

CHAPTER IV

METHODOLOGY AND STUDY MODELS

In order to investigate the effect of Block Ringfencing concept on the return to a concessionaire, the following steps are taken:

1. All relevant exploration and production data, including all economic variables, are collected.
2. Field sizes that are relevant to exploration and production conditions in Thailand are classified. All past history of discoveries and future prediction of discoveries of new fields have to be taken into consideration.
3. Prediction of future price is undertaken using related data and time-series approach.
4. Financial analysis is undertaken for each specific field size to investigate the effects of various economic parameters on the return to a concessionaire.
5. Financial analysis is also performed for various combinations of field sizes. Here, only combinations that are deemed to be realistic for Thailand are considered.
6. Results of the financial analysis for various combinations of field sizes are analyzed and compared with one another.

To complete the tasks listed above, various methods and data are needed. In addition, the detailed models for studying must also be formulated.

Estimation of gas and condensate prices

The time-series method (Box and Jenkins¹²) is used to estimate the prices of gas and condensate. In using this method, quarterly gas and condensate price data of Erawan gas field in bath/MMBtu were collected as shown in Figures 4-1 and 4-2.

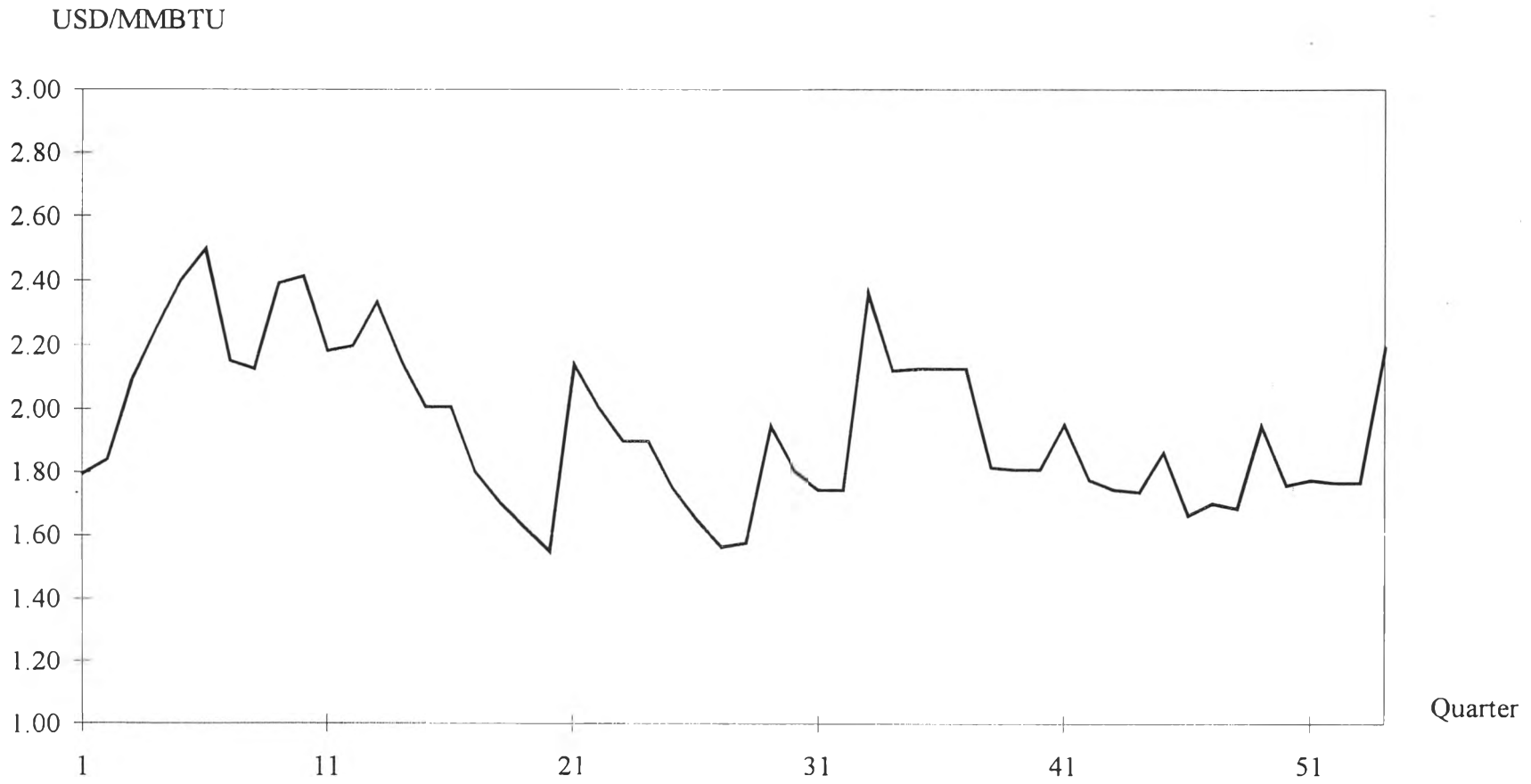


Figure 4-1 Quarterly gas price for Erawan gas field

USD/MMBTU

