

Beaufort Sea Play 5: Lisburne

Geological Assessment

Grasp UAI: (AAAAABAG)

Play Area: 1875 square miles

Play Water Depth Range: 5 – 650 feet

Play Depth Range: 3700 - 17000 feet

Play Exploration Chance: 0.15

Play 5, Lisburne, Beaufort Sea OCS Planning Area, 2006 Assessment, Undiscovered Technically-Recoverable Oil & Gas			
Assessment Results as of November 2005			
Resource Commodity (Units)	Resources *		
	F95	Mean	F05
BOE (Mmboe)	0	179	864
Total Gas (Tcfg)	0.000	0.224	0.983
Total Liquids (Mmbo)	0	139	689
Free Gas** (Tcfg)	0.000	0.071	0.296
Solution Gas (Tcfg)	0.000	0.153	0.688
Oil (Mmbo)	0	138	684
Condensate (Mmbc)	0	1	5

* Risked, Technically-Recoverable
 ** Free Gas Includes Gas Cap and Non-Associated Gas
 F95 = 95% chance that resources will equal or exceed the given quantity
 F05 = 5% chance that resources will equal or exceed the given quantity
 BOE = total hydrocarbon energy, expressed in barrels-of-oil-equivalent, where 1 barrel of oil = 5,620 cubic feet of natural gas
 Mmb = millions of barrels
 Tcf = trillions of cubic feet

Table 1

Play 05, the Lisburne play, is estimated to contain 179 Mmbbl mean BOE. This represents 1.4% of the mean hydrocarbon resources of the Beaufort Sea assessment province. Of this, 78% of the resources are expected to be liquid hydrocarbons. The overall assessment results for play 5 are shown in [table 1](#). [Table 5](#) reports the

detailed assessment results by commodity for play 5.

[Table 3](#) summarizes the volumetric input data developed for the GRASP computer model of Beaufort Sea play 5. [Table 4](#) reports the risk model used for play 5. The location of play 5 is shown in [figure 1](#).

The play includes the platform carbonates (limestone and dolomite) of the Mississippian to Pennsylvanian Lisburne Group. Potential hydrocarbon traps of structural origin include anticlines, faulted anticlines, and fault- block traps. Potential stratigraphic traps may be associated with porosity pinch-outs, unconformity truncations or paleo-karst topography at the Lower Cretaceous or other unconformities. Six OCS wells, Beechy Pt. #1 and #2, Mukluk, Mars, Y-0181 (Now in Northstar Field), and Phoenix tested prospects in the play without commercial success. The Lisburne field with 192 million barrels of recoverable oil produces from the corollary onshore play. The presence and quality of the reservoir and quality of the seal are the primary risk factors for this play.

A maximum of 18 hypothetical pools is forecast by the aggregation of the risk model and the prospect numbers model for play 5. These pools range in mean conditional (un-risked) recoverable volumes from 0.6 Mmboe (pool rank 18) to 287 Mmboe (pool rank 1). Pool rank 1 ranges in possible conditional recoverable volumes from 9 Mmboe (F95) to 976 Mmboe (F05). [Table 2](#) shows the conditional sizes of the 10 largest pools in play 5.

Play 5, Lisburne, Beaufort Sea OCS Planning Area, 2006 Assessment, Conditional BOE Sizes of Ten Largest Pools			
Assessment Results as of November 2005			
Pool Rank	BOE Resources *		
	F95	Mean	F05
1	9	287	976
2	2.31	69	268
3	0.89	27	99
4	0.45	14	49
5	0.28	8	28
6	0.19	5	18
7	0.15	3.7	13
8	0.12	2.8	10
9	0.10	2.2	8
10	0.08	1.9	6

* Conditional, Technically-Recoverable, Millions of Barrels Energy-Equivalent (Mmboe), from "PSRK.out" file
F95 = 95% chance that resources will equal or exceed the given quantity
F05 = 5% chance that resources will equal or exceed the given quantity
BOE = total hydrocarbon energy, expressed in barrels-of-oil-equivalent, where 1 barrel of oil = 5,620 cubic feet of natural gas

Table 2

Table 6 reports statistics for the simulation pools developed in the GRASP computer model for play 5. In the computer simulation for the play, a total of 24,214 “simulation pools” were sampled for size. These simulation pools can be grouped according to the USGS size class system in which sizes double with each successive class. Pool size class 9 contains the largest share (9,334, or 14%) of simulation pools (conditional, technically recoverable BOE resources) for play 5. Pool size class 9 ranges from 8 to 16 Mmboe. The largest pool among the 24,214 simulation pools falls within pool size class 18, which ranges in size from 4,096 to 8,192 Mmboe.

