

**MIE HOLDINGS CORPORATION**  
**Summary Data from RISC Reserve Report**

*Sino Gas and Energy Limited*

*Sanjiaobei PSC and Linxing PSC, P.R. China*

**Independent Reserves and Resources Assessment**

**As of**

**December 31, 2014**

# **MIE HOLDINGS CORPORATION**

## **Summary Data from RISC Reserve Report**

*SGE Sanjiaobei PSC and Linxing PSC, P.R. China*

*As of December 31, 2014*

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## **INTRODUCTION**

MIEH is pleased to prepare this Report summarizing some of the information presented in the Independent Resource Assessment of SanJiaoBei/Linxing PSC, China as of 31 DECEMBER 2014 provided to SGE by RISC on Feb. 5<sup>th</sup>, 2015. SGE is the operator and has 100% of the contractor interest. The SGE operating company is owned by SGEH (Sino Gas and Energy Holdings Limited) and MIE Holdings Corporation (MIEH) with 49% and 51% respectively. The SPE (Society of Petroleum Engineers) PRMS (Petroleum Resource Management System) has been used for resource classification.

## Resource Areas

The Linxing PSC is divided into Linxing West and Linxing East. The Linxing West area has adequate wells and well tests coverage to classify the complete area as discovered and gas productive. The Linxing East resource area is divided into a prospective area to the west of a major fault and a shallow CBM area east of the fault. The coals are shallower to the east of the fault in Linxing East and CBM resources in the coals are being evaluated in a shallow CBM pilot. The resources area is illustrated in figure 1-1.

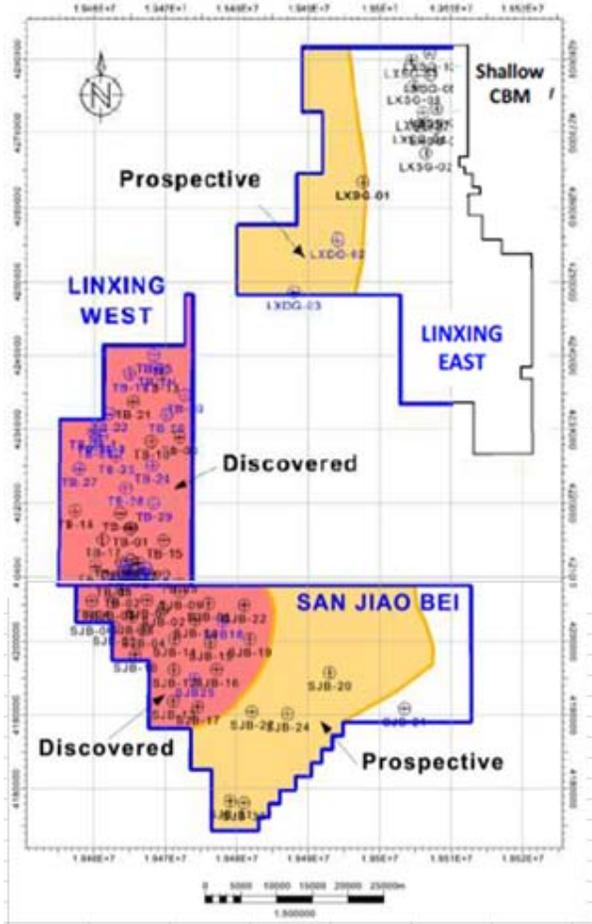


Figure 1-1 SJB/Linxing Resource Area

## Gas Prices

Gas prices between 1.76 and 2.43 RMB/m<sup>3</sup> are estimated, which have been converted to US\$/mscf at an average exchange rate over recent years of 6.12 RMB/USD (Table 2-6):

Gas Price	Low	Mid	High
RMB/m <sup>3</sup>	1.76	2.11	2.43
USD/mscf	8.30	9.76	11.23

Table 2-6 Wellhead Gas Price Assumption (RISC)

The mid-price is based on the gas sales agreements secured for the deep CBM pilot project.

# GROSS/SGE NET RESERVES AND RESOURCES

## Deep CBM

### Reserves, Contingent Resources and Prospective Resources

RISC's estimate of full field and SGE entitlement of reserves, contingent resources and prospective resources are shown in Table 1-1. Prospective and contingent resources are unrisksed.