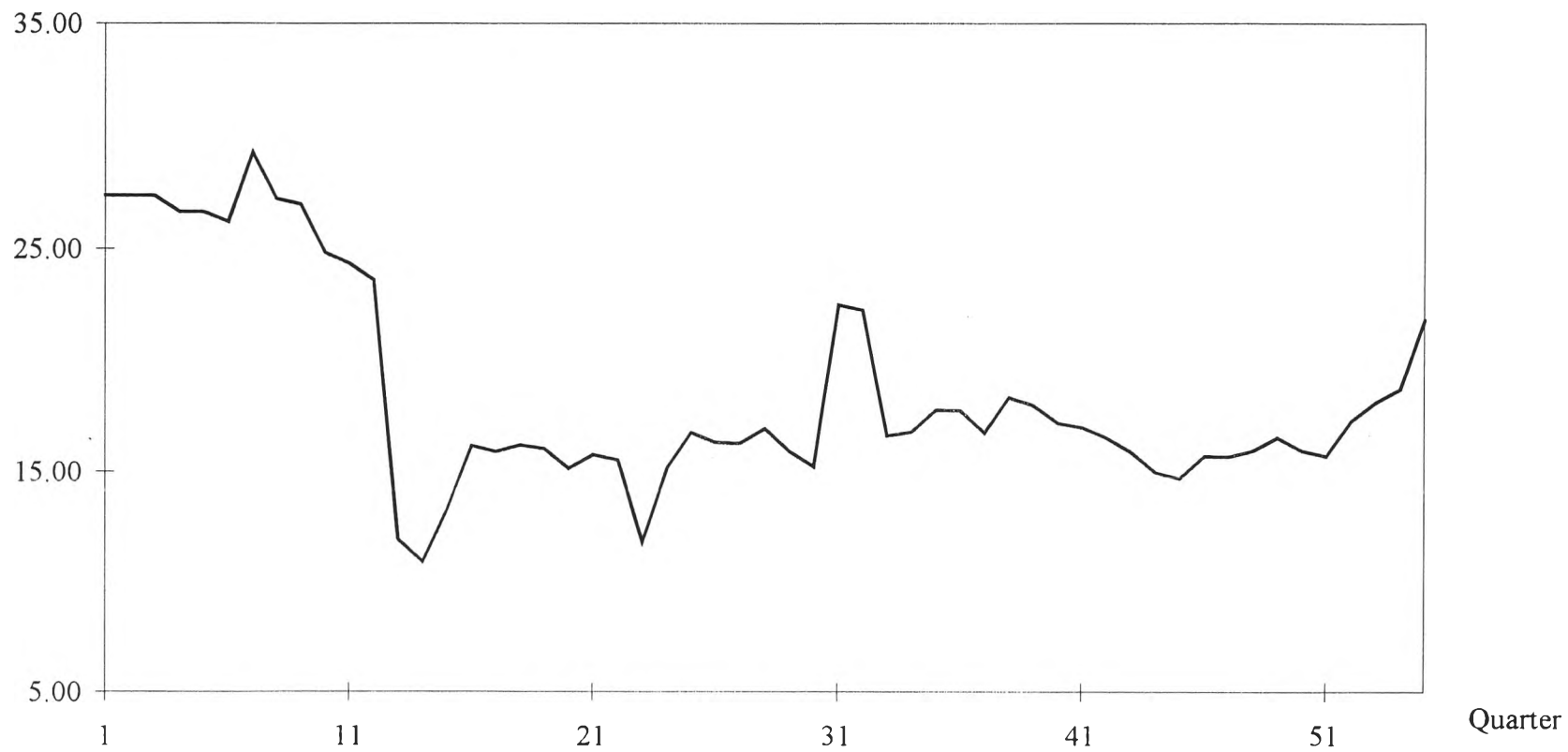


Figure 4-2 Quarterly condensate price for Erawan gas field

From these data the models for gas and condensate prices are identified as follows :

$$\text{Gas price model :} \quad (1 - 0.69B)Z_t = a_t$$

$$\text{Condensate price model :} \quad (1 - 0.9B)Z_t = a_t$$

where $Z_t =$ gas or condensate price

$a_t =$ white noise (randomly drawings from a fixed probability distribution)

and B is defined by

$$BZ_t = Z_{t-1}$$

where $Z_{t-1} =$ gas or condensate price at a time step that is one step ahead of time t.

From the gas and condensate price models, gas and condensate prices are predicted for 1997–2044 as shown in Figures 4-3 and 4-4. These prediction of gas and condensate price will be used for all financial analysis performed in this study. Details of the time-series method and the calculation are in Appendix I.

Financial Analysis

Financial Analysis of all study models are undertaken by using the Excel spreadsheet software. The input data prepared (daily production rates, prices, expenditures, etc.) will be filled in the worksheet annually and all parameters involved in the calculation will be filled in the specified cells in the worksheet. The methodology of fiscal regimes: sliding scale royalty, SRB, and income tax were formulated in the worksheet in such a manner that it can show the calculation step by step on the yearly basis. The spreadsheet software prepared will generate the output figures necessary for the financial analysis which are the net and cumulative cash flow, net present value

