	2.0	86,400	23,963	61,068	4,467
750	24.8	2.1	90,000	24,407	64,137	4,556
780	25.7	2.1	93,600	24,830	67,229	4,640
810	26.7	2.2	97,200	25,232	70,344	4,720
840	27.7	2.3	100,800	25,619	73,476	4,798
870	28.7	2.4	104,400	25,991	76,623	4,872
900	29.7	2.5	108,000	26,348	79,787	4,943
930	30.7	2.5	111,600	26,690	82,967	5,011
960	31.7	2.6	115,200	27,017	86,163	5,077
990	32.7	2.7	118,800	27,333	89,371	5,140
1020	33.7	2.8	122,400	27,638	92,590	5,201
1050	34.7	2.9	126,000	27,932	95,822	5,259
1080	35.6	3.0	129,600	28,217	99,064	5,316
1110	36.6	3.0	133,200	28,493	102,316	5,371
1140	37.6	3.1	136,800	28,760	105,580	5,425
1170	38.6	3.2	140,400	29,021	108,854	5,477
1200	39.6	3.3	144,000	29,274	112,138	5,527
1230	40.6	3.4	147,600	29,521	115,434	5,576
1260	41.6	3.5	151,200	29,761	118,739	5,624
1290	42.6	3.5	154,800	29,995	122,048	5,671
1320	43.6	3.6	158,400	30,223	125,361	5,717
1350	44.6	3.7	162,000	30,445	128,677	5,761
1380	45.5	3.8	165,600	30,661	131,996	5,804
1410	46.5	3.9	169,200	30,873	135,319	5,846
1440	47.5	3.9	172,800	31,080	138,647	5,888
1470	48.5	4.0	176,400	31,284	141,980	5,928
1500	49.5	4.1	180,000	31,483	145,317	5,968
1530	50.5	4.2	183,600	31,678	148,659	6,007
1560	51.5	4.3	187,200	31,869	152,005	6,045
1590	52.5	4.4	190,800	32,055	155,356	6,082
1620	53.5	4.4	194,400	32,238	158,712	6,119
1650	54.5	4.5	198,000	32,416	162,072	6,154
1680	55.4	4.6	201,600	32,590	165,437	6,189
1710	56.4	4.7	205,200	32,761	168,804	6,223
1740	57.4	4.8	208,800	32,929	172,176	6,257
1770	58.4	4.8	212,400	33,094	175,550	6,290
1800	59.4	4.9	216,000	33,256	178,928	6,322
1830	60.4	5.0	219,600	33,415	182,308	6,354

Time			Cumulative Production & Water Injection			
Days	Months	Years	Wi, STB	N_p, STB	W_p, STB	G_p, MMSCF
1860	61.4	5.1	223,200	33,571	185,693	6,385
1890	62.4	5.2	226,800	33,725	189,079	6,415
1920	63.4	5.3	230,400	33,876	192,468	6,446
1950	64.4	5.3	234,000	34,026	195,859	6,476
1980	65.3	5.4	237,600	34,173	199,253	6,505
2010	66.3	5.5	241,200	34,319	202,649	6,534
2040	67.3	5.6	244,800	34,462	206,048	6,563
2070	68.3	5.7	248,400	34,603	209,448	6,591
2100	69.3	5.8	252,000	34,742	212,852	6,618
2130	70.3	5.8	255,600	34,878	216,257	6,646
2160	71.3	5.9	259,200	35,013	219,665	6,673
2190	72.3	6.0	262,800	35,145	223,076	6,699
2220	73.3	6.1	266,400	35,276	226,489	6,725
2250	74.3	6.2	270,000	35,404	229,904	6,751
2280	75.2	6.2	273,600	35,530	233,321	6,776
2310	76.2	6.3	277,200	35,654	236,740	6,801
2340	77.2	6.4	280,800	35,777	240,161	6,825
2370	78.2	6.5	284,400	35,899	243,583	6,849
2400	79.2	6.6	288,000	36,019	247,007	6,873
2430	80.2	6.7	291,600	36,137	250,432	6,897
2460	81.2	6.7	295,200	36,254	253,858	6,920
2490	82.2	6.8	298,800	36,370	257,287	6,943
2520	83.2	6.9	302,400	36,484	260,716	6,966
2550	84.2	7.0	306,000	36,596	264,147	6,989
2580	85.1	7.1	309,600	36,707	267,580	7,011
2610	86.1	7.2	313,200	36,817	271,014	7,033
2640	87.1	7.2	316,800	36,925	274,450	7,054
2670	88.1	7.3	320,400	37,031	277,887	7,075
2700	89.1	7.4	324,000	37,136	281,326	7,096
2730	90.1	7.5	327,600	37,240	284,766	7,117
2760	91.1	7.6	331,200	37,342	288,207	7,137
2790	92.1	7.6	334,800	37,442	291,651	7,158
2820	93.1	7.7	338,400	37,541	295,095	7,177
2850	94.1	7.8	342,000	37,640	298,541	7,197
2880	95.0	7.9	345,600	37,737	301,988	7,216
2910	96.0	8.0	349,200	37,834	305,435	7,236
2940	97.0	8.1	352,800	37,929	308,884	7,255
2970	98.0	8.1	356,400	38,024	312,333	7,274
3000	99.0	8.2	360,000	38,118	315,784	7,292
3030	100.0	8.3	363,600	38,212	319,236	7,311
3060	101.0	8.4	367,200	38,304	322,688	7,329
3090	102.0	8.5	370,800	38,396	326,142	7,348
3120	103.0	8.5	374,400	38,486	329,596	7,366
3150	104.0	8.6	378,000	38,576	333,052	7,384
3180	105.0	8.7	381,600	38,666	336,509	7,402
3210	105.9	8.8	385,200	38,754	339,966	7,419
3240	106.9	8.9	388,800	38,842	343,425	7,437
3270	107.9	9.0	392,400	38,928	346,884	7,454
3300	108.9	9.0	396,000	39,014	350,345	7,471
3330	109.9	9.1	399,600	39,099	353,806	7,488
3360	110.9	9.2	403,200	39,184	357,269	7,505
3390	111.9	9.3	406,800	39,267	360,732	7,522
3420	112.9	9.4	410,400	39,350	364,197	7,538
3450	113.9	9.5	414,000	39,431	367,662	7,555
3480	114.9	9.5	417,600	39,512	371,129	7,571
3510	115.8	9.6	421,200	39,593	374,596	7,587
3540	116.8	9.7	424,800	39,672	378,064	7,603
3570	117.8	9.8	428,400	39,751	381,532	7,618
3600	118.8	9.9	432,000	39,830	385,002	7,634
3630	119.8	9.9	435,600	39,907	388,472	7,650
3660	120.8	10.0	439,200	39,984	391,942	7,665
3886	128.3	10.6	466,320	40,527	418,126	7,773

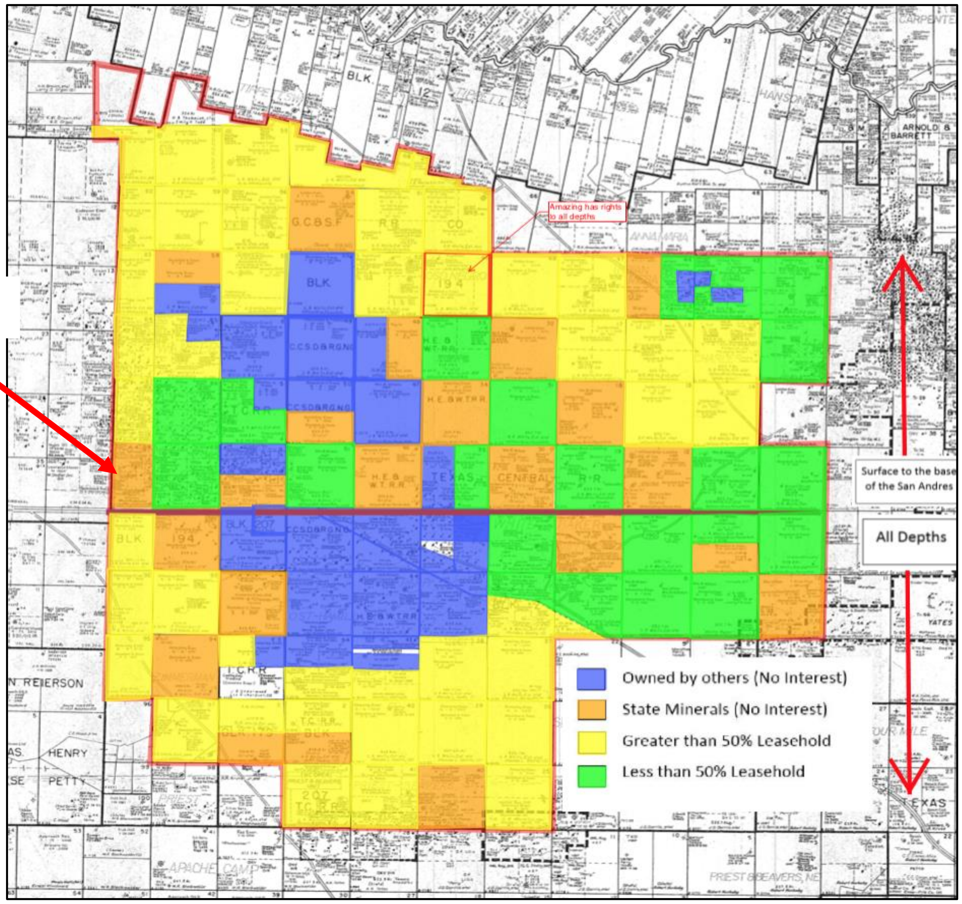
Time, Years	Cumulative Production & Water Injection			
	Wi, STB	N_p, STB	W_p, STB	G_p, MMSCF
0.1	3,600	1,585	1,995	0
1	43,200	15,505	27,493	2,779
2	86,400	23,963	61,068	4,467
3	133,200	28,493	102,316	5,371
4	176,400	31,284	141,980	5,928
5	219,600	33,415	182,308	6,354
6	262,800	35,145	223,076	6,699
7	306,000	36,596	264,147	6,989
8	349,200	37,834	305,435	7,236
9	396,000	39,014	350,345	7,471
10	439,200	39,984	391,942	7,665





Land

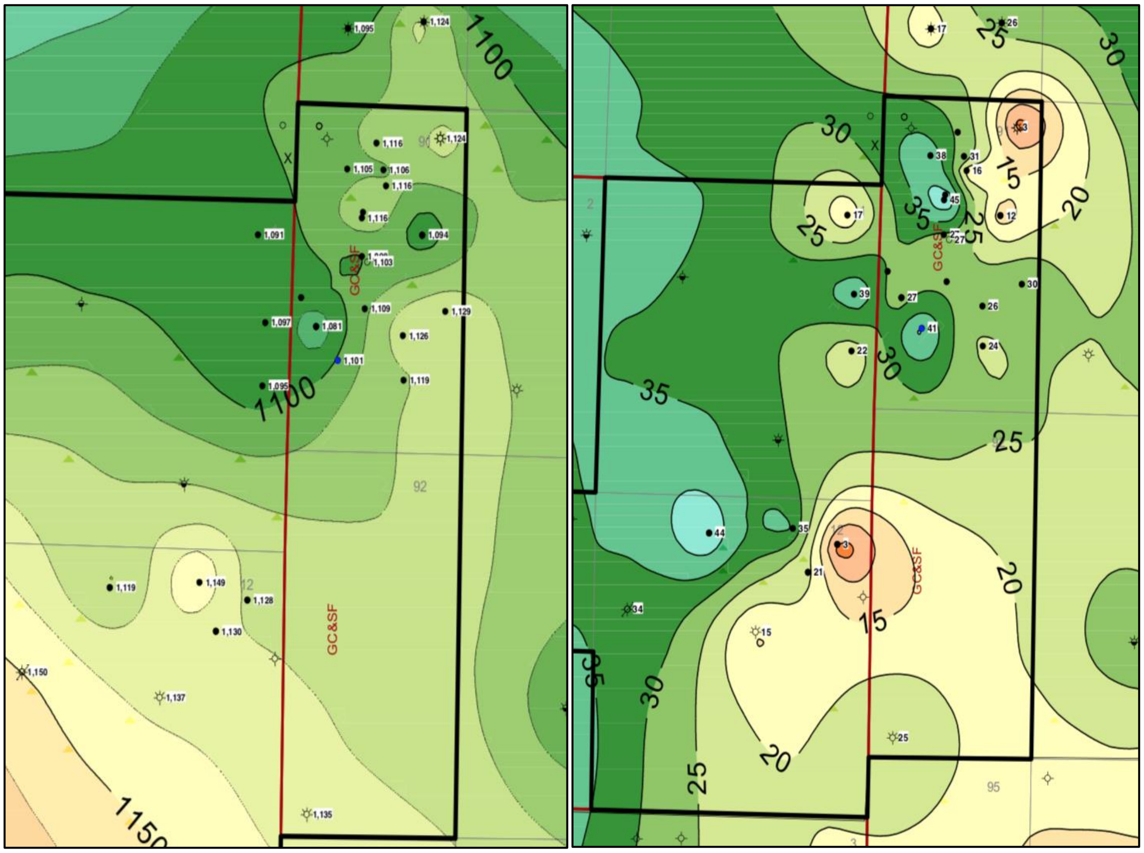
Section 91



Amazing Working Breakdown From Surface to Bottom of San Andres							
Block	**Survey**	**Section**	**Abstract**	**Gross Acres**	**Total (WI)**	**Net Acres**	**WI Outstanding**
194	GC&SF RR CO	86	A-6726	644.00	0.4729	304.55683	0.5271
194	GC&SF RR CO	87	A-4373	427.00	0.7229	308.68442	0.2771
194	GC&SF RR CO	89	A-4374	646.00	0.4729	305.50266	0.5271
194	GC&SF RR CO	91	A-4369	468.00	0.7503	351.16162	0.2497
194	GC&SF RR CO	93	A-4370	667.00	0.5547	369.97578	0.4453
194	GC&SF RR CO	95	A-4363	503.00	0.5547	279.00723	0.4453
194	GC&SF RR CO	97	A-4371	647.00	0.6328	409.42893	0.3672
207	TC RR CO	1	A-4497	663.00	0.6328	419.55391	0.3672

[18] The geological maps presented in this report were developed by Mr. Bruce Miller, Geologist. The digital files and more detailed maps should be requested to him.