### Sanjiaobei PSC

Deep CBM Gas Resource (bcf)	Full Field			SGE Entitlement		
	1P	2P	3P	1P	2P	3P
Developed Producing Reserves	3	4	6	1.4	2.4	3.3
Undeveloped Reserves	600	786	993	303	391	488
Total Reserves at 1/1/15	603	790	999	304	393	491
	<b>1C</b>	<b>2C</b>	<b>3C</b>	<b>1C</b>	<b>2C</b>	<b>3C</b>
Contingent Resource	498	740	1043	242	358	502
	<b>Low</b>	<b>Best</b>	<b>High</b>	<b>Low</b>	<b>Best</b>	<b>High</b>
Prospective Resource	1123	1644	2183	521	760	996

Table 1-1 SanJiaoBei PSC Deep CBM Resource Summary (unrisksed) at 1 January 2015

### Linxing PSC

Deep CBM Gas Resource (bcf)	Full Field			SGE Entitlement		
	1P	2P	3P	1P	2P	3P
Developed Producing Reserves	13	19	28	8	13	19
Undeveloped Reserves	621	799	995	402	509	627
Total Reserves at 1/1/15	634	818	1023	410	522	646
	<b>1C</b>	<b>2C</b>	<b>3C</b>	<b>1C</b>	<b>2C</b>	<b>3C</b>
Contingent Resource	1070	1547	2135	681	977	1340
	<b>Low</b>	<b>Best</b>	<b>High</b>	<b>Low</b>	<b>Best</b>	<b>High</b>
Prospective Resource	632	924	1228	389	565	737

Table 1-1 Linxing PSC Deep CBM Resource Summary (unrisksed) at 1 January 2015

## **Gas Initially In Place (GIIP)**

The total GIIP (Table 1-2) has been estimated probabilistically from uncertainty ranges in reservoir parameters.

### **Sanjiaobei PSC**

Resource (Bcf)	P90	P50	P10
<b>Contingent Resources &amp; Reserves (Discovered)</b>			
Total GIIP	3364	4113	5001
Developable GIIP	1625	2568	3685
Reserves	603	790	999
Contingent Resource	498	740	1043
<b>Prospective Resources</b>			
Total GIIP	3478	4265	5228
Developable GIIP	1651	2656	3861
Prospective Resource	1123	1644	2183

Table 1-2 SanJiaoBei PSC Deep GIIP and Resources (100%, unrisks) at 1 January 2015

### **Linxing PSC**

Resource (Bcf)	P90	P50	P10
<b>Contingent Resources &amp; Reserves (Discovered)</b>			
Total GIIP	5210	6369	7745
Developable GIIP	2517	3977	5708
Reserves	634	818	1023
Contingent Resource	1070	1547	2135
<b>Prospective Resources</b>			
Total GIIP	1962	2401	2923
Developable GIIP	904	1496	2159
Prospective Resource	632	924	1228

Table 1-2 Linxing PSC Deep GIIP and Resources (100%, unrisks) at 1 January 2015

### **Production Forecast (following pages)**

**Table 1-3:** Well numbers and development costs (100%, excluding the 26 deep wells already available) are tabulated in Table 1-3 for the P90, P50 and P10 realizations. 5% unsuccessful development wells (mechanical failure, nonproductive) are included in the well costs but excluded from the successful well numbers.

**Figure 1-2:** Gas production forecasts for each scenario are shown in Figure 1-2.

**Table 1-4:** The estimated probability and NPV (10% real) of a range of outcomes are given in Table 1-4 with the expected monetary value (EMV or risked NPV). Economic evaluation is at 1/1/2015 with pre 2015 expenses treated as sunk costs.

# Production Forecast

## Sanjiaobei PSC

Parameter		Reserves			Reserves + CR (Discovered Area)			Reserves, Contingent & Prospective Resource		
		P90	P50	P10	P90	P50	P10	P90	P50	P10
Max gas rate	MMscf/d	175	225	275	175	225	275	425	525	675
Production	Bcf	628	823	1040	1148	1593	2126	2317	3306	4400
Well numbers		387	387	387	534	534	534	1393	1393	1393
Wells	US\$MM	473	473	473	664	664	664	1784	1784	1784
Gathering	US\$MM	103	104	104	143	143	143	373	373	373
Facilities	US\$MM	182	205	242	182	205	242	354	404	488
Total Capex	US\$MM	757	782	818	989	1013	1049	2512	2562	2646
Unit Capex	\$/mscf	1.2	0.9	0.8	0.9	0.6	0.5	1.1	0.8	0.6
Unit Opex	\$/mscf	0.4	0.4	0.3	0.6	0.5	0.4	0.7	0.5	0.5
Unit cost	\$/mscf	1.7	1.3	1.1	1.5	1.1	0.9	1.8	1.3	1.1