GRASP Play Data Form (Minerals Management Service-Alaska Regional Office)

Basin: Beaufort
 Play Number: 05
 Play UAI Number: AAAAABAG

Assessor: Johnson/Scherr
 Play Name: Lisburne

Date: 10/7/2005

Play Area: mi² (million acres) 1875 (1200.1)
 Reservoir Thermal Maturity: % Ro

Play Depth Range: feet 3700 7900 17000
 Expected Oil Gravity: ° API 30
 Play Water Depth Range: feet 5 30 650

POOLS Module (Volumes of Pools, Acre-Feet)

Fractile	F100	F95	F90	F75	F50	Mean/Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Prospect Area (acres)-Model Input	6	185		922	2812		8579			42692		60000	80000
Prospect Area (acres)-Model Output													
Fill Fraction (Fraction of Area Filled)	0.1	0.144		0.289	0.499		0.756			0.949		0.99	1
Productive Area of Pool (acres)	1	71	139	417	1419	5987.75/12135.143	5106	10492	16282	25714			77209
Pay Thickness (feet)	8	30	39	58	90	112.728/86.141	141	179	210	267	350	419	1053

MPRO Module (Numbers of Pools)

Play Level Chance	0.5	Prospect Level Chance	0.3	Exploration Chance	0.15
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Risk Model	Play Chance	Petroleum System Factors	Prospect Chance
		Presence of porosity	0.5
		adequate seal	0.6
	0.5	Presence of adequate reservoir	

Fractile	F99	F95	F90	F75	F50	Mean/Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Numbers of Prospects in Play	10	11.3	12	13.5	15.5	16.15/2.9910	17.5	18.5	19.5	20.5	22	23	30
Numbers of Pools in Play					0@F49.75	2.42/2.82	5	6	7	8	9	9	18

Minimum Number of Pools	0	Mean Number of Pools	2.42	Maximum Number of Pools	18
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POOLS/PSRK/PSUM Modules (Play Resources)

Fractile	F100	F95	F90	F75	F50	Mean/Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Oil Recovery Factor (bbl/acre-foot)	24	54	63	80	105	113.989/48.474	138	159	176	203	239	267	464
Gas Recovery Factor (Mcfg/acre-foot)	19	60	74	104	151	177.336/110.278	220	270	309	379	476	555	1220
Gas Oil Ratio (Sol'n Gas)(cf/bbl)	90	170	230	390	720	1075.25/1034.163	1350	1900	2300	3200	4700		6000
Condensate Yield ((bbl)/Mmcfg)	0.25	1.55	2.34	4.65	10	18.331/23.705	21.49	32.41	42.79	64.62	102.76	140	143

Pool Size Distribution Statistics from POOLS (1,000 BOE): μ (mu)= 9.48317886 σ^2 (sigma squared)= 3.97754420 Random Number Generator Seed= 633591

BOE Conversion Factor (cf/bbl)	5620	Probability Any Pool Contains Both Oil and Free Gas (Gas Cap)	1
Probability Any Pool is 100% Oil	0	Fraction of Pool Volume Gas-Bearing in Oil Pools with Gas Cap	0.25
Probability Any Pool is 100% Gas	0		

Table 3. Input data for Beaufort Sea play 5, 2006 assessment.

GRASP - Geologic and Economic Resource Assessment Model - PSUM Module Results

Minerals Management Service - Alaska OCS Region
 GRASP Model Version: 8.29.2005)
 Computes the Geologic Resource Potential of the Play

Play UAI: AAAABAG **Play No. 5**

World Level - World Level Resources
 Country Level - UNITED STATES OF AMERICA
 Region Level - MMS - ALASKA REGION
 Basin Level - **BEAUFORT SHELF**
Play Level - 5 - Lisburne Play

Geologist Peter Johnson
 Remarks Play 5 2005 Assessment
 Run Date & Time: Date 19-Sep-05 Time 13:48:01

Summary of Play Potential

Product	MEAN	Standard Deviation
BOE (Mboe)	178,720	386,960
Oil (Mbo)	137,620	295,570
Condensate (Mbc)	1,279	5,086
Free (Gas Cap & Nonassociated) Gas (Mmcfg)	71,224	175,090
Solution Gas (Mmcfg)	152,570	449,100

10000 (Number of Trials in Sample)
 0.4972 (MPhc [Probability] of First Occurrence of Non-Zero Resource)
 Windowing Feature: used