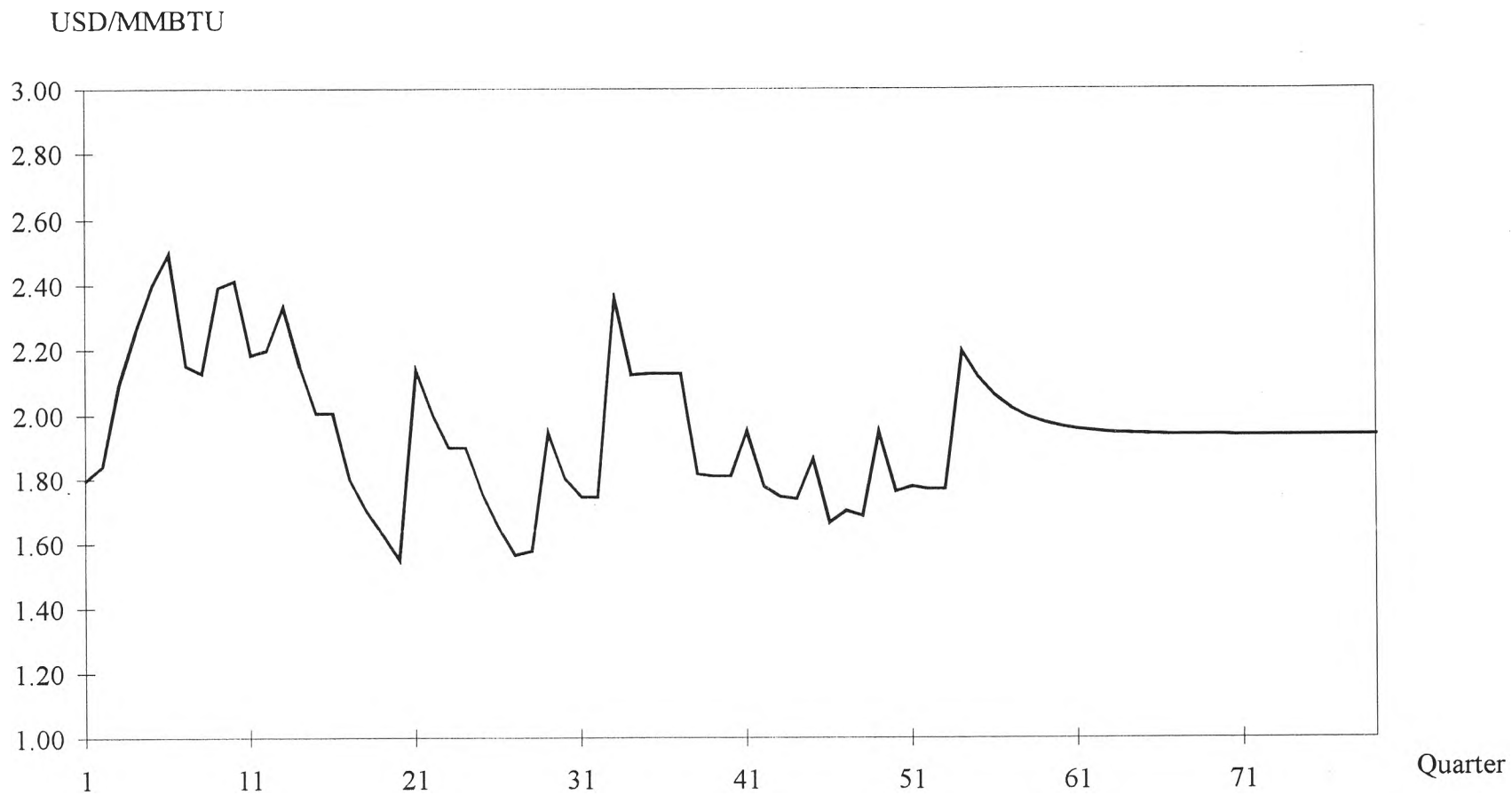


Figure 4-3 Prediction of Erawan gas price

USD/MMBTU

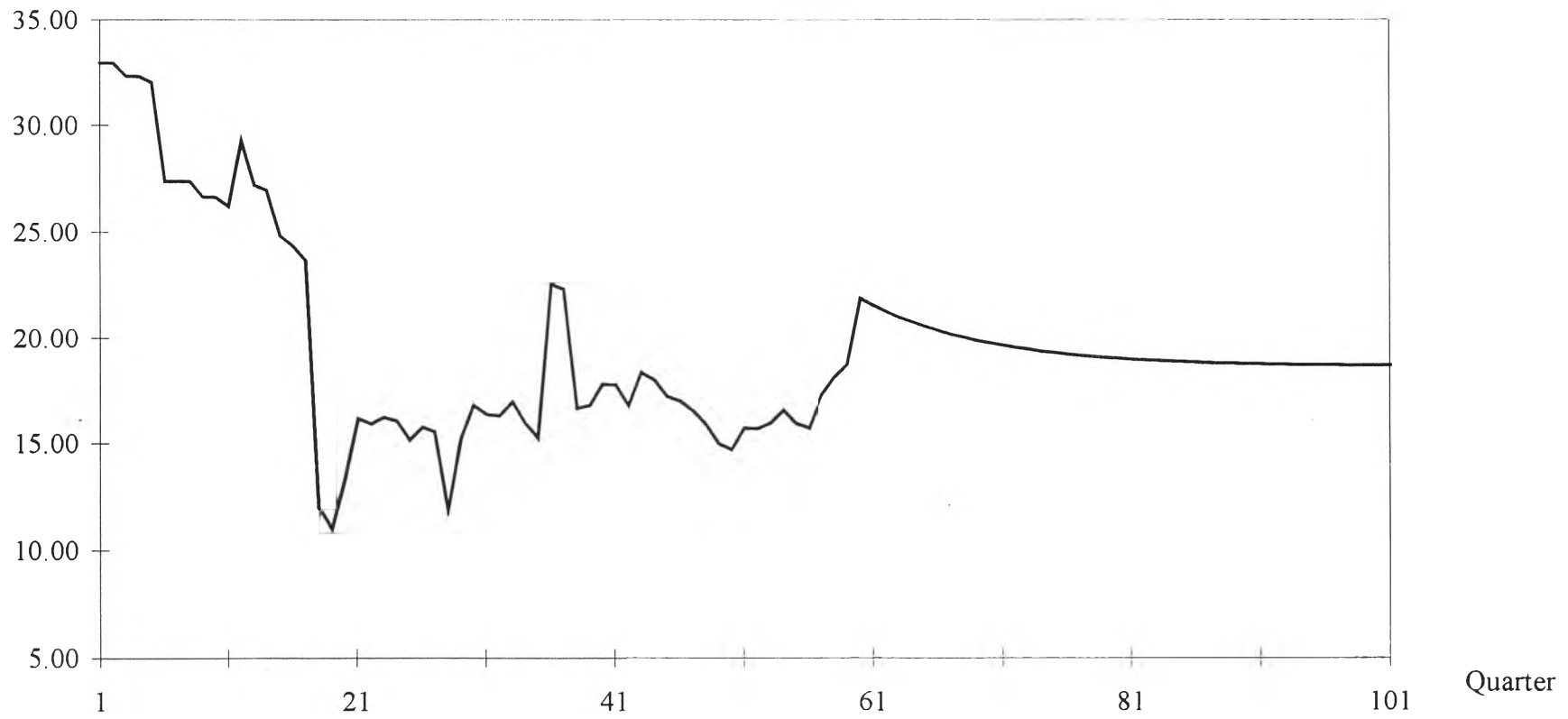


Figure 4-4 Prediction of Erawan Condensate price

for the specified discount rates, pay out period, and internal rate of return of the project studied. Example of the Excel spreadsheet software used is shown in Appendix II.

Study Models

Gas fields in the Gulf of Thailand are used as models in this study. The sizes of gas fields used for investigation are 0.5, 1.0, 1.5, and 2.0 trillion cubic feet (TCF). These field sizes are typical in the Gulf of Thailand. Each of these gas field sizes will be used to study the effect of various economic parameters and for combination of field sizes used in investigation of effect of the Block Ringfencing concept.

Financial System

The financial system used for financial analysis is a system under the latest version of Thai Petroleum Act and Thai Petroleum Income Tax Act (Thailand III). Details of parameters needed for financial analysis are already listed in Chapter III. The K value specified by the government, is 150,000 metres for each exploration block in the Gulf of Thailand. For all study cases, it is assumed that one concessionaire holds the exploration and production rights for all blocks (and all gas fields) under the study. In addition, exploration and development costs are treated as capital expenditure and can be depreciate for 5 years for the purpose of income tax calculation. Furthermore, in calculation of SRB the currency exchange rate (baht/US\$) and inflation indices (consumer price index and wholesale price index of Thailand) are needed. These are listed in Table 4-1.