Top: Queen "A" (Closure 10') & Isopach – Queen "A" Net Porosity (API_{CUTOFF} = 60°; ϕ_{CUTOFF} = 8.0%, (Closure 5')



Top Isopach

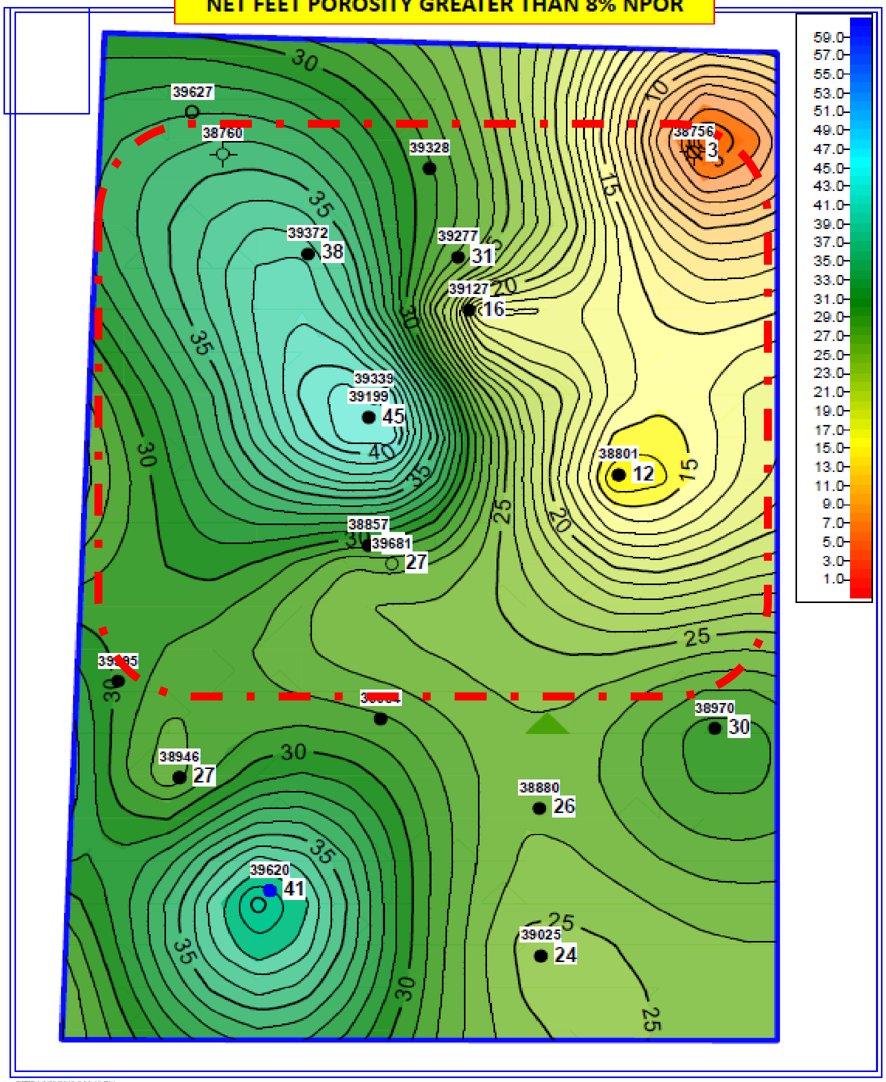
The proposed waterflood for Unit 1[19] – Phase 1 comprises 30 producers and 42 injectors, corresponding to 30, 5-Spot Patterns. The final well tally, their location and use as injectors or producers would be decided using a combination of the existing well locations and the geological model as the driving guides and the mechanical and geological conditions of the drilled wells. Below are illustrations of the general area of Section 91 where the wells comprised in Unit 1, Phase 1 would be located and the initial 30 5-spot patterns superimposed on the northern part of Section 91

Pecos County 70K-Acres Property - Section 91

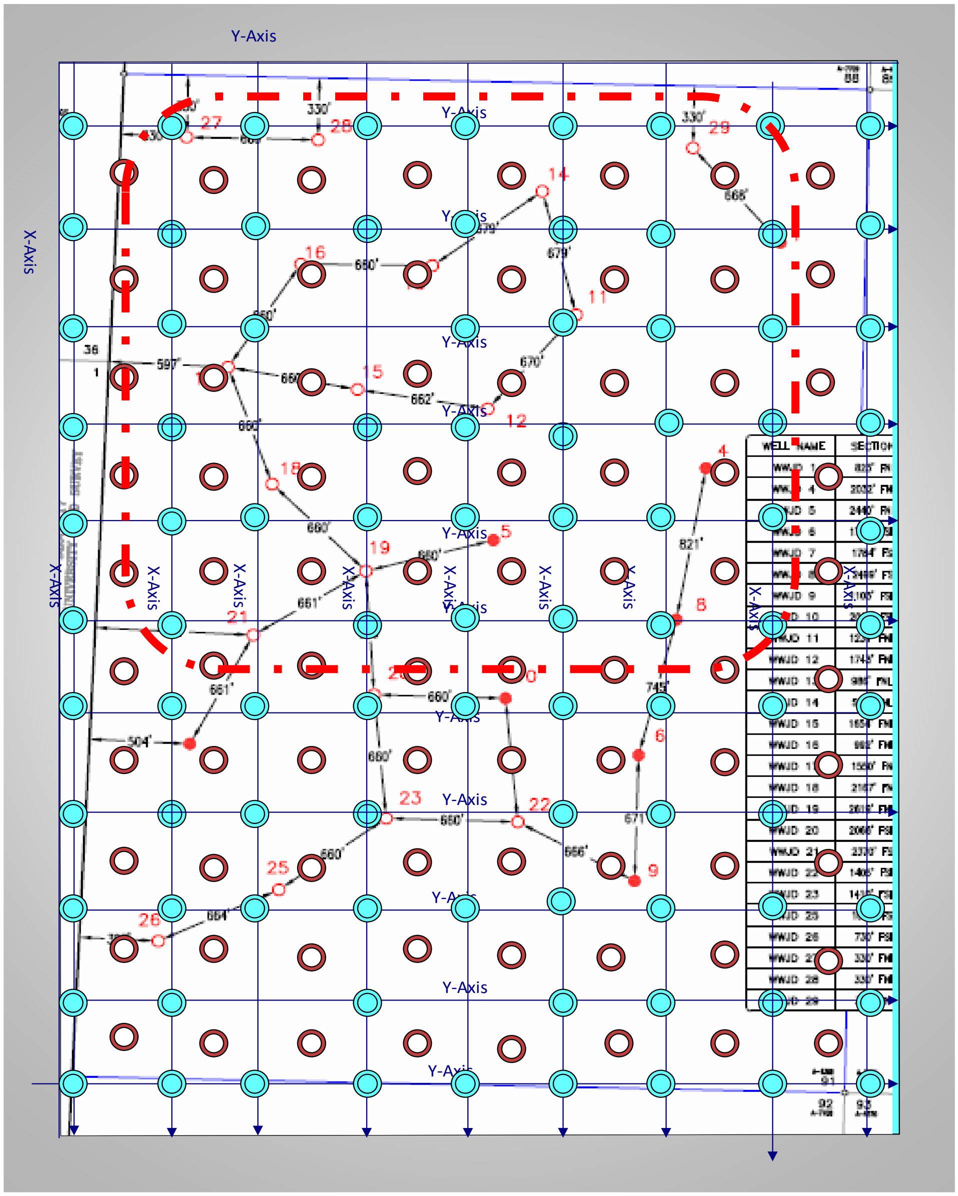
Wells	IP_{oil}, STBD	IP_{water}, STBD	S_{wi}, %	Water Cut, %	S_{oi}, %	S_{oirr}, %	S_{odisp}, %
WWJD 91-11	82	0	36.81%	0.00%	63.19%	18.05%	45%
WWJD 91-12	38	14	43.70%	26.92%	56.30%	18.05%	38.26%
WWJD 91-13	148	21	35.82%	12.43%	64.18%	18.05%	46.14%
WWJD 91-14	60	50	40.20%	45.45%	59.80%	18.05%	41.76%
WWJD 91-15	81	27	37.39%	25.00%	62.61%	18.05%	44.57%
WWJD 91-16	28	35	34.20%	55.56%	65.80%	18.05%	47.76%
Average	72.8	24.5	38.02%	27.56%	61.98%	18.05%	43.94%
Maximum	148	50	43.70%	55.56%	65.80%	18.05%	47.76%
Minimum	28.0	0.0	34.20%	0.00%	56.30%	18.05%	38.26%

[19] Unit 1 would be developed in two sub-phases, A & B; A would have 30 producers and 42 Injectors. The dashed lane shows the area to be developed first ($P1H_A$)

SECTION 91 QUEEN A ZONE
NET FEET POROSITY GREATER THAN 8% NPOR



RESERVOIR ROCK & FLUIDS PROPERTIES							
WELLS CONSIDERED IN THE ANALYSIS		WWJD-11	WWJD-12	WWJD-13	WWJD-14	WWJD-15	WWJD-16
Oil Formation Volume Factor, BBL/STB, β_O	1.107						
Water Formation Volume Factor, BBL/STB, β_w	1.013						
Formation Thickness (h), ft	33	27	36	32	23	41	39
Porosity, (ϕ)	11.1%	11.1%	10.7%	11.5%	11.1%	11.1%	11.1%
Oil Viscosity, cp, (μ_o)	2.65						
Water Viscosity, cp, (μ_w)	0.61						
Connate water saturation, (S_{wc})	20.0%						
Initial water saturation, (S_{wi})	37.99%	36.81%	43.47%	35.82%	40.27%	37.39%	34.20%
Residual oil saturation, (S_{or})	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%	18.05%
Mobile oil saturation, (S_{or})	43.96%	45.15%	38.49%	46.14%	41.69%	44.57%	47.76%
Area, Acres	5	5	5	5	5	5	5
Pore Volume (PV) , BBL	141,981	116,251	149,415	142,743	99,028	176,529	167,917
Original Oil in Place (OOIP), STB	79,528	66,358	76,300	82,758	53,432	99,841	99,810



Conditions at WBT			
Sw	(K_{ro}/K_{rw})	f_w	dF_w/dS_w
50.0%	1.707	71.8%	2.324
OOIP =		79,586	STB
E_V =		100.00%	80.00%
Oil Recovery @ BT =		30.80%	24.73%
Oil Recovery @ 5-Y =		52.17%	41.99%

$PV_{150Acres}$	$OOIP_{Ac\text{-}ft}$
4,262,519	861

$OOIP_{150Acres}$	$OOIP_{Ac\text{-}ft}$	$OOIP_{5Acres}$	$OOIP_{Ac\text{-}ft}$
2,387,575	482	79,586	482
E_V =		100.00%	80.00%
Oil Recovery @ BT =		30.80%	24.73%
Oil Recovery @ 10-Y =		61.83%	50.24%

Type Well Production Forecast

YEAR 1 & 2

Production Forecast
Queen Reservoir Type Production Well
EV = 100.0%

Time			$Q_{i-100\%}$	$Q_{o-100\%}$	$Q_{w-100\%}$	$Q_{g-100\%}$	$W_{i-100\%}$	$N_{p-100\%}$	$W_{p-100\%}$	$G_{p-100\%}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	STB	STB	STB	MMSCF
30	1.0	0.1	120	66	47	13	3,650	2,008	1,427	0.4
61	2.0	0.2	120	64	49	13	7,300	3,949	2,928	0.8
91	3.0	0.3	120	62	52	12	10,950	5,823	4,504	1.2
122	4.0	0.3	120	59	54	12	14,600	7,629	6,155	1.5
152	5.0	0.4	120	57	57	11	18,250	9,368	7,880	1.9
183	6.0	0.5	120	55	59	11	21,900	11,039	9,680	2.2
213	7.0	0.6	120	53	62	11	25,550	12,643	11,554	2.5
243	8.0	0.7	120	51	64	10	29,200	14,179	13,504	2.8
274	9.0	0.8	120	48	67	10	32,850	15,648	15,527	3.1
304	10.0	0.8	120	46	69	9	36,500	17,050	17,626	3.4
335	11.0	0.9	120	44	71	9	40,150	18,384	19,799	3.7
365	12.0	1.0	120	42	74	8	43,800	19,651	22,046	3.9
395	13.0	1.1	120	39	76	8	47,450	20,850	24,369	4.2
426	14.0	1.2	120	37	79	7	51,100	21,982	26,766	4.4
456	15.0	1.3	120	35	81	7	54,750	23,048	29,236	4.6
487	16.0	1.3	120	32	85	6	58,400	24,015	31,816	4.8
517	17.0	1.4	120	30	87	6	62,050	24,915	34,469	5.0
548	18.0	1.5	120	27	90	5	65,700	25,737	37,209	5.1
578	19.0	1.6	120	26	92	5	69,350	26,519	39,993	5.3
608	20.0	1.7	120	24	93	5	73,000	27,264	42,819	5.4
639	21.0	1.8	120	23	94	5	76,650	27,972	45,685	5.6
669	22.0	1.8	120	22	95	4	80,300	28,646	48,589	5.7
700	23.0	1.9	120	21	97	4	83,950	29,288	51,528	5.8
730	24.0	2.0	120	20	98	4	87,600	29,898	54,503	6.0

Production Forecast
Queen Reservoir Type Production Well
EV = 80.0%

Time			$Q_{i-80\%}$	$Q_{o-80\%}$	$Q_{w-80\%}$	$Q_{g-80\%}$	$W_{i-80\%}$	$N_{p-80\%}$	$W_{p-80\%}$	$G_{p-80\%}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	STB	STB	STB	MMSCF
30	1.0	0.1	120	53	66	11	3,600	1,585	1,995	0
60	2.0	0.2	120	51	68	10	7,200	3,116	4,043	306
90	3.0	0.2	120	49	70	10	10,800	4,594	6,146	601
120	3.9	0.3	120	48	72	9	14,400	6,020	8,302	886
150	4.9	0.4	120	46	74	9	18,000	7,391	10,512	1,159
180	5.9	0.5	120	44	75	9	21,600	8,710	12,777	1,423
210	6.9	0.6	120	42	77	8	25,200	9,976	15,095	1,675
240	7.9	0.7	120	40	79	8	28,800	11,188	17,467	1,917
270	8.9	0.7	120	39	81	8	32,400	12,347	19,892	2,149
300	9.9	0.8	120	37	83	7	36,000	13,453	22,372	2,369
330	10.9	0.9	120	35	84	7	39,600	14,506	24,906	2,579
360	11.8	1.0	120	33	86	7	43,200	15,505	27,493	2,779
390	12.8	1.1	120	32	88	6	46,800	16,452	30,134	2,968
420	13.8	1.2	120	30	89	6	50,400	17,345	32,791	3,146
436	14.3	1.2	120	28	89	6	52,320	17,793	34,213	3,236
480	15.8	1.3	120	25	90	5	57,600	18,912	38,156	3,459
510	16.8	1.4	120	26	90	5	61,146	19,678	40,819	3,612
540	17.8	1.5	120	25	92	5	64,800	20,425	43,610	3,761
570	18.8	1.6	120	23	93	5	68,400	21,119	46,406	3,899
600	19.7	1.6	120	22	95	4	72,000	21,771	49,247	4,029
630	20.7	1.7	120	20	96	4	75,600	22,382	52,134	4,151
660	21.7	1.8	120	19	98	4	79,200	22,950	55,067	4,265
690	22.7	1.9	120	18	99	4	82,800	23,478	58,045	4,370
720	23.7	2.0	120	16	101	3	86,400	23,963	61,068	4,467