Table 1-3 Well Numbers and Development Costs (100%)

## Sanjiaobei PSC

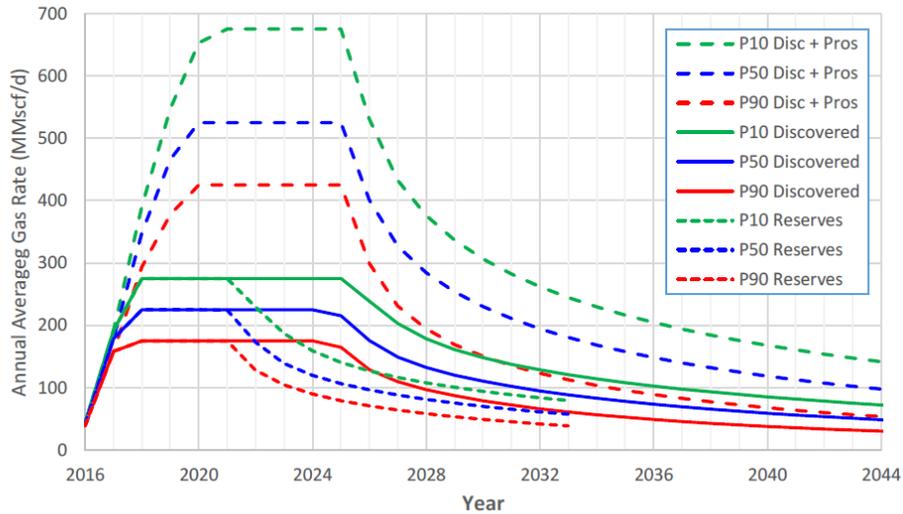


Figure 1-2 P90, P50, P10 Production Forecasts for Reserves, Discovered & Prospective Area Developments

## Sanjiaobei PSC

Economic Summary (SGE share, US\$MM)							
Resources	No dev / discovery		POS and Success NPV <sub>10RT</sub>				EMV
	POS	NPV	POS	P90	P50	P10	
Reserves	0%	-	100%	\$906	\$1,216	\$1,542	\$1220
Contingent	10%	-\$46	90%	\$319	\$444	\$577	\$397
Prospective	46%	-\$20	54%	\$1,102	\$1,502	\$1,983	\$813
<b>Total</b>							<b>\$2,430</b>

Table 1-4 Economic Summary (Deep CBM, SGE Share)

# Production Forecast

## Linxing PSC

Parameter		Reserves			Reserves + CR (Discovered Area)			Reserves, Contingent & Prospective Resource		
		P90	P50	P10	P90	P50	P10	P90	P50	P10
Max gas rate	MMscf/d	275	351	421	275	351	450	425	525	675
Production	Bcf	661	852	1066	1775	2464	3290	2434	3427	4569
Well numbers		462	462	462	827	827	827	1309	1309	1309
Wells	US\$MM	536	536	536	1012	1012	1012	1640	1640	1640
Gathering	US\$MM	124	124	124	222	222	222	351	351	351
Facilities	US\$MM	255	286	332	255	286	354	469	518	626
Total Capex	US\$MM	915	946	991	1488	1520	1587	2460	2509	2617
Unit Capex	\$/mscf	1.4	1.1	0.9	0.8	0.6	0.5	1.0	0.7	0.6
Unit Opex	\$/mscf	0.4	0.4	0.3	0.6	0.5	0.4	0.7	0.5	0.5
Unit cost	\$/mscf	1.8	1.5	1.3	1.4	1.1	0.9	1.7	1.3	1.0

Table 1-3 Well Numbers and Development Costs (100%)