Table 4-1 Exchange Rate and Inflation Indices

Year	Exchange Rate (Baht/US\$)	Consumer Price Index	Wholesale Price Index
1997	26.26	124.06	117.15
1998	26.43	127.71	120.03
1999	26.60	131.35	122.91
2000	26.77	135.00	125.78
2001	26.95	138.64	128.66
2002	27.12	142.29	131.54
2003	27.29	145.93	134.42
2004	27.46	149.58	137.29
2005	27.63	153.22	140.17
2006	27.80	156.87	143.05
2007	27.97	160.51	145.93
2008	28.14	164.15	148.81
2009	28.31	167.80	151.68
2010	28.49	171.44	154.56
2011	28.66	175.09	157.44
2012	28.83	178.73	160.32
2013	29.00	182.38	163.20
2014	29.17	186.02	166.07
2015	29.34	189.67	168.95
2016	29.51	193.31	171.83
2017	29.68	196.96	174.71
2018	29.85	200.60	177.58
2019	30.03	204.25	180.46
2020	30.20	207.89	183.34

Table 4-1 Exchange Rate and Inflation Indices (continued)

Year	Exchange Rate (Baht/US\$)	Consumer Price Index	Wholesale Price Index
2021	30.37	211.54	186.22
2022	30.54	215.18	189.10
2023	30.71	218.82	191.97
2024	30.88	222.47	194.85
2025	31.05	226.11	197.73
2026	31.22	229.76	200.61
2027	31.39	233.40	203.49
2028	31.57	237.05	206.36
2029	31.74	240.69	209.24
2030	31.91	244.34	212.12
2031	32.08	247.98	215.00
2032	32.25	251.63	217.87
2033	32.42	255.27	220.75
2034	32.59	258.92	223.63
2035	32.76	262.56	226.51
2036	32.93	266.20	229.39
2037	33.11	269.85	232.26
2038	33.28	273.49	235.14
2039	33.45	277.14	238.02
2040	33.62	280.78	240.90
2041	33.79	284.43	243.78
2042	33.96	288.07	246.65
2043	34.13	291.72	249.53
2044	34.30	295.36	252.41

Unit Costs

Unit costs for exploration and development are estimated, using available data from projects in the Gulf of Thailand, as follows:

Exploration :	2D Seismic Survey	US\$ 4,000	per line km.
	3D Seismic Survey	US\$ 6,500	per sq. km.
	Wildcat drilling	US\$ 10	million/well
	Appraisal drilling	US\$ 6	million/well
Development :	Development drilling	US\$ 3	million/well
	Well workover	US\$ 2	million/well
	Well platform	US\$ 10	million/platform

Production Facilities (Central Processing Platform with equipments, Living Quarter, Floating Storage unit, Pipeline, etc.) vary for each field size depend on maximum production rate;

0.5 TCF (120 MMCFD max.)	US\$ 90	million
1.0 TCF (220 MMCFD max.)	US\$ 165	million
1.5 TCF (300 MMCFD max.)	US\$ 225	million
2.0 TCF (400 MMCFD max.)	US\$ 300	million

The operating costs are also estimated from data of operating costs available from projects in the Gulf of Thailand. The operating costs used in this study are as follows :

Fixed operating cost	4 % of development cost
Variable operating cost	US\$ 160 per MMSCF

Detail of estimating operating costs are in Appendix III.

In addition to the operating costs, the abandonment cost is also estimated :

Platform abandonment cost US\$ 1 million/platform

Well abandonment cost US\$ 0.47 million/well

Exploration program

To estimate all exploration cost and the time that the cost occurs, it is necessary to design an exploration program for each exploration project. In this study, the exploration programs for all exploration projects are designed as follows:

1. In the first year - 2D seismic survey is conducted for 10,000 line km.

2. In the second and third years - Two wildcat wells are drilled.

(Assuming that one wildcat well is a dry hole).

3. In the third year - 3D seismic survey is conducted covering the area of 100 km², 150 km², 180 km², and 200 km² for gas field size of 0.5, 1.0, 1.5 and 2.0 TCF, respectively.

4. In the fourth year - Two appraisal wells are drilled.

The details of exploration costs and their incurring year are shown later in Tables 4-6 to 4-9 for gas field sizes of 0.5, 1.0, 1.5, and 2.0 TCF, respectively.

Development Program

The development programs for all field sizes are similar. The only differences are the cost of central processing platforms (CPP) and number of well platforms.

Development programs for all field sizes are as follows:

Installation of CPP and production facilities: year 5 (or year 1 of development stage) and year 6,

Installation of well platform: year 6 and year 7

The details of development costs and their incurring years are shown later in Tables 4-6 to 4-9 for gas fields sizes of 0.5, 1.0, 1.5, and 2.0 TCF, respectively.

Production profile

The production profiles for each field are similar. They start with a buildup period, then followed by a plateau period (a constant rate period) and a decline period, respectively. The buildup period is one year with 10% buildup rate for all field sizes. The plateau period is four years for 0.5-TCF field, five years for 1.0-TCF field, and six years for 1.5- and 2.0-TCF fields. The decline period is 15 years for 0.5-TCF field, 19 years for 1.0-TCF field, 20 years for 1.5-TCF field, and 23 years for 2.0-TCF field with decline rate of 10% (Figure 4-5).

Condensate production is estimated at 40, 35, 30, and 25 STB/MMSCF for gas field sizes of 0.5, 1.0, 1.5, and 2.0 TCF, respectively. The details of production profiles are shown later in Tables 4-6 to 4-9 for 0.5, 1.0, 1.5, and 2.0 TCF fields, respectively.

The selection of production profile used in the study was made by the observation on the behavior of the wells typically produced in the Gulf of Thailand. The maximum production rates of each well are 12, 14, 16 and 17 million cubic feet per day (MMCFD) for field sizes of 0.5, 1.0, 1.5 and 2.0 TCF, respectively, and the reserves per well are 7.95, 10.05, 13 and 14.54 BCF for field sizes of 0.5, 1.0, 1.5 and 2.0 TCF, respectively.