YEARS 1 - 10

Production Forecast Queen Reservoir Type Production Well EV = 100.0%											
Time			$Q_{i-100\%}$	$Q_{o-100\%}$	$Q_{w-100\%}$	$Q_{g-100\%}$	$W_{i-100\%}$	$N_{p-100\%}$	$W_{p-100\%}$	$G_{p-100\%}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	STB	STB	STB	MMSCF
30	1.0	0.1	120.0	66.0	46.9	13.2	3,600	1,981	1,407	0.4
60	2.0	0.2	120.0	63.8	49.4	12.7	7,200	3,895	2,888	0.8
90	3.0	0.2	120.0	61.6	51.8	12.3	10,800	5,743	4,442	1.1
120	4.0	0.3	120.0	59.4	54.3	11.9	14,400	7,524	6,070	1.5
150	5.0	0.4	120.0	57.2	56.7	11.4	18,000	9,239	7,772	1.8
180	5.9	0.5	120.0	54.9	59.2	11.0	21,600	10,888	9,547	2.2
210	6.9	0.6	120.0	52.7	61.6	10.5	25,200	12,470	11,396	2.5
240	7.9	0.7	120.0	50.5	64.1	10.1	28,800	13,985	13,319	2.8
270	8.9	0.7	120.0	48.3	66.5	9.6	32,400	15,434	15,315	3.1
300	9.9	0.8	120.0	46.1	69.0	9.2	36,000	16,816	17,384	3.4
330	10.9	0.9	120.0	43.9	71.4	8.8	39,600	18,132	19,528	3.6
360	11.9	1.0	120.0	41.6	73.9	8.3	43,200	19,382	21,744	3.9
390	12.9	1.1	120.0	39.4	76.3	7.9	46,800	20,565	24,035	4.1
420	13.9	1.2	120.0	37.2	78.8	7.4	50,400	21,681	26,399	4.3
436	14.4	1.2	120.0	35.0	81.2	7.0	52,320	22,242	27,698	4.4
480	15.8	1.3	120.0	31.8	84.8	6.3	57,600	23,640	31,430	4.7
510	16.8	1.4	120.0	29.6	87.2	5.9	61,146	24,515	34,008	4.9
540	17.8	1.5	120.0	27.4	89.7	5.5	64,800	25,348	36,740	5.1
570	18.8	1.6	120.0	26.1	91.2	5.2	68,400	26,130	39,475	5.2
600	19.8	1.6	120.0	24.8	92.5	5.0	72,000	26,874	42,251	5.4
630	20.8	1.7	120.0	23.6	93.8	4.7	75,600	27,583	45,066	5.5
660	21.8	1.8	120.0	22.5	95.1	4.5	79,200	28,257	47,919	5.6
690	22.8	1.9	120.0	21.4	96.3	4.3	82,800	28,900	50,808	5.8
720	23.8	2.0	120.0	20.4	97.4	4.1	86,400	29,512	53,730	5.9
750	24.8	2.1	120.0	19.4	98.5	3.9	90,000	30,095	56,685	6.0
780	25.7	2.1	120.0	18.5	99.5	3.7	93,600	30,650	59,671	6.1
810	26.7	2.2	120.0	17.6	100.5	3.5	97,200	31,178	62,686	6.2
840	27.7	2.3	120.0	16.8	101.4	3.3	100,800	31,681	65,729	6.3
870	28.7	2.4	120.0	16.0	102.3	3.2	104,400	32,161	68,798	6.4
900	29.7	2.5	120.0	15.2	103.2	3.0	108,000	32,617	71,893	6.5
930	30.7	2.5	120.0	14.5	104.0	2.9	111,600	33,051	75,012	6.6
960	31.7	2.6	120.0	13.8	104.7	2.8	115,200	33,465	78,154	6.7
990	32.7	2.7	120.0	13.1	105.5	2.6	118,800	33,859	81,318	6.8
1020	33.7	2.8	120.0	12.5	106.2	2.5	122,400	34,235	84,502	6.8
1050	34.7	2.9	120.0	11.9	106.8	2.4	126,000	34,592	87,707	6.9
1080	35.6	3.0	120.0	11.3	107.4	2.3	129,600	34,932	90,930	7.0
1110	36.6	3.0	120.0	10.8	108.0	2.2	133,200	35,256	94,172	7.0
1140	37.6	3.1	120.0	10.3	108.6	2.1	136,800	35,565	97,430	7.1
1170	38.6	3.2	120.0	9.8	109.2	2.0	140,400	35,858	100,705	7.2
1200	39.6	3.3	120.0	9.7	109.3	1.9	144,000	36,149	103,983	7.2
1230	40.6	3.4	120.0	9.6	109.4	1.9	147,600	36,436	107,265	7.3
1260	41.6	3.5	120.0	9.5	109.5	1.9	151,200	36,721	110,550	7.3
1290	42.6	3.5	120.0	9.4	109.6	1.9	154,800	37,002	113,839	7.4
1320	43.6	3.6	120.0	9.3	109.7	1.8	158,400	37,280	117,131	7.4
1350	44.6	3.7	120.0	9.2	109.9	1.8	162,000	37,555	120,427	7.5
1380	45.5	3.8	120.0	9.1	110.0	1.8	165,600	37,826	123,726	7.6
1410	46.5	3.9	120.0	8.9	110.1	1.8	169,200	38,095	127,029	7.6
1440	47.5	3.9	120.0	8.8	110.2	1.8	172,800	38,360	130,335	7.7
1470	48.5	4.0	120.0	8.7	110.3	1.7	176,400	38,622	133,645	7.7
1500	49.5	4.1	120.0	8.6	110.4	1.7	180,000	38,881	136,959	7.8
1530	50.5	4.2	120.0	8.5	110.6	1.7	183,600	39,137	140,275	7.8
1560	51.5	4.3	120.0	8.4	110.7	1.7	187,200	39,390	143,596	7.9
1590	52.5	4.4	120.0	8.3	110.8	1.7	190,800	39,639	146,919	7.9
1620	53.5	4.4	120.0	8.2	110.9	1.6	194,400	39,885	150,247	8.0
1650	54.5	4.5	120.0	8.1	111.0	1.6	198,000	40,129	153,578	8.0
1680	55.4	4.6	120.0	8.0	111.1	1.6	201,600	40,369	156,912	8.1
1710	56.4	4.7	120.0	7.9	111.3	1.6	205,200	40,605	160,250	8.1
1740	57.4	4.8	120.0	7.8	111.4	1.6	208,800	40,839	163,591	8.2
1770	58.4	4.8	120.0	7.7	111.5	1.5	212,400	41,070	166,936	8.2
1800	59.4	4.9	120.0	7.6	111.6	1.5	216,000	41,297	170,284	8.2
1830	60.4	5.0	120.0	7.5	111.7	1.5	219,600	41,521	173,636	8.3

Time			$Q_{i-100\%}$	$Q_{o-100\%}$	$Q_{w-100\%}$	$Q_{g-100\%}$	$W_{i-100\%}$	$N_{p-100\%}$	$W_{p-100\%}$	$G_{p-100\%}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	STB	STB	STB	MMSCF
1860	61.4	5.1	120.0	7.4	111.8	1.5	223,200	41,742	176,991	8.3
1890	62.4	5.2	120.0	7.3	112.0	1.4	226,800	41,960	180,350	8.4
1920	63.4	5.3	120.0	7.2	112.1	1.4	230,400	42,175	183,713	8.4
1950	64.4	5.3	120.0	7.1	112.2	1.4	234,000	42,386	187,079	8.5
1980	65.3	5.4	120.0	6.9	112.3	1.4	237,600	42,594	190,448	8.5
2010	66.3	5.5	120.0	6.8	112.4	1.4	241,200	42,800	193,821	8.5
2040	67.3	5.6	120.0	6.7	112.5	1.3	244,800	43,002	197,197	8.6
2070	68.3	5.7	120.0	6.6	112.7	1.3	248,400	43,201	200,577	8.6
2100	69.3	5.8	120.0	6.5	112.8	1.3	252,000	43,396	203,960	8.7
2130	70.3	5.8	120.0	6.4	112.9	1.3	255,600	43,589	207,347	8.7
2160	71.3	5.9	120.0	6.3	113.0	1.3	259,200	43,778	210,738	8.7
2190	72.3	6.0	120.0	6.2	113.1	1.2	262,800	43,964	214,132	8.8
2220	73.3	6.1	120.0	6.1	113.2	1.2	266,400	44,147	217,529	8.8
2250	74.3	6.2	120.0	6.0	113.4	1.2	270,000	44,327	220,930	8.8
2280	75.2	6.2	120.0	5.9	113.5	1.2	273,600	44,504	224,334	8.9
2310	76.2	6.3	120.0	5.8	113.6	1.2	277,200	44,677	227,742	8.9
2340	77.2	6.4	120.0	5.7	113.7	1.1	280,800	44,848	231,154	9.0
2370	78.2	6.5	120.0	5.6	113.8	1.1	284,400	45,015	234,568	9.0
2400	79.2	6.6	120.0	5.5	113.9	1.1	288,000	45,179	237,987	9.0
2430	80.2	6.7	120.0	5.4	114.1	1.1	291,600	45,340	241,409	9.0
2460	81.2	6.7	120.0	5.3	114.2	1.0	295,200	45,498	244,834	9.1
2490	82.2	6.8	120.0	5.2	114.3	1.0	298,800	45,652	248,263	9.1
2520	83.2	6.9	120.0	5.0	114.4	1.0	302,400	45,803	251,696	9.1
2550	84.2	7.0	120.0	4.9	114.5	1.0	306,000	45,952	255,131	9.2
2580	85.1	7.1	120.0	4.8	114.6	1.0	309,600	46,097	258,571	9.2
2610	86.1	7.2	120.0	4.7	114.8	0.9	313,200	46,239	262,014	9.2
2640	87.1	7.2	120.0	4.6	114.9	0.9	316,800	46,377	265,460	9.3
2670	88.1	7.3	120.0	4.5	115.0	0.9	320,400	46,513	268,910	9.3
2700	89.1	7.4	120.0	4.4	115.1	0.9	324,000	46,645	272,364	9.3
2730	90.1	7.5	120.0	4.3	115.2	0.9	327,600	46,775	275,821	9.3
2760	91.1	7.6	120.0	4.2	115.3	0.8	331,200	46,901	279,281	9.4
2790	92.1	7.6	120.0	4.1	115.5	0.8	334,800	47,023	282,745	9.4
2820	93.1	7.7	120.0	4.0	115.6	0.8	338,400	47,143	286,212	9.4
2850	94.1	7.8	120.0	3.9	115.7	0.8	342,000	47,260	289,683	9.4
2880	95.0	7.9	120.0	3.8	115.8	0.8	345,600	47,373	293,158	9.5
2910	96.0	8.0	120.0	3.7	115.9	0.7	349,200	47,483	296,636	9.5
2940	97.0	8.1	120.0	3.6	116.0	0.7	352,800	47,590	300,117	9.5
2970	98.0	8.1	120.0	3.5	116.2	0.7	356,400	47,694	303,602	9.5
3000	99.0	8.2	120.0	3.4	116.3	0.7	360,000	47,795	307,091	9.5
3030	100.0	8.3	120.0	3.3	116.4	0.6	363,600	47,893	310,583	9.6
3060	101.0	8.4	120.0	3.1	116.5	0.6	367,200	47,987	314,078	9.6
3090	102.0	8.5	120.0	3.0	116.6	0.6	370,800	48,078	317,577	9.6
3120	103.0	8.5	120.0	2.9	116.7	0.6	374,400	48,166	321,080	9.6
3150	104.0	8.6	120.0	2.8	116.9	0.6	378,000	48,251	324,586	9.6
3180	105.0	8.7	120.0	2.7	117.0	0.5	381,600	48,333	328,095	9.6
3210	105.9	8.8	120.0	2.6	117.1	0.5	385,200	48,412	331,608	9.7
3240	106.9	8.9	120.0	2.5	117.2	0.5	388,800	48,487	335,125	9.7
3270	107.9	9.0	120.0	2.4	117.3	0.5	392,400	48,559	338,645	9.7
3300	108.9	9.0	120.0	2.3	117.5	0.5	396,000	48,628	342,168	9.7
3330	109.9	9.1	120.0	2.2	117.6	0.4	399,600	48,694	345,695	9.7
3360	110.9	9.2	120.0	2.1	117.7	0.4	403,200	48,757	349,226	9.7
3390	111.9	9.3	120.0	2.0	117.8	0.4	406,800	48,817	352,760	9.7
3420	112.9	9.4	120.0	1.9	117.9	0.4	410,400	48,873	356,297	9.8
3450	113.9	9.5	120.0	1.8	118.0	0.4	414,000	48,926	359,838	9.8
3480	114.9	9.5	120.0	1.7	118.2	0.3	417,600	48,977	363,383	9.8
3510	115.8	9.6	120.0	1.6	118.3	0.3	421,200	49,023	366,931	9.8
3540	116.8	9.7	120.0	1.5	118.4	0.3	424,800	49,067	370,483	9.8
3570	117.8	9.8	120.0	1.4	118.5	0.3	428,400	49,108	374,038	9.8
3600	118.8	9.9	120.0	1.2	118.6	0.2	432,000	49,145	377,596	9.8
3630	119.8	9.9	120.0	1.1	118.7	0.2	435,600	49,180	381,158	9.8
3660	120.8	10.0	120.0	1.0	118.9	0.2	439,200	49,211	384,724	9.8