## Linxing PSC

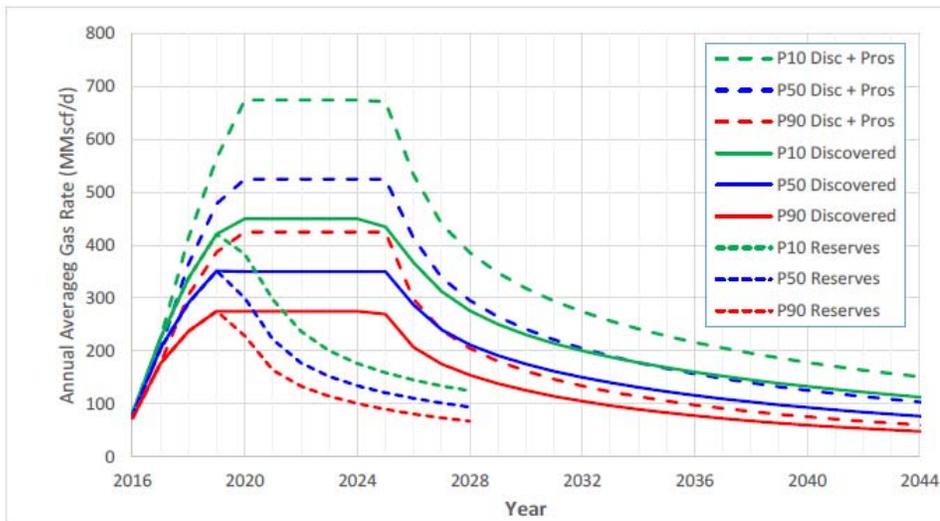


Figure 1-2 P90, P50, P10 Production Forecasts for Reserves, Discovered & Prospective Area Developments

## Linxing PSC

Economic Summary (SGE share, US\$MM)							
Resources	No dev / discovery		POS and Success NPV <sub>10RT</sub>				EMV
	POS	NPV	POS	P90	P50	P10	
Reserves	0%	-	100%	\$1,401	\$1,846	\$2,316	\$1,852
Contingent	10%	-\$88	90%	\$1,023	\$1,416	\$1,876	\$1,281
Prospective	32.5%	-\$20	67.5%	\$757	\$1,051	\$1,416	\$715
<b>Total</b>							<b>\$3,848</b>

Table 1-4 Economic Summary (Deep CBM, SGE Share)

## SHALLOW CBM – LINXING EAST

The estimated shallow CBM GIIP and contingent resources are shown in Table 1-5. SGE entitlement will be approximately 64.75%.

Parameter		Realisation		
		low	best	high
GIIP	bcf	546	910	1,274
Contingent Resource	bcf	109	273	431

Table 1-5 Shallow CBM Full Field GIIP and Resources

Linxing East shallow CBM resources are contingent, contingent upon economic development being confirmed with further pilot testing.

# ECONOMIC EVALUATION

## DEEP CBM

### Development Cost

Development costs (excluding sunk costs up to 31 December 2014) for the deeper CBM development scenarios are summarized in the table as below.

#### Sanjiaobei

Costs, US\$MM 2014 RT	Reserves			Reserves + CR			Reserves, Contingent & Prospective Resource		
	P90	P50	P10	P90	P50	P10	P90	P50	P10
Wells	473	473	473	664	664	664	1784	1784	1784
Gathering	103	104	104	143	143	143	373	373	373
Plant	87	110	134	87	110	134	200	249	310
Pipeline	95	95	107	95	95	107	155	155	178
Total Capex	757	782	818	989	1013	1049	2512	2562	2646

Table 4-1 Development Costs

#### Linxing

Costs, US\$MM 2014 RT	Reserves			Reserves + CR			Reserves, Contingent & Prospective Resource		
	P90	P50	P10	P90	P50	P10	P90	P50	P10
Wells	536	536	536	1012	1012	1012	1640	1640	1640
Gathering	124	124	124	222	222	222	351	351	351
Plant	134	166	197	134	166	213	200	249	320
Pipeline	121	121	134	121	121	141	269	269	306
Total Capex	915	946	991	1488	1520	1587	2460	2509	2617

Table 5-1 Development Costs

### Plateau Production Rates

#### Sanjiaobei

Plateau MMscf/d	P90	P50	P10
Discovered Area	175	225	275
Discovered plus Prospective Area	425	525	675

Table 4-2 Range of Plateau Production Rates (MMscf/d wellhead gas)