Well programs

As mentioned before, well programs for exploration period are the same for all field sizes. However, for development and production period, well program for each field size will follow the production profile of that field size. Well programs for 0.5, 1.0, 1.5, and 2.0 TCF gas fields are shown in Tables 4-2 to 4-5.

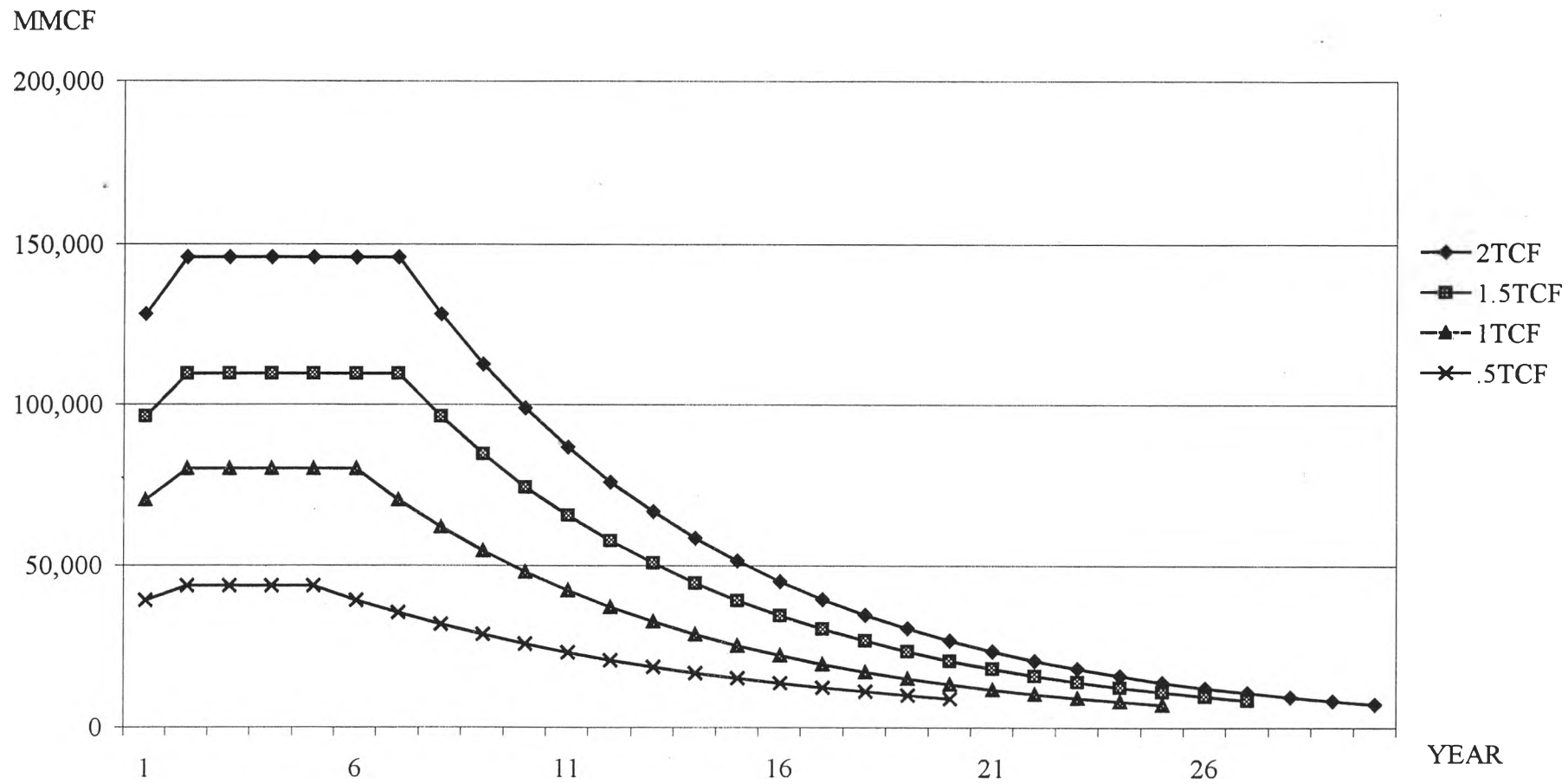


Figure 4-5 Production profiles of 4 field sizes (.5TCF, 1TCF, 1.5TCF, 2TCF)

Table 4-2 Well program for 0.5 TCF gas field

Year	Wildcat Well		Appraisal Well		Development Well		Cum.Depth (M) (meters)
	(wells)	(meters)	(wells)	(meters)	(wells)	(meters)	
1997							
1998	2	7,000					
1999							
2000			2	7,000			
2001							
2002					8	28,000	66,500
2003					7	24,500	91,000
2004					7	24,500	115,500
2005					7	24,500	101,500
2006					7	24,500	98,000
2007					6	21,000	91,000
2008					5	17,500	84,000
2009					5	17,500	73,500
2010					4	14,000	66,500
2011					4	14,000	59,500
2012					3	10,500	52,500
2013					3	10,500	49,000
2014					3	10,500	42,000
2015					2	7,000	38,500
2016					2	7,000	35,000
2017					2	7,000	31,500
2018					2	7,000	31,500
2019					2	7,000	28,000
2020					1	3,500	24,500
2021					1	3,500	17,500
2022					0	0	17,500
Total	2	7,000	2	7,000	81	283,500	1,214,500

Table 4-3 Well program for 1 TCF gas field

Year	Wildcat Well		Appraisal Well		Development Well		Cum.Depth (M) (meters)
	(wells)	(meters)	(wells)	(meters)	(wells)	(meters)	
1997							
1998	2	7,000					
1999							
2000			2	7,000			
2001							
2002					16	56,000	105,000
2003					10	35,000	140,000
2004					10	35,000	175,000
2005					10	35,000	210,000
2006					10	35,000	178,500
2007					10	35,000	168,000
2008					7	24,500	157,500
2009					7	24,500	143,500
2010					6	21,000	126,000
2011					5	17,500	108,500
2012					5	17,500	98,000
2013					4	14,000	87,500
2014					4	14,000	77,000
2015					3	10,500	70,000
2016					3	10,500	59,500
2017					2	7,000	52,500
2018					2	7,000	45,500
2019					2	7,000	42,000
2020					2	7,000	35,000
2021					1	3,500	31,500
2022					1	3,500	28,000
2023					1	3,500	24,500
2024					1	3,500	21,000
2025					1	3,500	21,000
2026					1	3,500	17,500
2027					0	0	17,500
Total	2	7,000	2	7,000	124	434,000	2,240,000