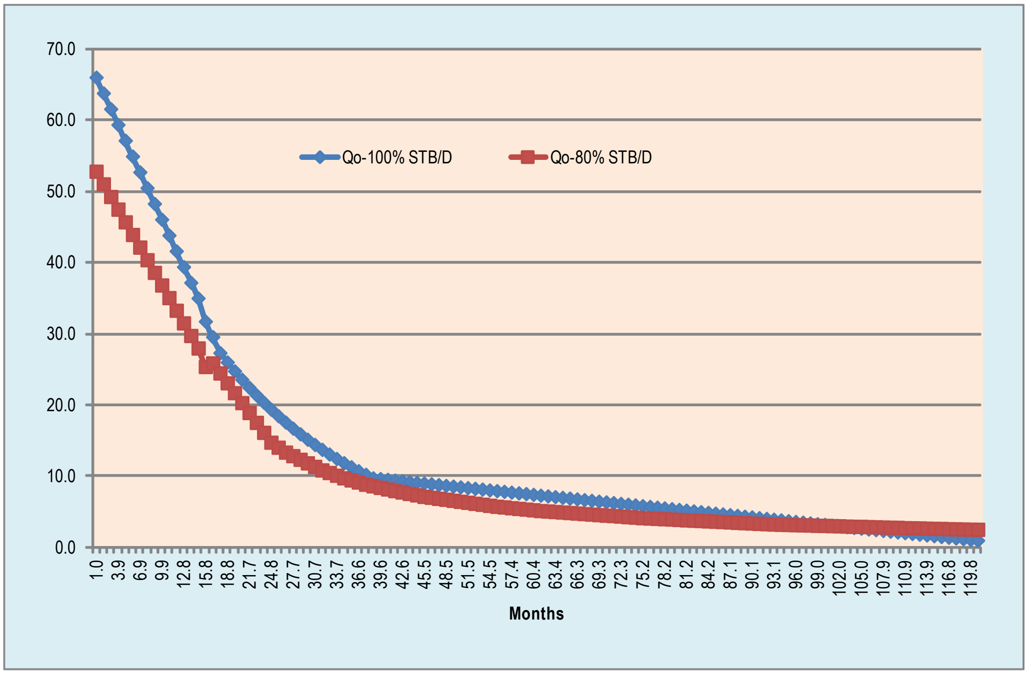
Production Forecast

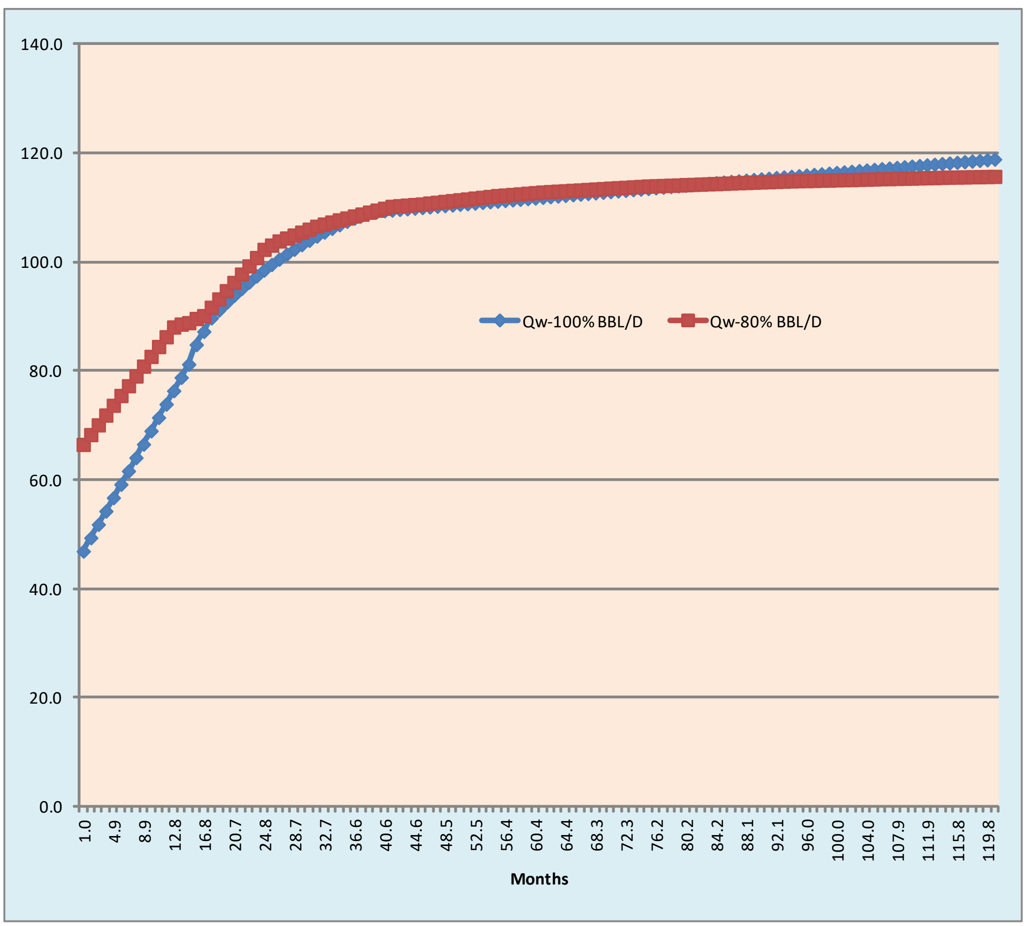
Queen Reservoir Type Production Well

EV = 80.0%

Time			$Q_{i-80\%}$	$Q_{o-80\%}$	$Q_{w-80\%}$	$Q_{g-80\%}$	$W_{i-80\%}$	$N_{p-80\%}$	$W_{p-80\%}$	$G_{p-80\%}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	STB	STB	STB	MMSCF
30	1.0	0.1	120.0	52.8	66.5	10.5	3,600	1,585	1,995	0.3
60	2.0	0.2	120.0	51.0	68.3	10.2	7,200	3,116	4,043	306.0
90	3.0	0.2	120.0	49.3	70.1	9.8	10,800	4,594	6,146	601.1
120	3.9	0.3	120.0	47.5	71.9	9.5	14,400	6,020	8,302	885.5
150	4.9	0.4	120.0	45.7	73.7	9.1	18,000	7,391	10,512	1159.3
180	5.9	0.5	120.0	44.0	75.5	8.8	21,600	8,710	12,777	1422.6
210	6.9	0.6	120.0	42.2	77.3	8.4	25,200	9,976	15,095	1675.2
240	7.9	0.7	120.0	40.4	79.1	8.1	28,800	11,188	17,467	1917.1
270	8.9	0.7	120.0	38.6	80.9	7.7	32,400	12,347	19,892	2148.5
300	9.9	0.8	120.0	36.9	82.7	7.4	36,000	13,453	22,372	2369.2
330	10.9	0.9	120.0	35.1	84.5	7.0	39,600	14,506	24,906	2579.4
360	11.8	1.0	120.0	33.3	86.2	6.7	43,200	15,505	27,493	2778.9
390	12.8	1.1	120.0	31.5	88.0	6.3	46,800	16,452	30,134	2967.8
420	13.8	1.2	120.0	29.8	88.6	5.9	50,400	17,345	32,791	3146.1
436	14.3	1.2	120.0	28.0	88.8	5.6	52,320	17,793	34,213	3235.6
480	15.8	1.3	120.0	25.4	89.6	5.1	57,600	18,912	38,156	3458.9
510	16.8	1.4	120.0	25.9	90.1	5.2	61,146	19,678	40,819	3611.8
540	17.8	1.5	120.0	24.5	91.7	4.9	64,800	20,425	43,610	3760.8
570	18.8	1.6	120.0	23.1	93.2	4.6	68,400	21,119	46,406	3899.3
600	19.7	1.6	120.0	21.7	94.7	4.3	72,000	21,771	49,247	4029.5
630	20.7	1.7	120.0	20.4	96.2	4.1	75,600	22,382	52,134	4151.4
660	21.7	1.8	120.0	19.0	97.7	3.8	79,200	22,950	55,067	4264.9
690	22.7	1.9	120.0	17.6	99.3	3.5	82,800	23,478	58,045	4370.2
720	23.7	2.0	120.0	16.2	100.8	3.2	86,400	23,963	61,068	4467.1
750	24.8	2.1	120.0	14.8	102.3	3.0	90,000	24,407	64,137	4,556
780	25.7	2.1	120.0	14.1	103.1	2.8	93,600	24,830	67,229	4,640
810	26.7	2.2	120.0	13.4	103.8	2.7	97,200	25,232	70,344	4,720
840	27.7	2.3	120.0	12.9	104.4	2.6	100,800	25,619	73,476	4,798
870	28.7	2.4	120.0	12.4	104.9	2.5	104,400	25,991	76,623	4,872
900	29.7	2.5	120.0	11.9	105.5	2.4	108,000	26,348	79,787	4,943
930	30.7	2.5	120.0	11.4	106.0	2.3	111,600	26,690	82,967	5,011
960	31.7	2.6	120.0	10.9	106.5	2.2	115,200	27,017	86,163	5,077
990	32.7	2.7	120.0	10.5	106.9	2.1	118,800	27,333	89,371	5,140
1020	33.7	2.8	120.0	10.2	107.3	2.0	122,400	27,638	92,590	5,201
1050	34.7	2.9	120.0	9.8	107.7	2.0	126,000	27,932	95,822	5,259
1080	35.6	3.0	120.0	9.5	108.1	1.9	129,600	28,217	99,064	5,316
1110	36.6	3.0	120.0	9.2	108.4	1.8	133,200	28,493	102,316	5,371
1140	37.6	3.1	120.0	8.9	108.8	1.8	136,800	28,760	105,580	5,425
1170	38.6	3.2	120.0	8.7	109.1	1.7	140,400	29,021	108,854	5,477
1200	39.6	3.3	120.0	8.5	109.5	1.7	144,000	29,274	112,138	5,527
1230	40.6	3.4	120.0	8.2	109.8	1.6	147,600	29,521	115,434	5,576
1260	41.6	3.5	120.0	8.0	110.2	1.6	151,200	29,761	118,739	5,624
1290	42.6	3.5	120.0	7.8	110.3	1.6	154,800	29,995	122,048	5,671
1320	43.6	3.6	120.0	7.6	110.4	1.5	158,400	30,223	125,361	5,717
1350	44.6	3.7	120.0	7.4	110.5	1.5	162,000	30,445	128,677	5,761
1380	45.5	3.8	120.0	7.2	110.6	1.4	165,600	30,661	131,996	5,804
1410	46.5	3.9	120.0	7.1	110.8	1.4	169,200	30,873	135,319	5,846
1440	47.5	3.9	120.0	6.9	110.9	1.4	172,800	31,080	138,647	5,888
1470	48.5	4.0	120.0	6.8	111.1	1.4	176,400	31,284	141,980	5,928
1500	49.5	4.1	120.0	6.6	111.2	1.3	180,000	31,483	145,317	5,968
1530	50.5	4.2	120.0	6.5	111.4	1.3	183,600	31,678	148,659	6,007
1560	51.5	4.3	120.0	6.4	111.5	1.3	187,200	31,869	152,005	6,045
1590	52.5	4.4	120.0	6.2	111.7	1.2	190,800	32,055	155,356	6,082
1620	53.5	4.4	120.0	6.1	111.8	1.2	194,400	32,238	158,712	6,119
1650	54.5	4.5	120.0	5.9	112.0	1.2	198,000	32,416	162,072	6,154
1680	55.4	4.6	120.0	5.8	112.2	1.2	201,600	32,590	165,437	6,189
1710	56.4	4.7	120.0	5.7	112.3	1.1	205,200	32,761	168,804	6,223
1740	57.4	4.8	120.0	5.6	112.4	1.1	208,800	32,929	172,176	6,257
1770	58.4	4.8	120.0	5.5	112.5	1.1	212,400	33,094	175,550	6,290
1800	59.4	4.9	120.0	5.4	112.6	1.1	216,000	33,256	178,928	6,322
1830	60.4	5.0	120.0	5.3	112.7	1.1	219,600	33,415	182,308	6,354