#### Linxing

Plateau MMscf/d	P90	P50	P10
Discovered Area	275	350	450
Discovered plus Prospective Area	425	525	675

Table 5-2 Range of Plateau Production Rates (MMscf/d wellhead gas)

## Operating Cost (Opex)

### Sanjiaobei

Opex, US\$MM 2014 RT	Reserves			Reserves + CR			Reserves, Contingent & Prospective Resource		
	P90	P50	P10	P90	P50	P10	P90	P50	P10
Lifecycle Opex, \$MM	283	321	364	711	796	892	1630	1797	2039
Peak Opex, \$MM/yr	17	20	22	20	22	25	47	52	59

Table 4-3 Operating Costs

### Linxing

Opex, US\$MM 2014 RT	Reserves			Reserves + CR			Reserves, Contingent & Prospective Resource		
	P90	P50	P10	P90	P50	P10	P90	P50	P10
Lifecycle Opex, \$MM	276	312	350	1071	1186	1368	1676	1844	2117
Peak Opex, \$MM/yr	24	27	31	30	34	39	47	52	60

Table 5-3 Operating Costs

## Unit Technical Costs

Unit technical costs for the cases are shown in the tables below.

### Sanjiaobei

US\$MM 2014 RT	Reserves			Reserves + CR			Reserves, Contingent & Prospective Resource		
	P90	P50	P10	P90	P50	P10	P90	P50	P10
Production, Bcf	628	823	1040	1148	1593	2126	2317	3306	4400
Lifecycle Capex, \$MM	757	782	818	989	1013	1049	2512	2562	2646
Lifecycle Opex, \$MM	283	321	364	711	796	892	1630	1797	2039
Unit Capex, \$/mscf	1.2	0.9	0.8	0.9	0.6	0.5	1.1	0.8	0.6
Unit Opex, \$/mscf	0.4	0.4	0.3	0.6	0.5	0.4	0.7	0.5	0.5
UTC, \$/mscf	1.7	1.3	1.1	1.5	1.1	0.9	1.8	1.3	1.1

Table 4-4 Unit Technical Costs

### Linxing

US\$MM 2014 RT	Reserves			Reserves + CR			Reserves, Contingent & Prospective Resource		
	P90	P50	P10	P90	P50	P10	P90	P50	P10
Production, Bcf	661	852	1066	1775	2464	3290	2434	3427	4569
Lifecycle Capex, \$MM	915	946	991	1488	1520	1587	2460	2509	2617
Lifecycle Opex, \$MM	276	312	350	1071	1186	1368	1676	1844	2117
Unit Capex, \$/mscf	1.4	1.1	0.9	0.8	0.6	0.5	1.0	0.7	0.6
Unit Opex, \$/mscf	0.4	0.4	0.3	0.6	0.5	0.4	0.7	0.5	0.5
UTC, \$/mscf	1.8	1.5	1.3	1.4	1.1	0.9	1.7	1.3	1.0

Table 5-4 Unit Technical Costs

## Economic Analysis

Discounted Cashflow Analysis of the P90, P50 and P10 scenarios has been conducted on the Linxing and Sanjiaobei PSCs to calculate the after tax NPV, EMV and mean recoverable volumes. The analysis has been divided into reserves, contingent and prospective resources.

### **Reserves and Contingent Resources**

Economic results from developing reserves and contingent resources in the discovered area are summarized in the tables as below.

SanJiaoBei Block - Reserves					
	IRR(RT)	NPV10% real at 1/1/2014 (US\$MM)	Probability	Recoverable Gas (Bcf, SGE share)	EMV (US\$MM)
Develop (P90 outcome)	75%	\$906	25%	304	\$227
Develop (P50 outcome)	87%	\$1,216	50%	393	\$608
Develop (P10 outcome)	90%	\$1,542	25%	491	\$385
<b>Total SanJiaoBei Block - Reserves EMV</b>					<b>\$1,220</b>

Table 5-1: Reserves Area Economics and Resources

Linxing Block - Reserves					
	IRR(RT)	NPV10% real at 1/1/2014 (US\$MM)	Probability	Recoverable Gas (Bcf, SGE share)	EMV (US\$MM)
Develop (P90 outcome)	133%	\$1,401	25%	410	\$350
Develop (P50 outcome)	151%	\$1,846	50%	522	\$923
Develop (P10 outcome)	155%	\$2,316	25%	646	\$579
<b>Total Linxing Block - Reserves EMV</b>					<b>\$1,852</b>