Table 4-4 Well program for 1.5 TCF gas field

Year	Wildcat Well		Appraisal Well		Development Well		Cum.Depth (M) (meters)
	(wells)	(meters)	(wells)	(meters)	(wells)	(meters)	
1997							
1998	2	7,000					
1999							
2000			2	7,000			
2001							
2002					19	66,500	119,000
2003					11	38,500	154,000
2004					10	35,000	189,000
2005					10	35,000	224,000
2006					10	35,000	252,000
2007					11	38,500	224,000
2008					11	38,500	213,500
2009					8	28,000	203,000
2010					7	24,500	189,000
2011					6	21,000	171,500
2012					5	17,500	150,500
2013					5	17,500	126,000
2014					4	14,000	112,000
2015					4	14,000	98,000
2016					3	10,500	87,500
2017					3	10,500	77,000
2018					2	7,000	66,500
2019					2	7,000	59,500
2020					2	7,000	52,500
2021					2	7,000	45,500
2022					1	3,500	38,500
2023					1	3,500	35,000
2024					1	3,500	31,500
2025					1	3,500	28,000
2026					1	3,500	24,500
2027					1	3,500	24,500
2028					1	3,500	21,000
2029					0	0	21,000
Total	2	7,000	2	7,000	142	497,000	3,038,000

Table 4-5 Well program for 2 TCF gas field

Year	Wildcat Well		Appraisal Well		Development Well		Cum.Depth (M) (meters)
	(wells)	(meters)	(wells)	(meters)	(wells)	(meters)	
1997							
1998	2	7,000					
1999							
2000			2	7,000			
2001							
2002					24	84,000	140,000
2003					12	42,000	182,000
2004					12	42,000	224,000
2005					12	42,000	266,000
2006					12	42,000	308,000
2007					12	42,000	259,000
2008					13	45,500	248,500
2009					9	31,500	234,500
2010					8	28,000	217,000
2011					7	24,500	196,000
2012					6	21,000	175,000
2013					6	21,000	147,000
2014					5	17,500	129,500
2015					4	14,000	115,500
2016					4	14,000	101,500
2017					3	10,500	91,000
2018					3	10,500	80,500
2019					3	10,500	70,000
2020					2	7,000	63,000
2021					2	7,000	56,000
2022					2	7,000	52,500
2023					2	7,000	45,500
2024					1	3,500	38,500
2025					1	3,500	35,000
2026					1	3,500	31,500
2027					1	3,500	28,000
2028					1	3,500	24,500
2029					1	3,500	24,500
2030					1	3,500	21,000
2031					0	0	17,500
2032					0	0	17,500
Total	2	7,000	2	7,000	170	595,000	3,640,000

Cumulative Meters of Well Drilled (M) of each field are estimated with the assumption that total depth of well is 3,500 ft. and production life of well for each field are 4 years for field size 0.5 TCF, 5 years for 1.0 TCF, and 6 years for 1.5 and 2.0 TCF. Cumulative Meters of Well Drilled for 0.5, 1.0, 1.5 and 2.0 TCF gas field are shown in Table 4-2 to 4-5.

Profile of cost

After all programs have been designed, various costs can be estimated and their incurring years identified. Tables 4-6 to 4-9 show these costs and also the gas and condensate production profiles.

Combination models

The combination models that will be used to investigate the effects of Block Ringfencing concept on the return to the concessionaire is composed of models with two and three blocks. Details of these models are listed below:

1. Two blocks with one field in each block, 10 models
 0.5+0.5 TCF, 1.0+0.5 TCF, 1.0+1.0 TCF, 1.5+0.5 TCF, 1.5+1.0 TCF,
 1.5+1.5 TCF, 2.0+0.5 TCF, 2.0+1.0 TCF, 2.0+1.5 TCF, and 2.0+2.0 TCF

In the case of using Block Ringfencing concept, Royalty and SRB are calculated by block. In the case of not using Block Ringfencing concept, Royalty is calculated by field and SRB is calculated in aggregate of two blocks (revenue, cost, K (2×150,000), and M values).

2. Two blocks with two fields in one block and one field in the other block, 4 models
 (0.5+0.5 TCF) + 0.5 TCF, 2.0 TCF + (0.5+0.5 TCF),
 (1.0+1.0 TCF) + 1.0 TCF, and (1.0+1.0 TCF) + 2.0 TCF

Note : numbers in the parentheses are sizes of two gas fields in one block.

In the case of using Block Ringfencing concept, Royalty and SRB are calculated in aggregate of two fields (revenue, cost, K (150,000), and M values in SRB calculation) for the block with two fields and calculated separately for one field in the other block. In the case of not using Block Ringfencing concept, Royalty is calculated by field and SRB is calculated in aggregate of two blocks (revenue, cost, K of the two blocks ($2 \times 150,000$), and M values).

3. Three Blocks with one field in each block, 4 models

0.5+0.5+0.5 TCF, 1.0+1.0+1.0 TCF, 1.5+1.5+1.5 TCF, and

2.0+2.0+2.0 TCF

In the case of using Block Ringfencing concept, Royalty and SRB are calculated by block. In the case of not using Block Ringfencing concept, Royalty is calculated by field and SRB is calculated in aggregate of three blocks (revenue, cost, K ($3 \times 150,000$), and M values).

For all cases, the income tax will be calculated based on total revenue of the concessionaire.