Time			$Q_{i-80\%}$	$Q_{o-80\%}$	$Q_{w-80\%}$	$Q_{g-80\%}$	$W_{i-80\%}$	$N_{p-80\%}$	$W_{p-80\%}$	$G_{p-80\%}$
Days	Months	Years	BBL/D	STB/D	BBL/D	MSCF/D	STB	STB	STB	MMSCF
1860	61.4	5.1	120.0	5.2	112.8	1.0	223,200	33,571	185,693	6,385
1890	62.4	5.2	120.0	5.1	112.9	1.0	226,800	33,725	189,079	6,415
1920	63.4	5.3	120.0	5.1	113.0	1.0	230,400	33,876	192,468	6,446
1950	64.4	5.3	120.0	5.0	113.0	1.0	234,000	34,026	195,859	6,476
1980	65.3	5.4	120.0	4.9	113.1	1.0	237,600	34,173	199,253	6,505
2010	66.3	5.5	120.0	4.8	113.2	1.0	241,200	34,319	202,649	6,534
2040	67.3	5.6	120.0	4.8	113.3	1.0	244,800	34,462	206,048	6,563
2070	68.3	5.7	120.0	4.7	113.4	0.9	248,400	34,603	209,448	6,591
2100	69.3	5.8	120.0	4.6	113.4	0.9	252,000	34,742	212,852	6,618
2130	70.3	5.8	120.0	4.6	113.5	0.9	255,600	34,878	216,257	6,646
2160	71.3	5.9	120.0	4.5	113.6	0.9	259,200	35,013	219,665	6,673
2190	72.3	6.0	120.0	4.4	113.7	0.9	262,800	35,145	223,076	6,699
2220	73.3	6.1	120.0	4.3	113.8	0.9	266,400	35,276	226,489	6,725
2250	74.3	6.2	120.0	4.3	113.8	0.9	270,000	35,404	229,904	6,751
2280	75.2	6.2	120.0	4.2	113.9	0.8	273,600	35,530	233,321	6,776
2310	76.2	6.3	120.0	4.2	114.0	0.8	277,200	35,654	236,740	6,801
2340	77.2	6.4	120.0	4.1	114.0	0.8	280,800	35,777	240,161	6,825
2370	78.2	6.5	120.0	4.1	114.1	0.8	284,400	35,899	243,583	6,849
2400	79.2	6.6	120.0	4.0	114.1	0.8	288,000	36,019	247,007	6,873
2430	80.2	6.7	120.0	4.0	114.2	0.8	291,600	36,137	250,432	6,897
2460	81.2	6.7	120.0	3.9	114.2	0.8	295,200	36,254	253,858	6,920
2490	82.2	6.8	120.0	3.9	114.3	0.8	298,800	36,370	257,287	6,943
2520	83.2	6.9	120.0	3.8	114.3	0.8	302,400	36,484	260,716	6,966
2550	84.2	7.0	120.0	3.8	114.4	0.7	306,000	36,596	264,147	6,989
2580	85.1	7.1	120.0	3.7	114.4	0.7	309,600	36,707	267,580	7,011
2610	86.1	7.2	120.0	3.7	114.5	0.7	313,200	36,817	271,014	7,033
2640	87.1	7.2	120.0	3.6	114.5	0.7	316,800	36,925	274,450	7,054
2670	88.1	7.3	120.0	3.6	114.6	0.7	320,400	37,031	277,887	7,075
2700	89.1	7.4	120.0	3.5	114.6	0.7	324,000	37,136	281,326	7,096
2730	90.1	7.5	120.0	3.5	114.7	0.7	327,600	37,240	284,766	7,117
2760	91.1	7.6	120.0	3.4	114.7	0.7	331,200	37,342	288,207	7,137
2790	92.1	7.6	120.0	3.4	114.8	0.7	334,800	37,442	291,651	7,158
2820	93.1	7.7	120.0	3.3	114.8	0.7	338,400	37,541	295,095	7,177
2850	94.1	7.8	120.0	3.3	114.9	0.7	342,000	37,640	298,541	7,197
2880	95.0	7.9	120.0	3.2	114.9	0.6	345,600	37,737	301,988	7,216
2910	96.0	8.0	120.0	3.2	114.9	0.6	349,200	37,834	305,435	7,236
2940	97.0	8.1	120.0	3.2	115.0	0.6	352,800	37,929	308,884	7,255
2970	98.0	8.1	120.0	3.2	115.0	0.6	356,400	38,024	312,333	7,274
3000	99.0	8.2	120.0	3.1	115.0	0.6	360,000	38,118	315,784	7,292
3030	100.0	8.3	120.0	3.1	115.1	0.6	363,600	38,212	319,236	7,311
3060	101.0	8.4	120.0	3.1	115.1	0.6	367,200	38,304	322,688	7,329
3090	102.0	8.5	120.0	3.1	115.1	0.6	370,800	38,396	326,142	7,348
3120	103.0	8.5	120.0	3.0	115.2	0.6	374,400	38,486	329,596	7,366
3150	104.0	8.6	120.0	3.0	115.2	0.6	378,000	38,576	333,052	7,384
3180	105.0	8.7	120.0	3.0	115.2	0.6	381,600	38,666	336,509	7,402
3210	105.9	8.8	120.0	2.9	115.3	0.6	385,200	38,754	339,966	7,419
3240	106.9	8.9	120.0	2.9	115.3	0.6	388,800	38,842	343,425	7,437
3270	107.9	9.0	120.0	2.9	115.3	0.6	392,400	38,928	346,884	7,454
3300	108.9	9.0	120.0	2.9	115.4	0.6	396,000	39,014	350,345	7,471
3330	109.9	9.1	120.0	2.8	115.4	0.6	399,600	39,099	353,806	7,488
3360	110.9	9.2	120.0	2.8	115.4	0.6	403,200	39,184	357,269	7,505
3390	111.9	9.3	120.0	2.8	115.5	0.6	406,800	39,267	360,732	7,522
3420	112.9	9.4	120.0	2.8	115.5	0.5	410,400	39,350	364,197	7,538
3450	113.9	9.5	120.0	2.7	115.5	0.5	414,000	39,431	367,662	7,555
3480	114.9	9.5	120.0	2.7	115.5	0.5	417,600	39,512	371,129	7,571
3510	115.8	9.6	120.0	2.7	115.6	0.5	421,200	39,593	374,596	7,587
3540	116.8	9.7	120.0	2.7	115.6	0.5	424,800	39,672	378,064	7,603
3570	117.8	9.8	120.0	2.6	115.6	0.5	428,400	39,751	381,532	7,618
3600	118.8	9.9	120.0	2.6	115.6	0.5	432,000	39,830	385,002	7,634
3630	119.8	9.9	120.0	2.6	115.7	0.5	435,600	39,907	388,472	7,650
3660	120.8	10.0	120.0	2.6	115.7	0.5	439,200	39,984	391,942	7,665


Qo-100% STB/D
Qo-80% STB/D
Months


Qw-100% BBL/D
Qw-80% BBL/D
Months

Drilling Schedule

Number of Rigs	2	Units
Drilling & Completion Time,	15.2	Days/Well
No. of Wells Drilled/Rig,	2	Units/Month
Total Wells Drilled,	4	Month
Drilling & Completion Cost	$190,000	xwell
Existing Well Tally	20	

E_V = 80%

DRILLING SCHEDULE

		PRODUCERS															
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	STB/D
YEARS	DAYS																
0.1	30	106															106
0.2	60	102	106														208
0.3	90	99	102	106													306
0.3	120	95	99	102	106												401
0.4	150	91	95	99	102	106											493
0.5	180	88	91	95	99	102	106										581
0.6	210	84	88	91	95	99	102	106									665
0.7	240	81	84	88	91	95	99	102	106								746
0.8	270	77	81	84	88	91	95	99	102	106							823
0.8	300	74	77	81	84	88	91	95	99	102	106						897
0.9	330	70	74	77	81	84	88	91	95	99	102	106					967
1.0	360	67	70	74	77	81	84	88	91	95	99	102	106				1,034
1.1	390	63	67	70	74	77	81	84	88	91	95	99	102	106			1,097
1.2	420	60	63	67	70	74	77	81	84	88	91	95	99	102	106		1,156
1.2	436	56	60	63	67	70	74	77	81	84	88	91	95	99	102	106	1,212
1.3	480	51	56	60	63	67	70	74	77	81	84	88	91	95	99	102	1,158
1.4	510	52	51	56	60	63	67	70	74	77	81	84	88	91	95	99	1,107
1.5	540	49	52	51	56	60	63	67	70	74	77	81	84	88	91	95	1,058
1.6	570	46	49	52	51	56	60	63	67	70	74	77	81	84	88	91	1,009
1.7	600	43	46	49	52	51	56	60	63	67	70	74	77	81	84	88	961
1.8	630	41	43	46	49	52	51	56	60	63	67	70	74	77	81	84	914
1.8	660	38	41	43	46	49	52	51	56	60	63	67	70	74	77	81	867
1.9	690	35	38	41	43	46	49	52	51	56	60	63	67	70	74	77	822
2.0	720	32	35	38	41	43	46	49	52	51	56	60	63	67	70	74	777
2.1	750	30	32	35	38	41	43	46	49	52	51	56	60	63	67	70	733
2.2	780	28	30	32	35	38	41	43	46	49	52	51	56	60	63	67	691
2.3	810	27	28	30	32	35	38	41	43	46	49	52	51	56	60	63	651
2.3	840	26	27	28	30	32	35	38	41	43	46	49	52	51	56	60	614
2.4	870	25	26	27	28	30	32	35	38	41	43	46	49	52	51	56	579
2.5	900	24	25	26	27	28	30	32	35	38	41	43	46	49	52	51	547
2.6	930	23	24	25	26	27	28	30	32	35	38	41	43	46	49	52	519
2.7	960	22	23	24	25	26	27	28	30	32	35	38	41	43	46	49	489
2.8	990	21	22	23	24	25	26	27	28	30	32	35	38	41	43	46	461
2.8	1,020	20	21	22	23	24	25	26	27	28	30	32	35	38	41	43	435
2.9	1,050	20	20	21	22	23	24	25	26	27	28	30	32	35	38	41	411
3.0	1,080	19	20	20	21	22	23	24	25	26	27	28	30	32	35	38	389
3.1	1,110	18	19	20	20	21	22	23	24	25	26	27	28	30	32	35	370
3.2	1,140	18	18	19	20	20	21	22	23	24	25	26	27	28	30	32	352
3.3	1,170	17	18	18	19	20	20	21	22	23	24	25	26	27	28	30	337
3.3	1,200	17	17	18	18	19	20	20	21	22	23	24	25	26	27	28	324
3.4	1,230	16	17	17	18	18	19	20	20	21	22	23	24	25	26	27	313
3.5	1,260	16	16	17	17	18	18	19	20	20	21	22	23	24	25	26	302
3.6	1,290	16	16	16	17	17	18	18	19	20	20	21	22	23	24	25	292
3.7	1,320	15	16	16	16	17	17	18	18	19	20	20	21	22	23	24	282
3.8	1,350	15	15	16	16	16	17	17	18	18	19	20	20	21	22	23	273
3.8	1,380	14	15	15	16	16	16	17	17	18	18	19	20	20	21	22	265
3.9	1,410	14	14	15	15	16	16	16	17	17	18	18	19	20	20	21	257
4.0	1,440	14	14	14	15	15	16	16	16	17	17	18	18	19	20	20	250

DRILLING SCHEDULE

		PRODUCERS															
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	STB/D
4.1	1,470	14	14	14	14	15	15	16	16	16	17	17	18	18	19	20	243
4.2	1,500	13	14	14	14	14	15	15	16	16	16	17	17	18	18	19	237
4.3	1,530	13	13	14	14	14	14	15	15	16	16	16	17	17	18	18	231
4.3	1,560	13	13	13	14	14	14	14	15	15	16	16	16	17	17	18	225
4.4	1,590	12	13	13	13	14	14	14	14	15	15	16	16	16	17	17	220
4.5	1,620	12	12	13	13	13	14	14	14	14	15	15	16	16	16	17	214
4.6	1,650	12	12	12	13	13	13	14	14	14	14	15	15	16	16	16	209
4.7	1,680	12	12	12	12	13	13	13	14	14	14	14	15	15	16	16	205
4.8	1,710	11	12	12	12	12	13	13	13	14	14	14	14	15	15	16	200
4.8	1,740	11	11	12	12	12	12	13	13	13	14	14	14	14	15	15	196
4.9	1,770	11	11	11	12	12	12	12	13	13	13	14	14	14	14	15	191
5.0	1,800	11	11	11	11	12	12	12	12	13	13	13	14	14	14	14	187
5.1	1,830	11	11	11	11	11	12	12	12	12	13	13	13	14	14	14	184
5.2	1,860	10	11	11	11	11	11	12	12	12	12	13	13	13	14	14	180
5.3	1,890	10	10	11	11	11	11	11	12	12	12	12	13	13	13	14	176
5.3	1,920	10	10	10	11	11	11	11	11	12	12	12	12	13	13	13	173
5.4	1,950	10	10	10	10	11	11	11	11	11	12	12	12	12	13	13	170
5.5	1,980	10	10	10	10	10	11	11	11	11	11	12	12	12	12	13	166
5.6	2,010	10	10	10	10	10	10	11	11	11	11	11	12	12	12	12	163
5.7	2,040	10	10	10	10	10	10	10	11	11	11	11	11	12	12	12	160
5.8	2,070	9	10	10	10	10	10	10	10	11	11	11	11	11	12	12	158
5.8	2,100	9	9	10	10	10	10	10	10	10	11	11	11	11	11	12	155
5.9	2,130	9	9	9	10	10	10	10	10	10	10	11	11	11	11	11	153
6.0	2,160	9	9	9	9	10	10	10	10	10	10	10	11	11	11	11	150
6.1	2,190	9	9	9	9	9	10	10	10	10	10	10	10	11	11	11	148
6.2	2,220	9	9	9	9	9	9	10	10	10	10	10	10	10	11	11	145
6.3	2,250	9	9	9	9	9	9	9	10	10	10	10	10	10	10	11	143
6.3	2,280	8	9	9	9	9	9	9	9	10	10	10	10	10	10	10	141
6.4	2,310	8	8	9	9	9	9	9	9	9	10	10	10	10	10	10	139
6.5	2,340	8	8	8	9	9	9	9	9	9	9	10	10	10	10	10	137
6.6	2,370	8	8	8	8	9	9	9	9	9	9	9	10	10	10	10	135
6.7	2,400	8	8	8	8	8	9	9	9	9	9	9	9	10	10	10	133
6.8	2,430	8	8	8	8	8	8	9	9	9	9	9	9	9	10	10	131
6.8	2,460	8	8	8	8	8	8	8	9	9	9	9	9	9	9	10	129
6.9	2,490	8	8	8	8	8	8	8	8	9	9	9	9	9	9	9	127
7.0	2,520	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9	125
7.1	2,550	8	8	8	8	8	8	8	8	8	8	9	9	9	9	9	124
7.2	2,580	7	8	8	8	8	8	8	8	8	8	8	9	9	9	9	122
7.3	2,610	7	7	8	8	8	8	8	8	8	8	8	8	9	9	9	120
7.3	2,640	7	7	7	8	8	8	8	8	8	8	8	8	8	9	9	119
7.4	2,670	7	7	7	7	8	8	8	8	8	8	8	8	8	8	9	117
7.5	2,700	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8	116
7.6	2,730	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	114
7.7	2,760	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	113
7.8	2,790	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	111
7.8	2,820	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	110
7.9	2,850	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	108
8.0	2,880	6	7	7	7	7	7	7	7	7	7	7	8	8	8	8	107
8.1	2,910	6	6	7	7	7	7	7	7	7	7	7	7	8	8	8	105
8.2	2,940	6	6	6	7	7	7	7	7	7	7	7	7	7	8	8	104
8.3	2,970	6	6	6	6	7	7	7	7	7	7	7	7	7	7	8	103
8.3	3,000	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	101
8.4	3,030	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	100
8.5	3,060	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	99
8.6	3,090	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	98
8.7	3,120	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	97
8.8	3,150	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7	96
8.8	3,180	6	6	6	6	6	6	6	6	6	6	6	7	7	7	7	95
8.9	3,210	6	6	6	6	6	6	6	6	6	6	6	6	7	7	7	94
9.0	3,240	6	6	6	6	6	6	6	6	6	6	6	6	6	7	7	93
9.1	3,270	6	6	6	6	6	6	6	6	6	6	6	6	6	6	7	92
9.2	3,300	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	92
9.3	3,330	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	91
9.3	3,360	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	90
9.4	3,390	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	89
9.5	3,420	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	88
9.6	3,450	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	88
9.7	3,480	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	87
9.8	3,510	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6	86
9.8	3,540	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	85
9.9	3,570	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	84
10.0	3,600	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	84
10.1	3,630	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	83

DRILLING SCHEDULE

		INJECTORS																		
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	34	38	40	STB/D
YEARS	DAYS																			
0.1	30	240																		240
0.2	60	240	240																	480
0.3	90	240	240	240																720
0.3	120	240	240	240	240															960
0.4	150	240	240	240	240	240														1,200
0.5	180	240	240	240	240	240	240													1,440
0.6	210	240	240	240	240	240	240	240												1,680
0.7	240	240	240	240	240	240	240	240	240											1,920
0.8	270	240	240	240	240	240	240	240	240	240										2,160
0.8	300	240	240	240	240	240	240	240	240	240	240									2,400
0.9	330	240	240	240	240	240	240	240	240	240	240	240								2,640
1.0	360	240	240	240	240	240	240	240	240	240	240	240	240							2,880
1.1	390	240	240	240	240	240	240	240	240	240	240	240	240	240						3,120
1.2	420	240	240	240	240	240	240	240	240	240	240	240	240	240	240					3,360
1.2	436	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240				3,600
1.3	480	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480			4,080
1.4	510	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480		4,560
1.5	540	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
1.6	570	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
1.7	600	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
1.8	630	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
1.8	660	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
1.9	690	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.0	720	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.1	750	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.2	780	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.3	810	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.3	840	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.4	870	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.5	900	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.6	930	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.7	960	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.8	990	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.8	1,020	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
2.9	1,050	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.0	1,080	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.1	1,110	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.2	1,140	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.3	1,170	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.3	1,200	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.4	1,230	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.5	1,260	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.6	1,290	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.7	1,320	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.8	1,350	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.8	1,380	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
3.9	1,410	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.0	1,440	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.1	1,470	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.2	1,500	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.3	1,530	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.3	1,560	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.4	1,590	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.5	1,620	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.6	1,650	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.7	1,680	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.8	1,710	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.8	1,740	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
4.9	1,770	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.0	1,800	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.1	1,830	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.2	1,860	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.3	1,890	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.3	1,920	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.4	1,950	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.5	1,980	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.6	2,010	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.7	2,040	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.8	2,070	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.8	2,100	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
5.9	2,130	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.0	2,160	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040

Note: The Number of Wells (Injectors & producers) are not a function of Sweep Efficiency, only water production is.