Table 6-2: Reserves Area Economics and Resources

SanJiaoBei Block - Contingent Resource					
	IRR(RT)	NPV10% real at 1/1/2014 (US\$MM)	Probability	Recoverable Gas (Bcf, SGE share)	EMV (US\$MM)
Appraisal fails		-\$46	10%	0	-\$5
Develop (P90 outcome)	76%	\$319	23%	242	\$72
Develop (P50 outcome)	87%	\$444	45%	358	\$200
Develop (P10 outcome)	91%	\$577	23%	502	\$130
<b>Total SanJiaoBei Block - Discovered EMV</b>					<b>\$397</b>

Table 5-2: Contingent Resource Area Economics and Resources

Linxing Block - Contingent Resource					
	IRR(RT)	NPV10% real at 1/1/2014 (US\$MM)	Probability	Recoverable Gas (Bcf, SGE share)	EMV (US\$MM)
Appraisal fails		-\$88	10%	0	-\$9
Develop (P90 outcome)	91%	\$1,023	23%	681	\$230
Develop (P50 outcome)	102%	\$1,416	45%	977	\$637
Develop (P10 outcome)	107%	\$1,876	23%	1340	\$422
<b>Total Linxing Block - Discovered EMV</b>					<b>\$1,281</b>

Table 6-3: Contingent Resource Area Economics and Resources

## Prospective Resources

The incremental economic results from developing prospective resources are summarized in tables below.

SanJiaoBei Block - Prospective					
	IRR(RT)	NPV10% real at 1/1/2014 (US\$MM)	Probability	Recoverable Volume (Bcf, Contractor share)	EMV (US\$MM)
Exploration fails		-\$20	46%	0	-\$9.2
Develop (P90 outcome)	81%	\$1,102	14%	521	\$149
Develop (P50 outcome)	92%	\$1,502	27%	760	\$405
Develop (P10 outcome)	96%	\$1,983	14%	996	\$268
<b>Total SanJiaoBei Block - Prospective EMV</b>					<b>\$813</b>

Table 5-3: Prospective Resource Economics and Resources

Linxing Block - Prospective					
	IRR(RT)	NPV10% real at 1/1/2014 (US\$MM)	Probability	Recoverable Volume (Bcf, Contractor share)	EMV (US\$MM)
Exploration fails		-\$20	32.5%	0	-\$6.5
Develop (P90 outcome)	69%	\$757	17%	389	\$128
Develop (P50 outcome)	78%	\$1,051	34%	565	\$355
Develop (P10 outcome)	83%	\$1,416	17%	737	\$239
<b>Total Linxing Block - Prospective EMV</b>					<b>\$715</b>

Table 6-4: Prospective Resource Economics and Resources

## **SGE Share Reserves and Resources**

SGE share (cost + profit gas) and full field resource volumes are summarized in Tables as below.

### **Sanjiaobei PSC (Deep CBM)**

Gas Resource (bcf)	Full Field			SGE Entitlement			Development probability
	1P	2P	3P	1P	2P	3P	
Reserves	603	790	999	304	393	491	firm
	1C	2C	3C	1C	2C	3C	
Contingent Resource	498	740	1043	242	358	502	90%
	low	best	high	low	best	high	
Prospective Resource	1123	1644	2183	521	760	996	54%

Table 5-4: Resource Volumes at 1 January 2015

### **Linxing PSC (Deep CBM)**

Gas Resource (bcf)	Full Field			SGE Entitlement			Development probability
	1P	2P	3P	1P	2P	3P	
Reserves	634	818	1023	410	522	646	firm
	1C	2C	3C	1C	2C	3C	
Contingent Resource	1070	1547	2135	681	977	1340	90%
	low	best	high	low	best	high	
Prospective Resource	632	924	1228	389	565	737	67.5%

Table 6-5: Resource Volumes at 1 January 2015

In addition contingent resources are assigned to the east of Linxing East as tabled below:

Parameter		Realisation		
		low	best	high
GIIP	bcf	546	910	1,274
Contingent Resource	bcf	109	273	431

Table 1-5 Shallow CBM Full Field GIIP and Resources

SGE entitlement of the shallow CBM resources will be approximately 64.75%.