Table 4-6 Cost and production profile for 0.5 TCF gas field

Year	Exploration Phase			Development Phase			Total Investment MMUS\$	Production Phase			Abandonment Cost MMUS\$
	Seismic	Wildcat Well	Appraisal Well	Facilities Cost	Well Head Platform Cost	Well Cost		Operating Cost	Gas Production	Condensate Production	
	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$		MMUS\$	MMCF	MMSTB	
1997	4.00						4.00				
1998		12.00					12.00				
1999	0.65	8.00					8.65				
2000			12.00				12.00				
2001				20.00			20.00				
2002				60.00		24.00	84.00				
2003				10.00	40.00	21.00	71.00	13.35	39,420	1.58	
2004						21.00	21.00	14.89	43,800	1.75	
2005						21.00	21.00	15.73	43,800	1.75	
2006						21.00	21.00	16.57	43,800	1.75	

Table 4-6 Cost and production profile for 0.5 TCF gas field (continued)

Year	Exploration Phase			Development Phase			Total Investment MMUS\$	Production Phase			Abandonment Cost MMUS\$
	Seismic	Wildcat Well	Appraisal Well	Facilities Cost	Well Head Platform Cost	Well Cost		Operating Cost	Gas Production	Condensate Production	
	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$		MMUS\$	MMCF	MMSTB	
2007						18.00	18.00	15.57	43,800	1.75	
2008						15.00	15.00	14.75	39,420	1.58	
2009						15.00	15.00	13.88	35,478	1.42	
2010						8.00	8.00	13.07	31,930	1.28	
2011						8.00	8.00	12.04	28,737	1.15	
2012						6.00	6.00	11.18	25,863	1.03	
2013						6.00	6.00	10.40	23,277	0.93	6.64
2014						6.00	6.00	9.27	20,949	0.84	
2015						4.00	4.00	8.86	18,854	0.75	
2016						4.00	4.00	8.40	16,969	0.68	6.64

Table 4-6 Cost and production profile for 0.5 TCF gas field (continued)

Year	Exploration Phase			Development Phase			Total Investment MMUS\$	Production Phase			Abandonment Cost MMUS\$
	Seismic	Wildcat Well	Appraisal Well	Facilities Cost	Well Head Platform Cost	Well Cost		Operating Cost	Gas Production	Condensate Production	
	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$		MMUS\$	MMCF	MMSTB	
2017						4.00	4.00	7.64	15,272	0.61	6.64
2018						4.00	4.00	7.72	13,745	0.55	
2019						4.00	4.00	7.42	12,370	0.49	
2020						2.00	2.00	6.82	11,133	0.45	
2021						2.00	2.00	6.96	10,020	0.40	
2022						0.00	0.00	6.72	9,018	0.36	
TOTAL	4.65	20.00	12.00	90.00	40.00	214.00	380.65	221.23	527,658	21.11	19.92

Table 4-7 Cost and production profile for 1.0 TCF gas field

Year	Exploration Phase			Development Phase			Total Investment MMU\$	Production Phase			Abandonment Cost MMU\$
	Seismic	Wildcat Well	Appraisal Well	Facilities Cost	Well Head Platform Cost	Well Cost		Operating Cost	Gas Production	Condensate Production	
	MMU\$	MMU\$	MMU\$	MMU\$	MMU\$	MMU\$		MMU\$	MMCF	MMSTB	
1997	4.00						4.00				
1998		12.00					12.00				
1999	0.98	8.00					8.98				
2000			12.00				12.00				
2001				50.00			50.00				
2002				100.00		48.00	148.00				
2003				15.00	60.00	30.00	105.00	22.31	70,664	2.47	
2004						30.00	30.00	25.05	80,300	2.81	
2005						30.00	30.00	26.25	80,300	2.81	
2006						30.00	30.00	27.45	80,300	2.81	
2007						30.00	30.00	28.65	80,300	2.81	

Table 4-7 Cost and production profile for 1.0 TCF gas field (continued)

Year	Exploration Phase			Development Phase			Total Investment MMU\$\$	Production Phase			Abandonment Cost MMU\$\$
	Seismic MMU\$\$	Wildcat Well MMU\$\$	Appraisal Well MMU\$\$	Facilities Cost MMU\$\$	Well Head Platform Cost MMU\$\$	Well Cost MMU\$\$		Operating Cost MMU\$\$	Gas Production MMCF	Condensate Production MMSTB	
2008						21.00	21.00	27.05	80,300	2.81	
2009						14.00	14.00	25.15	70,664	2.47	
2010						12.00	12.00	23.15	62,184	2.18	
2011						10.00	10.00	21.24	54,722	1.92	
2012						10.00	10.00	19.38	48,156	1.69	
2013						8.00	8.00	17.66	42,377	1.48	
2014						8.00	8.00	16.33	37,292	1.31	
2015						6.00	6.00	15.37	32,817	1.15	6.64
2016						6.00	6.00	14.10	28,879	1.01	
2017						4.00	4.00	13.39	25,413	0.89	6.64
2018						4.00	4.00	12.26	22,364	0.78	

Table 4-7 Cost and production profile for 1.0 TCF gas field (continued)

Year	Exploration Phase			Development Phase			Total Investment MMUS\$	Production Phase			Abandonment Cost MMUS\$
	Seismic MMUS\$	Wildcat Well MMUS\$	Appraisal Well MMUS\$	Facilities Cost MMUS\$	Well Head Platform Cost MMUS\$	Well Cost MMUS\$		Operating Cost MMUS\$	Gas Production MMCF	Condensate Production MMSTB	
2019						4.00	4.00	11.67	19,680	0.69	6.64
2020						4.00	4.00	10.73	17,318	0.61	
2021						2.00	2.00	10.72	15,240	0.53	6.64
2022						2.00	2.00	9.87	13,411	0.47	
2023						2.00	2.00	9.93	11,802	0.41	6.64
2024						2.00	2.00	9.22	10,386	0.36	
2025						2.00	2.00	9.34	9,139	0.32	
2026						2.00	2.00	9.09	8,043	0.28	
2027						0.00	0.00	9.33	7,078	0.25	
TOTAL	4.98	20.00	12.00	165.00	60.00	321.00	582.98	424.66	1,009,128	35.32	33.20

Table 4-8 Cost and production profile for 1.5 TCF gas field

Year	Exploration Phase			Development Phase			Total Investment MMUS\$	Production Phase			Abandonment Cost MMUS\$
	Seismic MMUS\$	Wildcat Well MMUS\$	Appraisal Well MMUS\$	Facilities Cost MMUS\$	Well Head Platform Cost MMUS\$	Well Cost MMUS\$		Operating Cost MMUS\$	Gas Production MMCF	Condensate Production MMSTB	
1997	4.00						4.00				
1998		12.00					12.00				
1999	1.17	8.00					9.17				
2000			12.00				12.00				
2001				65.00			65.00				
2002				140.00		57.00	197.00				
2003				20.00	70.00	33.00	123.00	29.18	96,360	2.89	
2004						30.00	30.00	32.60	109,500	3.29	
2005						30.00	30.00	33.80	109,500	3.29	
2006						30.00	30.00	35.00	109,500	3.29	
2007						33.00	33.00	36.20	109,500	3.29	
2008						33.00	33.00	37.52	109,500	3.29	