DRILLING SCHEDULE

		INJECTORS																	
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	34	38	40	STB/D
6.0	2,160	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.1	2,190	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.2	2,220	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.3	2,250	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.3	2,280	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.4	2,310	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.5	2,340	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.6	2,370	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.7	2,400	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.8	2,430	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.8	2,460	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
6.9	2,490	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.0	2,520	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.1	2,550	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.2	2,580	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.3	2,610	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.3	2,640	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.4	2,670	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.5	2,700	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.6	2,730	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.7	2,760	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.8	2,790	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.8	2,820	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
7.9	2,850	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.0	2,880	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.1	2,910	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.2	2,940	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.3	2,970	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.3	3,000	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.4	3,030	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.5	3,060	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.6	3,090	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.7	3,120	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.8	3,150	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.8	3,180	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
8.9	3,210	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.0	3,240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.1	3,270	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.2	3,300	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.3	3,330	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.3	3,360	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.4	3,390	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.5	3,420	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.6	3,450	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.7	3,480	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.8	3,510	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.8	3,540	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
9.9	3,570	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
10.0	3,600	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040
10.1	3,630	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	480	480	480	5,040

		WATER PRODUCTION															
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	STB/D
YEARS	DAYS																
0.1	30	133															133
0.2	60	99	133														232
0.3	90	104	99	133													335
0.3	120	109	104	99	133												444
0.4	150	113	109	104	99	133											557
0.5	180	118	113	109	104	99	133										676
0.6	210	123	118	113	109	104	99	133									799
0.7	240	158	123	118	113	109	104	99	133								957
0.8	270	162	158	123	118	113	109	104	99	133							1,119
0.8	300	138	162	158	123	118	113	109	104	99	133						1,257
0.9	330	143	138	162	158	123	118	113	109	104	99	133					1,400
1.0	360	148	143	138	162	158	123	118	113	109	104	99	133				1,547

		WATER PRODUCTION															
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	STB/D
YEARS	DAYS																
1.1	390	153	148	143	138	162	158	123	118	113	109	104	99	133			1,700
1.2	420	158	153	148	143	138	162	158	123	118	113	109	104	99	133		1,858
1.2	436	162	158	153	148	143	138	162	158	123	118	113	109	104	99	133	2,020
1.3	480	170	162	158	153	148	143	138	162	158	123	118	113	109	104	99	2,057
1.4	510	180	170	162	158	153	148	143	138	162	158	123	118	113	109	104	2,138
1.5	540	183	180	170	162	158	153	148	143	138	162	158	123	118	113	109	2,218
1.6	570	186	183	180	170	162	158	153	148	143	138	162	158	123	118	113	2,296
1.6	600	189	186	183	180	170	162	158	153	148	143	138	162	158	123	118	2,372
1.7	630	192	189	186	183	180	170	162	158	153	148	143	138	162	158	123	2,446
1.8	660	195	192	189	186	183	180	170	162	158	153	148	143	138	162	158	2,518
1.9	690	199	195	192	189	186	183	180	170	162	158	153	148	143	138	162	2,559
2.0	720	202	199	195	192	189	186	183	180	170	162	158	153	148	143	138	2,598
2.1	750	205	202	199	195	192	189	186	183	180	170	162	158	153	148	143	2,665
2.1	780	206	205	202	199	195	192	189	186	183	180	170	162	158	153	148	2,728
2.2	810	208	206	205	202	199	195	192	189	186	183	180	170	162	158	153	2,788
2.3	840	209	208	206	205	202	199	195	192	189	186	183	180	170	162	158	2,844
2.4	870	210	209	208	206	205	202	199	195	192	189	186	183	180	170	162	2,897
2.5	900	211	210	209	208	206	205	202	199	195	192	189	186	183	180	170	2,945
2.5	930	212	211	210	209	208	206	205	202	199	195	192	189	186	183	180	2,987
2.6	960	213	212	211	210	209	208	206	205	202	199	195	192	189	186	183	3,020
2.7	990	214	213	212	211	210	209	208	206	205	202	199	195	192	189	186	3,051
2.8	1,020	215	214	213	212	211	210	209	208	206	205	202	199	195	192	189	3,079
2.9	1,050	215	215	214	213	212	211	210	209	208	206	205	202	199	195	192	3,105
3.0	1,080	216	215	215	214	213	212	211	210	209	208	206	205	202	199	195	3,129
3.0	1,110	217	216	215	215	214	213	212	211	210	209	208	206	205	202	199	3,150
3.1	1,140	218	217	216	215	215	214	213	212	211	210	209	208	206	205	202	3,169
3.2	1,170	218	218	217	216	215	215	214	213	212	211	210	209	208	206	205	3,186
3.3	1,200	219	218	218	217	216	215	215	214	213	212	211	210	209	208	206	3,200
3.4	1,230	220	219	218	218	217	216	215	215	214	213	212	211	210	209	208	3,214
3.5	1,260	220	220	219	218	218	217	216	215	215	214	213	212	211	210	209	3,226
3.5	1,290	221	220	220	219	218	218	217	216	215	215	214	213	212	211	210	3,238
3.6	1,320	221	221	220	220	219	218	218	217	216	215	215	214	213	212	211	3,249
3.7	1,350	221	221	221	220	220	219	218	218	217	216	215	215	214	213	212	3,259
3.8	1,380	221	221	221	221	220	220	219	218	218	217	216	215	215	214	213	3,269
3.9	1,410	222	221	221	221	221	220	220	219	218	218	217	216	215	215	214	3,277
3.9	1,440	222	222	221	221	221	221	220	220	219	218	218	217	216	215	215	3,285
4.0	1,470	222	222	222	221	221	221	221	220	220	219	218	218	217	216	215	3,293
4.1	1,500	222	222	222	222	221	221	221	221	220	220	219	218	218	217	216	3,300
4.2	1,530	223	222	222	222	222	221	221	221	221	220	220	219	218	218	217	3,306
4.3	1,560	223	223	222	222	222	222	221	221	221	221	220	220	219	218	218	3,313
4.4	1,590	223	223	223	222	222	222	222	221	221	221	221	220	220	219	218	3,318
4.4	1,620	224	223	223	223	222	222	222	222	221	221	221	221	220	220	219	3,324
4.5	1,650	224	224	223	223	223	222	222	222	222	221	221	221	221	220	220	3,329
4.6	1,680	224	224	224	223	223	223	222	222	222	222	221	221	221	221	220	3,334
4.7	1,710	225	224	224	224	223	223	223	222	222	222	222	221	221	221	221	3,338
4.8	1,740	225	225	224	224	224	223	223	223	222	222	222	222	221	221	221	3,342
4.8	1,770	225	225	225	224	224	224	223	223	223	222	222	222	222	221	221	3,346
4.9	1,800	225	225	225	225	224	224	224	223	223	223	222	222	222	222	221	3,350
5.0	1,830	225	225	225	225	225	224	224	224	223	223	223	222	222	222	222	3,354
5.1	1,860	226	225	225	225	225	225	224	224	224	223	223	223	222	222	222	3,358
5.2	1,890	226	226	225	225	225	225	225	224	224	224	223	223	223	222	222	3,362
5.3	1,920	226	226	226	225	225	225	225	225	224	224	224	223	223	223	222	3,366
5.3	1,950	226	226	226	226	225	225	225	225	225	224	224	224	223	223	223	3,369
5.4	1,980	226	226	226	226	226	225	225	225	225	225	224	224	224	223	223	3,373
5.5	2,010	226	226	226	226	226	226	225	225	225	225	225	224	224	224	223	3,376
5.6	2,040	227	226	226	226	226	226	226	225	225	225	225	225	224	224	224	3,379
5.7	2,070	227	227	226	226	226	226	226	226	225	225	225	225	225	224	224	3,382
5.8	2,100	227	227	227	226	226	226	226	226	226	225	225	225	225	225	224	3,385
5.8	2,130	227	227	227	227	226	226	226	226	226	226	225	225	225	225	225	3,388
5.9	2,160	227	227	227	227	227	226	226	226	226	226	226	225	225	225	225	3,391
6.0	2,190	227	227	227	227	227	227	226	226	226	226	226	226	225	225	225	3,393
6.1	2,220	228	227	227	227	227	227	227	226	226	226	226	226	226	225	225	3,396
6.2	2,250	228	228	227	227	227	227	227	227	226	226	226	226	226	226	225	3,398
6.2	2,280	228	228	228	227	227	227	227	227	227	226	226	226	226	226	226	3,401
6.3	2,310	228	228	228	228	227	227	227	227	227	227	226	226	226	226	226	3,403
6.4	2,340	228	228	228	228	228	227	227	227	227	227	227	226	226	226	226	3,405
6.5	2,370	228	228	228	228	228	228	227	227	227	227	227	227	226	226	226	3,408
6.6	2,400	228	228	228	228	228	228	228	227	227	227	227	227	227	226	226	3,410
6.7	2,430	228	228	228	228	228	228	228	228	227	227	227	227	227	227	226	3,412
6.7	2,460	228	228	228	228	228	228	228	228	228	227	227	227	227	227	227	3,414
6.8	2,490	229	228	228	228	228	228	228	228	228	228	227	227	227	227	227	3,416
6.9	2,520	229	229	228	228	228	228	228	228	228	228	228	227	227	227	227	3,418
7.0	2,550	229	229	229	228	228	228	228	228	228	228	228	228	227	227	227	3,420

		WATER PRODUCTION														
DAYS		30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	TOTAL
WELL TALLY		2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	STB/D
YEARS	DAYS																
7.1	2,580	229	229	229	229	228	228	228	228	228	228	228	228	228	227	227	3,422
7.2	2,610	229	229	229	229	229	228	228	228	228	228	228	228	228	228	227	3,423
7.2	2,640	229	229	229	229	229	229	228	228	228	228	228	228	228	228	228	3,425
7.3	2,670	229	229	229	229	229	229	229	228	228	228	228	228	228	228	228	3,427
7.4	2,700	229	229	229	229	229	229	229	229	228	228	228	228	228	228	228	3,428
7.5	2,730	229	229	229	229	229	229	229	229	229	228	228	228	228	228	228	3,430
7.6	2,760	229	229	229	229	229	229	229	229	229	229	228	228	228	228	228	3,431
7.6	2,790	230	229	229	229	229	229	229	229	229	229	229	228	228	228	228	3,433
7.7	2,820	230	230	229	229	229	229	229	229	229	229	229	229	228	228	228	3,434
7.8	2,850	230	230	230	229	229	229	229	229	229	229	229	229	229	228	228	3,436
7.9	2,880	230	230	230	230	229	229	229	229	229	229	229	229	229	229	228	3,437
8.0	2,910	230	230	230	230	230	229	229	229	229	229	229	229	229	229	229	3,438
8.1	2,940	230	230	230	230	230	230	229	229	229	229	229	229	229	229	229	3,440
8.1	2,970	230	230	230	230	230	230	230	229	229	229	229	229	229	229	229	3,441
8.2	3,000	230	230	230	230	230	230	230	230	229	229	229	229	229	229	229	3,442
8.3	3,030	230	230	230	230	230	230	230	230	230	229	229	229	229	229	229	3,444
8.4	3,060	230	230	230	230	230	230	230	230	230	230	229	229	229	229	229	3,445
8.5	3,090	230	230	230	230	230	230	230	230	230	230	230	229	229	229	229	3,446
8.5	3,120	230	230	230	230	230	230	230	230	230	230	230	230	229	229	229	3,447
8.6	3,150	230	230	230	230	230	230	230	230	230	230	230	230	230	229	229	3,448
8.7	3,180	230	230	230	230	230	230	230	230	230	230	230	230	230	230	229	3,450
8.8	3,210	231	230	230	230	230	230	230	230	230	230	230	230	230	230	230	3,451
8.9	3,240	231	231	230	230	230	230	230	230	230	230	230	230	230	230	230	3,452
9.0	3,270	231	231	231	230	230	230	230	230	230	230	230	230	230	230	230	3,453
9.0	3,300	231	231	231	231	230	230	230	230	230	230	230	230	230	230	230	3,454
9.1	3,330	231	231	231	231	231	230	230	230	230	230	230	230	230	230	230	3,455
9.2	3,360	231	231	231	231	231	231	230	230	230	230	230	230	230	230	230	3,456
9.3	3,390	231	231	231	231	231	231	231	230	230	230	230	230	230	230	230	3,457
9.4	3,420	231	231	231	231	231	231	231	231	230	230	230	230	230	230	230	3,458
9.5	3,450	231	231	231	231	231	231	231	231	231	230	230	230	230	230	230	3,459
9.5	3,480	231	231	231	231	231	231	231	231	231	231	230	230	230	230	230	3,460
9.6	3,510	231	231	231	231	231	231	231	231	231	231	231	230	230	230	230	3,461
9.7	3,540	231	231	231	231	231	231	231	231	231	231	231	231	230	230	230	3,461
9.8	3,570	231	231	231	231	231	231	231	231	231	231	231	231	231	230	230	3,462
9.9	3,600	231	231	231	231	231	231	231	231	231	231	231	231	231	231	230	3,463
9.9	3,630	231	231	231	231	231	231	231	231	231	231	231	231	231	231	231	3,464
10	3,660	231	231	231	231	231	231	231	231	231	231	231	231	231	231	231	3,465

E_V = 80%

Years	Qi-80% BBL/D	Qo-80% STB/D	Qw-80% BBL/D	Qg-80% MSCF/D	Wi-80% STB	Np-80% STB	Wp-80% STB	Gp-80% MMSCF
1.0	1,560	602	788	0.12	569,400	219,794	287,600	43.9
2.0	4,500	1,012	2,232	0.20	1,642,500	369,234	814,537	73.7
3.0	5,040	543	2,936	0.11	1,839,600	198,234	1,071,782	39.6
4.0	5,040	301	3,227	0.06	1,839,600	109,997	1,177,798	22.0
5.0	5,040	213	3,324	0.04	1,839,600	77,806	1,213,367	15.5
6.0	5,040	166	3,374	0.03	1,839,600	60,461	1,231,418	12.1
7.0	5,040	136	3,406	0.03	1,839,600	49,683	1,243,263	9.9
8.0	5,040	115	3,429	0.02	1,839,600	41,935	1,251,471	8.4
9.0	5,040	99	3,445	0.02	1,839,600	36,082	1,257,549	7.2
10.0	5,040	88	3,458	0.02	1,839,600	32,084	1,262,205	6.4

E_V = 80%

Years	Wi-80% STB	Np-80% STB	Wp-80% STB	Gp-80% MMSCF
1.0	569,400	219,794	287,600	43.9
2.0	2,211,900	589,028	1,102,137	117.6
3.0	4,051,500	787,262	2,173,918	157.1
4.0	5,891,100	897,259	3,351,717	179.1
5.0	7,730,700	975,065	4,565,084	194.6
6.0	9,570,300	1,035,527	5,796,502	206.7
7.0	11,409,900	1,085,210	7,039,764	216.6
8.0	13,249,500	1,127,145	8,291,236	225.0
9.0	15,089,100	1,163,228	9,548,785	232.2
10.0	16,928,700	1,195,312	10,810,990	238.6

E_V = 100%

Years	Qi-100% BBL/D	Qo-100% STB/D	Qw-100% BBL/D	Qg-100% MSCF/D	Wi-100% STB	Np-100% STB	Wp-100% STB	Gp-100% MMSCF
1.0	1,560	753	749	0.15	569,400	274,742	273,303	54.8
2.0	4,500	1,248	2,222	0.25	1,642,500	455,697	810,963	91.0
3.0	5,040	655	2,936	0.13	1,839,600	239,111	1,071,782	47.7
4.0	5,040	362	3,227	0.07	1,839,600	132,137	1,177,798	26.4
5.0	5,040	261	3,324	0.05	1,839,600	95,187	1,213,367	19.0
6.0	5,040	222	3,374	0.04	1,839,600	80,965	1,231,418	16.2
7.0	5,040	184	3,406	0.04	1,839,600	67,229	1,243,263	13.4
8.0	5,040	147	3,429	0.03	1,839,600	53,494	1,251,471	10.7
9.0	5,040	109	3,445	0.02	1,839,600	39,758	1,257,549	7.9
10.0	5,040	71	3,458	0.01	1,839,600	26,022	1,262,205	5.2

Years	Wi-100% STB	Np-100% STB	Wp-100% STB	Gp-100% MMSCF
1.0	569,400	274,742	273,303	54.8
2.0	2,211,900	730,439	1,084,267	145.8
3.0	4,051,500	969,550	2,156,048	193.5
4.0	5,891,100	1,101,686	3,333,847	219.9
5.0	7,730,700	1,196,873	4,547,214	238.9
6.0	9,570,300	1,277,838	5,778,631	255.1
7.0	11,409,900	1,345,067	7,021,894	268.5
8.0	13,249,500	1,398,561	8,273,366	279.2
9.0	15,089,100	1,438,319	9,530,914	287.1

Capital Expenditures (CAPEX), Costs & Lease Operating Expenses

TOTAL CAPEX WATER SUPPLY = $1,085,000

CAPEX - Water Supply	Unit, $/ft	Feet	Total
Water Supply Lines	3.5	10,000	35,000.0
Labor			200,000.0

CAPITAL EXPENDITURES	Unit	Feet	Total
Production wells, $/Well	190,000.0		5,700,000
Injection Wells, $/Well	150,000.0		6,300,000
Water Facility			350,000

CAPITAL EXPENDITURES - 5-Spot	Unit, $/ft	Feet	Total
Electricity	6.75	467.0	3,152.3
Injector Lines	8.1	1,401.0	11,348.1
Flow Lines	3.5	467.0	1,634.5
Injection Pumps, Units	4.0	125,000.0	500,000.0
Labor	2.0	2,335.0	4,670.0
ROW/Estimated Impact	6.0	2,335.0	14,010.0

5-Spot Tally		$/Array	Total	Drilling Schedule	1st-Year	2nd-Year	3rd-Year
	30	34,815	1,044,446		24	6	

PETROLEUM PRICES	
Gas, $/MSCF=	2.73
WTI, $/BBL =	65
Liquids C_3-$C_{4, GPM, \$/G}$=	0.2
Number of Pumps	4
WELLS	
WELL $TALLY_{PROD}$ =	30
WELL $TALLY_{Inj}$ =	42

Field, Technical & Administrative Support	$/Well	Max/Month
Field Perssonel	300.0	20,000.0
Technical Support	150.0	8,000.0
Administrative Support	69.4	5,000.0
Financial & Accounting	27.8	2,000.0
Audits, Certifications, Misc.	8.3	600.0
Special Studies (Geoscience & Engineering)	69.4	5,000.0
Corporate	138.9	10,000.0

PROJECTED LEASE OPERATING EXPENSES (LOE)

Injection	$/BBL	$/Month
Chemicals Inj. Water	1.00	
Injection Water	0.50	
Water Disposal	0.35	
Electricity Inj. Pumps/Pump		1,500.0
Production		
Chemicals Production	1.50	
WORKOVER, $ =	8,000.0	Note: 2 Wells/Year

Liquids C_3-$C_{4, GPM}$=	8.653

TOTAL CAPITAL EXPENDITURES	14,129,446
Effective CAPEX	10,729,446

Economics
(E$_V$ = 100%)

ECONOMIC INDICATORS (5 Years)				
10.0%	NPV (10%) =	$26,738,554	IRR =	N/A
15.0%	NPV (15%) =	$24,091,879	BT NET INCOME, $/WELL	
20.0%	NPV (20%) =	$21,840,116	1,031,455	

ECONOMIC INDICATORS (10 Years)				
10.0%	NPV (10%) =	$25,767,400	IRR =	N/A
15.0%	NPV (15%) =	$23,222,671	BT NET INCOME, $/WELL	
20.0%	NPV (20%) =	$21,311,223	1,031,455	

Threshold Oil Price	@$/BBL
NPV(10%) = $0.0	$38.20

Year	OIL		GAS		LIQUIDS		WATER			
	Qo, STB/D	Np, STB	Qg, MSCF/D	Gp, MMSCF	Q_L,Gallon	Np, Gal	Qw_i, STB/D	W_i, STB/D	Qw, STB/D	Wp, STB
1	753	274,742	0.150	54.84	1.300	474,518	1,560.000	569,400	748.776	273,303
2	1248	455,697	0.249	90.96	2.156	787,051	4,500.000	1,642,500	2,221.817	810,963
3	655	239,111	0.131	47.73	1.131	412,978	5,040.000	1,839,600	2,936.388	1,071,782
4	362	132,137	0.072	26.37	0.625	228,218	5,040.000	1,839,600	3,226.845	1,177,798
5	261	95,187	0.052	19.00	0.450	164,401	5,040.000	1,839,600	3,324.294	1,213,367
6	222	80,965	0.044	16.16	0.383	139,838	5,040.000	1,839,600	3,373.747	1,231,418
7	184	67,229	0.037	13.42	0.318	116,115	5,040.000	1,839,600	3,406.200	1,243,263
8	147	53,494	0.029	10.68	0.253	92,391	5,040.000	1,839,600	3,428.689	1,251,471
9	109	39,758	0.022	7.94	0.188	68,668	5,040.000	1,839,600	3,445.339	1,257,549
10	71	26,022	0.014	5.19	0.123	44,944	5,040.000	1,839,600	3,458.096	1,262,205

Year	Sales - Income			CAPEX - CAPITAL EXPENDITURES		
	Oil,	Gas, $	Liquids, $	WELLS	FACILITIES	MISC. (10%)
1	17,858,242	149,709	94,904	4,760,000	1,920,556	668,056
2	29,620,275	248,313	157,410	3,540,000	208,889	374,889
3	15,542,202	130,293	82,596	16,000		1,600
4	8,588,876	72,002	45,644	16,000		1,600
5	6,187,139	51,868	32,880	16,000		1,600
6	5,262,737	44,119	27,968	16,000		1,600
7	4,369,916	36,634	23,223	16,000		1,600
8	3,477,094	29,149	18,478	16,000		1,600
9	2,584,273	21,664	13,734	16,000		1,600
10	1,691,451	14,180	8,989	16,000		1,600

Year	ROYALTIES	OPEX				CASHFLOW, $		ROI
	%	Lifting	Ad + Tec	Disp	Total (Inc. 5%)	YEAR	Cumulative	%
1	4,520,283	840,068	607,200	95,656	1,620,071	4,613,889	4,613,889	42.9%
2	7,497,492	1,917,990	607,200	283,837	2,949,478	15,455,250	20,069,139	205.4%
3	3,934,046	1,984,339	607,200	375,124	3,114,995	8,688,450	28,757,588	254.2%
4	2,174,018	1,982,902	607,200	412,229	3,152,448	3,362,455	32,120,043	98.4%
5	1,566,090	1,980,831	607,200	424,678	3,163,345	1,524,852	33,644,895	44.6%
6	1,332,105	1,986,574	607,200	430,996	3,176,009	809,109	34,454,004	23.7%
7	1,106,114	1,983,739	607,200	435,142	3,177,385	128,674	34,582,678	3.8%
8	880,123	1,975,448	607,200	438,015	3,171,696	(544,697)	34,037,981	
9	654,132	1,963,960	607,200	440,142	3,161,868	(1,213,929)	32,824,052	
10	428,141	1,950,341	607,200	441,772	3,149,278	(1,880,399)	30,943,653	

MONTH	OIL		GAS		LIQUIDS		WATER			
	Qo, STB/D	Np, STB	Qg, MSCF/D	Gp, MMSCF	Q_L,Gallon	Np, Gal	Qw_i, STB/D	W_i, STB/D	Qw, STB/D	Wp, STB
1	132	4,017	26.358	0.80	228.079	6,937	240.000	7,300	93.814	2,854
2	260	7,899	51.832	1.58	448.502	13,642	480.000	14,600	192.535	5,856
3	383	11,646	76.421	2.32	661.269	20,114	720.000	21,900	296.163	9,008
4	502	15,258	100.125	3.05	866.380	26,352	960.000	29,200	404.698	12,310
5	616	18,735	122.944	3.74	1,063.836	32,358	1,200.000	36,500	518.140	15,760
6	726	22,078	144.879	4.41	1,253.636	38,131	1,440.000	43,800	636.489	19,360
7	831	25,286	165.929	5.05	1,435.780	43,672	1,680.000	51,100	759.745	23,109
8	932	28,358	186.094	5.66	1,610.268	48,979	1,920.000	58,400	917.872	27,919
9	1029	31,297	205.374	6.25	1,777.100	54,053	2,160.000	65,700	1,079.592	32,838
10	1121	34,100	223.769	6.81	1,936.277	58,895	2,400.000	73,000	1,217.569	37,034
11	1209	36,768	241.280	7.34	2,087.798	63,504	2,640.000	80,300	1,360.452	41,380
12	1292	39,302	257.906	7.84	2,231.663	67,880	2,880.000	87,600	1,508.243	45,876
13	1371	41,701	273.648	8.32	2,367.872	72,023	3,120.000	94,900	1,660.940	50,520
14	1445	43,965	288.504	8.78	2,496.425	75,933	3,360.000	102,200	1,818.545	55,314
15	1515	46,096	302.489	9.20	2,617.441	79,614	3,600.000	109,500	1,980.980	60,255
16	1447	44,013	288.819	8.78	2,499.150	76,016	4,080.000	124,100	2,056.799	62,561
17	1379	41,931	275.162	8.37	2,380.973	72,421	4,560.000	138,700	2,138.332	65,041
18	1309	39,828	261.362	7.95	2,261.563	68,789	5,040.000	153,300	2,218.003	67,464
19	1242	37,781	247.925	7.54	2,145.292	65,253	5,040.000	153,300	2,295.811	69,831
20	1177	35,792	234.875	7.14	2,032.376	61,818	5,040.000	153,300	2,371.756	72,141
21	1113	33,866	222.238	6.76	1,923.026	58,492	5,040.000	153,300	2,445.839	74,394
22	1052	32,007	210.036	6.39	1,817.438	55,280	5,040.000	153,300	2,518.058	76,591
23	993	30,217	198.290	6.03	1,715.802	52,189	5,040.000	153,300	2,558.450	77,820
24	937	28,500	187.021	5.69	1,618.296	49,223	5,040.000	153,300	2,598.294	79,031