Table 4-8 Cost and production profile for 1.5 TCF gas field (continued)

Year	Exproation Phase			Development Phase			Total Investment MMUS\$	Production Phase			Abondonment Cost MMUS\$
	Seismic MMUS\$	Wildcat Well MMUS\$	Appraisal Well MMUS\$	Facilities Cost MMUS\$	Well Head Platform Cost MMUS\$	Well Cost MMUS\$		Operating Cost MMUS\$	Gas Production MMCF	Condensate Production MMSTB	
2009						16.00	16.00	35.68	109,500	3.29	
2010						14.00	14.00	32.90	96,360	2.89	
2011						12.00	12.00	30.41	84,797	2.54	
2012						10.00	10.00	28.06	74,621	2.24	
2013						10.00	10.00	25.83	65,667	1.97	
2014						8.00	8.00	23.65	57,787	1.73	
2015						8.00	8.00	21.54	50,852	1.53	6.64
2016						6.00	6.00	19.84	44,750	1.34	
2017						6.00	6.00	18.66	39,380	1.18	6.64
2018						4.00	4.00	17.26	34,654	1.04	
2019						4.00	4.00	16.36	30,496	0.91	6.64
2020						4.00	4.00	15.13	26,836	0.81	

Table 4-8 Cost and production profile for 1.5 TCF gas field (continued)

Year	Exploration Phase			Development Phase			Total Investment MMUS\$	Production Phase			Abandonment Cost MMUS\$
	Seismic MMUS\$	Wildcat Well MMUS\$	Appraisal Well MMUS\$	Facilities Cost MMUS\$	Well Head Platform Cost MMUS\$	Well Cost MMUS\$		Operating Cost MMUS\$	Gas Production MMCF	Condensate Production MMSTB	
2021						4.00	4.00	14.46	23,616	0.71	6.64
2022						2.00	2.00	13.85	20,782	0.62	
2023						2.00	2.00	13.29	18,288	0.55	6.64
2024						2.00	2.00	12.77	16,094	0.48	
2025						2.00	2.00	12.39	14,162	0.42	6.64
2026						2.00	2.00	12.03	12,463	0.37	
2027						2.00	2.00	11.71	10,967	0.33	
2028						2.00	2.00	11.82	9,651	0.29	
2029						0.00	0.00	11.64	8,493	0.25	
TOTA	5.17	20.00	12.00	225.00	70.00	366.00	698.17	603.57	1,494,077	44.82	39.84

Table 4-9 Cost and production profile for 2.0 TCF gas field

Year	Exploration Phase			Development Phase			Total Investment MMUS\$	Production Phase			Abandonment Cost MMUS\$
	Seismic	Wildcat Well	Appraisal Well	Facilities Cost	Well Head platform Co	Well Cost		Operating Cost	Gas Production	Condensate Production	
	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$		MMUS\$	MMCF	MMSTB	
1997	4.00						4.00				
1998		12.00					12.00				
1999	1.30	8.00					9.30				
2000			12.00				12.00				
2001				80.00			80.00				
2002				175.00		72.00	247.00				
2003				45.00	80.00	36.00	161.00	37.87	128,188	3.20	
2004						36.00	36.00	42.16	146,000	3.65	
2005						36.00	36.00	43.60	146,000	3.65	
2006						36.00	36.00	45.04	146,000	3.65	
2007						36.00	36.00	46.48	146,000	3.65	
2008						39.00	39.00	47.92	146,000	3.65	

Table 4-9 Cost and production profile for 2.0 TCF gas field (continued)

Year	Exploration Phase			Development Phase			Total Investment MMUS\$	Production Phase			Abandonment Cost MMUS\$
	Seismic MMUS\$	Wildcat Well MMUS\$	Appraisal Well MMUS\$	Facilities Cost MMUS\$	Well Head platform Co MMUS\$	Well Cost MMUS\$		Operating Cost MMUS\$	Gas Production MMCF	Condensate Production MMSTB	
2009						18.00	18.00	45.72	146,000	3.65	
2010						16.00	16.00	42.15	128,188	3.20	
2011						14.00	14.00	38.85	112,549	2.81	
2012						12.00	12.00	35.77	98,818	2.47	
2013						12.00	12.00	32.88	86,762	2.17	6.64
2014						10.00	10.00	30.23	76,177	1.90	
2015						8.00	8.00	27.58	66,884	1.67	
2016						8.00	8.00	25.88	58,724	1.47	6.64
2017						6.00	6.00	24.01	51,560	1.29	
2018						6.00	6.00	22.68	45,269	1.13	
2019						6.00	6.00	21.16	39,746	0.99	6.64
2020						4.00	4.00	20.14	34,897	0.87	

Table 4-9 Cost and production profile for 2.0 TCF gas field (continued)

Year	Exploration Phase			Development Phase			Total Investment	Production Phase			Abandonment Cost
	Seismic	Wildcat Well	Appraisal Well	Facilities Cost	Well Head platform Co	Well Cost		Operating Cost	Gas Production	Condensate Production	
	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMUS\$	MMCF	MMSTB	MMUS\$
2021						4.00	4.00	18.82	30,640	0.77	
2022						4.00	4.00	18.06	26,902	0.67	
2023						4.00	4.00	17.38	23,620	0.59	
2024						2.00	2.00	16.84	20,738	0.52	
2025						2.00	2.00	16.27	18,208	0.46	
2026						2.00	2.00	15.76	15,987	0.40	
2027						2.00	2.00	15.37	14,036	0.35	
2028						2.00	2.00	15.01	12,324	0.31	
2029						2.00	2.00	14.69	10,820	0.27	
2030						2.00	2.00	14.40	9,500	0.24	
2031						0.00	0.00	14.61	8,341	0.21	
2032						0.00	0.00	14.37	7,324	0.18	
TOTAL	5.30	20.00	12.00	300.00	80.00	437.00	854.30	821.71	2,002,203	50.06	19.92