MONTH	Sales - Income			CAPEX - CAPITAL EXPENDITURES		
	Oil,	Gas, $	Liquids, $	WELLS	FACILITIES	MISC.
1	261,085	2,189	1,387	396,667	320,093	71,676
2	513,407	4,304	2,728	396,667	320,093	71,676
3	756,965	6,346	4,023	396,667	320,093	71,676
4	991,760	8,314	5,270	396,667	320,093	71,676
5	1,217,790	10,209	6,472	396,667	320,093	71,676
6	1,435,057	12,030	7,626	396,667	320,093	71,676
7	1,643,560	13,778	8,734	396,667		39,667
8	1,843,299	15,453	9,796	396,667		39,667
9	2,034,275	17,054	10,811	396,667		39,667
10	2,216,487	18,581	11,779	396,667		39,667
11	2,389,935	20,035	12,701	396,667		39,667
12	2,554,620	21,416	13,576	396,667	69,630	46,630
13	2,710,541	22,723	14,405	295,000	69,630	36,463
14	2,857,698	23,957	15,187	295,000	69,630	36,463
15	2,996,227	25,118	15,923	295,000		29,500
16	2,860,817	23,983	15,203	295,000		29,500
17	2,725,538	22,849	14,484	295,000		29,500
18	2,588,848	21,703	13,758	295,000		29,500
19	2,455,750	20,587	13,051	295,000		29,500
20	2,326,494	19,503	12,364	295,000		29,500
21	2,201,319	18,454	11,698	295,000		29,500
22	2,080,451	17,441	11,056	295,000		29,500
23	1,964,106	16,465	10,438	295,000		29,500
24	1,852,489	15,530	9,845	295,000		29,500

MONTH	ROYALTIES	OPEX				CASHFLOW, $		ROI
	%	Lifting	Admin.	Disp	Total	Month	CUMULATIVE	%
1	66,086	11,805	50,600	999	66,574	(656,434)	(656,434)	-15.7%
2	129,954	22,132	50,600	2,050	78,521	(476,471)	(1,132,905)	-11.4%
3	191,603	32,481	50,600	3,153	90,545	(303,250)	(1,436,155)	-7.2%
4	251,034	42,851	50,600	4,308	102,647	(136,773)	(1,572,928)	-3.3%
5	308,247	53,243	50,600	5,516	114,827	22,961	(1,549,967)	0.5%
6	363,242	63,657	50,600	6,776	127,084	175,952	(1,374,015)	4.2%
7	416,018	74,092	50,600	8,088	139,419	674,302	(699,712)	17.6%
8	466,576	85,916	50,600	9,772	153,601	812,037	112,324	21.2%
9	514,916	97,701	50,600	11,493	167,784	943,106	1,055,430	24.6%
10	561,038	108,201	50,600	12,962	180,351	1,069,125	2,124,555	27.9%
11	604,941	118,723	50,600	14,483	192,996	1,188,401	3,312,956	31.0%
12	646,626	129,266	50,600	16,057	205,719	1,224,341	4,537,296	31.3%
13	686,093	139,831	50,600	17,682	218,519	1,441,964	5,979,260	37.9%
14	723,341	150,418	50,600	19,360	231,397	1,541,010	7,520,270	40.5%
15	758,406	161,026	50,600	21,089	244,351	1,710,011	9,230,281	45.9%
16	724,131	161,360	50,600	21,896	245,549	1,605,822	10,836,104	43.1%
17	689,889	161,958	50,600	22,764	247,089	1,501,393	12,337,497	40.3%
18	655,290	162,439	50,600	23,612	248,484	1,396,034	13,733,531	37.5%
19	621,600	162,918	50,600	24,441	249,856	1,293,431	15,026,962	34.7%
20	588,883	163,400	50,600	25,249	251,211	1,193,767	16,220,729	32.1%
21	557,198	163,891	50,600	26,038	252,555	1,097,217	17,317,946	29.5%
22	526,604	164,397	50,600	26,807	253,894	1,003,950	18,321,896	27.0%
23	497,155	163,555	50,600	27,237	253,461	915,893	19,237,789	24.6%
24	468,902	162,797	50,600	27,661	253,111	831,350	20,069,139	22.3%

Economics

(E_V = 80%)

ECONOMIC INDICATORS (5 Years)				
10.0%	NPV (10%) =	$18,186,401	IRR =	N/A
15.0%	NPV (15%) =	$16,340,546	BT NET INCOME, $/WELL	
20.0%	NPV (20%) =	$14,769,145	601,084	

ECONOMIC INDICATORS (10 Years)				
10.0%	NPV (10%) =	$16,009,512	IRR =	N/A
15.0%	NPV (15%) =	$14,530,394	BT NET INCOME, $/WELL	
20.0%	NPV (20%) =	$13,536,463	601,084	

Year	OIL		GAS		LIQUIDS		WATER			
	Qo, STB/D	Np, STB	Qg, MSCF/D	Gp, MMSCF	Q_L,Gallon	Np, Gal	Qw_i, STB/D	W_i, STB/D	Qw, STB/D	Wp, STB
1	602	219,794	0.120	43.87	1.040	379,614	1,560.000	569,400	787.944	287,600
2	1012	369,234	0.202	73.70	1.747	637,719	4,500.000	1,642,500	2,231.609	814,537
3	543	198,234	0.108	39.57	0.938	342,378	5,040.000	1,839,600	2,936.388	1,071,782
4	301	109,997	0.060	21.96	0.520	189,980	5,040.000	1,839,600	3,226.845	1,177,798
5	213	77,806	0.043	15.53	0.368	134,383	5,040.000	1,839,600	3,324.294	1,213,367
6	166	60,461	0.033	12.07	0.286	104,425	5,040.000	1,839,600	3,373.747	1,231,418
7	136	49,683	0.027	9.92	0.235	85,810	5,040.000	1,839,600	3,406.200	1,243,263
8	115	41,935	0.023	8.37	0.198	72,427	5,040.000	1,839,600	3,428.689	1,251,471
9	99	36,082	0.020	7.20	0.171	62,319	5,040.000	1,839,600	3,445.339	1,257,549
10	88	32,084	0.018	6.40	0.152	55,414	5,040.000	1,839,600	3,458.096	1,262,205

Year	Sales - Income			CAPEX - CAPITAL EXPENDITURES		
	Oil,	Gas, $	Liquids, $	WELLS	FACILITIES	MISC. (10%)
1	14,286,593	119,767	75,923	4,760,000	1,920,556	668,056
2	24,000,215	201,199	127,544	3,540,000	208,889	374,889
3	12,885,224	108,019	68,476	16,000		1,600
4	7,149,806	59,938	37,996	16,000		1,600
5	5,057,419	42,397	26,877	16,000		1,600
6	3,929,990	32,946	20,885	16,000		1,600
7	3,229,424	27,073	17,162	16,000		1,600
8	2,725,769	22,851	14,485	16,000		1,600
9	2,345,360	19,662	12,464	16,000		1,600
10	2,085,489	17,483	11,083	16,000		1,600

Year	ROYALTIES	OPEX				CASHFLOW, $		ROI
	%	Lifting	Ad + Tec	Disp	Total (Inc. 5%)	YEAR	Cumulative	%
1	3,616,226	779,090	607,200	100,660	1,561,297	1,956,148	1,956,148	18.2%
2	6,074,941	1,793,657	607,200	285,088	2,820,242	11,309,996	13,266,145	150.3%
3	3,261,511	1,923,024	607,200	375,124	3,050,615	6,731,993	19,998,137	197.0%
4	1,809,761	1,949,693	607,200	412,229	3,117,579	2,302,801	22,300,938	67.4%
5	1,280,135	1,954,760	607,200	424,678	3,135,971	692,987	22,993,925	20.3%
6	994,760	1,955,818	607,200	430,996	3,143,715	(172,255)	22,821,670	-5.0%
7	817,433	1,957,420	607,200	435,142	3,149,750	(711,123)	22,110,547	-20.8%
8	689,947	1,958,109	607,200	438,015	3,153,491	(1,097,933)	21,012,614	
9	593,658	1,958,447	607,200	440,142	3,156,079	(1,389,851)	19,622,763	
10	527,880	1,959,434	607,200	441,772	3,158,826	(1,590,251)	18,032,512	

MONTH	OIL		GAS		LIQUIDS		WATER			
	Qo, STB/D	Np, STB	Qg, MSCF/D	Gp, MMSCF	Q_L,Gallon	Np, Gal	Qw_i, STB/D	W_i, STB/D	Qw, STB/D	Wp, STB
1	106	3,213	21.087	0.64	182.463	5,550	240.0	7,300	132.982	4,045
2	208	6,319	41.466	1.26	358.801	10,914	480.0	14,600	231.703	7,048
3	306	9,316	61.137	1.86	529.015	16,091	720.0	21,900	335.331	10,200
4	401	12,206	80.100	2.44	693.104	21,082	960.0	29,200	443.866	13,501
5	493	14,988	98.355	2.99	851.069	25,887	1,200.0	36,500	557.308	16,951
6	581	17,662	115.903	3.53	1,002.909	30,505	1,440.0	43,800	675.657	20,551
7	665	20,228	132.743	4.04	1,148.624	34,937	1,680.0	51,100	798.913	24,300
8	746	22,687	148.875	4.53	1,288.214	39,183	1,920.0	58,400	957.040	29,110
9	823	25,037	164.299	5.00	1,421.680	43,243	2,160.0	65,700	1,118.760	34,029
10	897	27,280	179.016	5.45	1,549.022	47,116	2,400.0	73,000	1,256.737	38,226
11	967	29,415	193.024	5.87	1,670.238	50,803	2,640.0	80,300	1,399.620	42,572
12	1034	31,441	206.325	6.28	1,785.330	54,304	2,880.0	87,600	1,547.411	47,067
13	1097	33,361	218.918	6.66	1,894.297	57,618	3,120.0	94,900	1,700.108	51,712
14	1156	35,172	230.803	7.02	1,997.140	60,746	3,360.0	102,200	1,857.713	56,505
15	1212	36,877	241.992	7.36	2,093.953	63,691	3,600.0	109,500	2,020.148	61,446
16	1158	35,210	231.055	7.03	1,999.320	60,813	4,080.0	124,100	2,056.799	62,561
17	1107	33,682	221.026	6.72	1,912.540	58,173	4,560.0	138,700	2,138.332	65,041
18	1058	32,177	211.150	6.42	1,827.080	55,574	5,040.0	153,300	2,218.003	67,464
19	1009	30,695	201.426	6.13	1,742.940	53,014	5,040.0	153,300	2,295.811	69,831
20	961	29,236	191.855	5.84	1,660.121	50,495	5,040.0	153,300	2,371.756	72,141
21	914	27,801	182.436	5.55	1,578.622	48,016	5,040.0	153,300	2,445.839	74,394
22	868	26,389	173.170	5.27	1,498.443	45,578	5,040.0	153,300	2,518.058	76,591
23	822	25,000	164.057	4.99	1,419.585	43,179	5,040.0	153,300	2,558.450	77,820
24	777	23,635	155.096	4.72	1,342.047	40,821	5,040.0	153,300	2,598.294	79,031

MONTH	Sales - Income			CAPEX - CAPITAL EXPENDITURES			ROYALTIES
	Oil,	Gas, $	Liquids, $	WELLS	FACILITIES	MISC.	%
1	208,868	1,751	1,110	396,667	320,093	71,676	52,869
2	410,726	3,443	2,183	396,667	320,093	71,676	103,963
3	605,572	5,077	3,218	396,667	320,093	71,676	153,283
4	793,408	6,651	4,216	396,667	320,093	71,676	200,828
5	974,232	8,167	5,177	396,667	320,093	71,676	246,598
6	1,148,046	9,624	6,101	396,667	320,093	71,676	290,594
7	1,314,848	11,023	6,987	396,667		39,667	332,815
8	1,474,640	12,362	7,837	396,667		39,667	373,261
9	1,627,420	13,643	8,649	396,667		39,667	411,933
10	1,773,190	14,865	9,423	396,667		39,667	448,830
11	1,911,948	16,028	10,161	396,667		39,667	483,953
12	2,043,696	17,133	10,861	396,667	69,630	46,630	517,301
13	2,168,433	18,178	11,524	295,000	69,630	36,463	548,874
14	2,286,158	19,165	12,149	295,000	69,630	36,463	578,673
15	2,396,981	20,094	12,738	295,000		29,500	606,725
16	2,288,653	19,186	12,163	295,000		29,500	579,305
17	2,189,315	18,353	11,635	295,000		29,500	554,160
18	2,091,487	17,533	11,115	295,000		29,500	529,398
19	1,995,172	16,726	10,603	295,000		29,500	505,018
20	1,900,367	15,931	10,099	295,000		29,500	481,021
21	1,807,074	15,149	9,603	295,000		29,500	457,407
22	1,715,292	14,380	9,116	295,000		29,500	434,175
23	1,625,021	13,623	8,636	295,000		29,500	411,326
24	1,536,262	12,879	8,164	295,000		29,500	388,859

MONTH	OPEX				CASHFLOW, $		ROI
	Lifting	Admin.	Disp	Total	Month	CUMULATIVE	%
1	12,387	50,600	1,416	67,623	(697,198)	(697,198)	-16.6%
2	21,550	50,600	2,467	78,347	(554,394)	(1,251,592)	-13.2%
3	30,774	50,600	3,570	89,191	(417,042)	(1,668,634)	-10.0%
4	40,061	50,600	4,725	100,155	(285,143)	(1,953,777)	-6.8%
5	49,409	50,600	5,933	111,240	(158,696)	(2,112,473)	-3.8%
6	58,820	50,600	7,193	122,444	(37,702)	(2,150,175)	-0.9%
7	68,293	50,600	8,505	133,768	429,942	(1,720,233)	11.2%
8	79,195	50,600	10,188	146,983	538,261	(1,181,972)	14.0%
9	90,099	50,600	11,910	160,240	641,205	(540,766)	16.7%
10	99,758	50,600	13,379	171,924	740,390	199,624	19.3%
11	109,480	50,600	14,900	183,729	834,122	1,033,746	21.7%
12	119,263	50,600	16,473	195,653	845,809	1,879,555	21.6%
13	129,108	50,600	18,099	207,698	1,040,470	2,920,026	27.4%
14	139,016	50,600	19,777	219,862	1,117,845	4,037,870	29.4%
15	148,984	50,600	21,506	232,145	1,266,444	5,304,315	34.0%
16	148,157	50,600	21,896	231,685	1,184,512	6,488,827	31.8%
17	149,584	50,600	22,764	234,096	1,106,547	7,595,374	29.7%
18	150,961	50,600	23,612	236,433	1,029,805	8,625,179	27.6%
19	152,289	50,600	24,441	238,696	954,286	9,579,465	25.6%
20	153,566	50,600	25,249	240,886	879,990	10,459,455	23.6%
21	154,793	50,600	26,038	243,003	806,917	11,266,371	21.7%
22	155,970	50,600	26,807	245,046	735,066	12,001,438	19.7%
23	155,730	50,600	27,237	245,245	666,209	12,667,647	17.9%
24	155,499	50,600	27,661	245,448	598,498	13,266,145	16.1%

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