Empirical Probability Distributions of the Products

Greater Than Percentage	BOE (Mboe)	Oil (Mbo)	Condensate (Mbc)	Free (Gas Cap & Nonassociated) Gas (Mmcfg)	Solution Gas (Mmcfg)
100	0	0	0	0	0
99.99	0	0	0	0	0
99	0	0	0	0	0
95	0	0	0	0	0
90	0	0	0	0	0
85	0	0	0	0	0
80	0	0	0	0	0
75	0	0	0	0	0
70	0	0	0	0	0
65	0	0	0	0	0
60	0	0	0	0	0
55	0	0	0	0	0
50	140	108	1	75	94
45	25,957	20,062	269	12,595	19,018
40	56,671	44,599	407	25,167	40,388
35	92,482	72,089	695	41,024	69,681
30	137,050	106,770	993	61,870	102,750
25	193,990	150,470	1,384	78,466	158,390
20	269,480	210,790	2,227	120,810	196,530
15	373,180	295,520	2,232	142,000	281,860
10	537,550	421,400	3,758	199,860	431,760
8	637,200	490,560	6,246	267,400	521,590
6	772,510	608,060	4,935	277,560	618,930
5	864,170	684,060	5,129	295,880	687,520
4	985,520	753,570	6,091	409,490	859,840
2	1,396,500	1,073,800	8,743	574,710	1,189,800
1	1,885,100	1,431,100	13,768	676,450	1,798,000
0.1	3,457,400	2,736,800	4,103	610,680	3,416,200
0.01	5,313,800	4,488,900	17,001	1,958,900	2,581,500
0.001	6,944,800	5,391,800	4,315	1,146,700	7,557,000

Table 5. Assessment results by commodity for Beaufort Sea play 5, 2006 assessment.

Basin: BEAUFORT SHELF Play 05 - Lisburne Play UAI Key: AAAAAABG				Model Simulation "Pools" Reported by "Fieldsize.out" GRASP Module																		
Classification and Size				Pool Count Statistics			Pool Types Count			Mixed Pool Range		Oil Pool Range		Gas Pool Range		Total Pool Range		Pool Resource Statistics (MMBOE)				
Class	Min (MMBOE)	Max (MMBOE)	Pool Count	Percentage	Trial Average	Trials w/Pool Avg	Mixed Pool	Oil Pool	Gas Pool	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Total Resource	Average Resource	
1	0.0312	0.0625	86	0.355166	0.0086	0.017293	86	0	0	1	1	0	0	0	0	1	1	0.031778	0.062478	4.107876	47.766004	
2	0.0625	0.125	184	0.759891	0.0184	0.037	184	0	0	1	2	0	0	0	0	1	2	0.062683	0.124826	17.292894	93.983121	
3	0.125	0.25	292	1.205914	0.0292	0.058717	292	0	0	1	2	0	0	0	0	1	2	0.125054	0.249968	55.635297	190.531835	
4	0.25	0.5	622	2.568762	0.0622	0.125075	622	0	0	1	3	0	0	0	0	1	3	0.250395	0.499172	231.180367	371.672630	
5	0.5	1	1111	4.588255	0.1111	0.223406	1111	0	0	1	4	0	0	0	0	1	4	0.501117	0.999438	830.579931	747.596681	
6	1	2	1781	7.355249	0.1781	0.358134	1781	0	0	1	4	0	0	0	0	1	4	1.000776	1.999512	2629.554000	1.476448	
7	2	4	2515	10.386553	0.2515	0.505731	2515	0	0	1	4	0	0	0	0	1	4	2.000044	3.999764	7340.528000	2.918699	
8	4	8	3027	12.501033	0.3027	0.608687	3027	0	0	1	5	0	0	0	0	1	5	4.000691	7.997063	17553.833000	5.799086	
9	8	16	3334	13.766894	0.3334	0.67042	3334	0	0	1	5	0	0	0	0	1	5	8.001965	15.999353	38880.172000	11.661719	
10	16	32	3184	13.149418	0.3184	0.640257	3184	0	0	1	5	0	0	0	0	1	5	16.002773	31.967620	72753.325000	22.849663	
11	32	64	2680	11.067977	0.268	0.53891	2680	0	0	1	5	0	0	0	0	1	5	32.015082	63.826634	121955.463000	45.505772	
12	64	128	2175	8.982407	0.2175	0.437362	2175	0	0	1	4	0	0	0	0	1	4	64.023303	127.885915	195895.003000	90.066666	
13	128	256	1477	6.099777	0.1477	0.297004	1477	0	0	1	3	0	0	0	0	1	3	128.028918	255.886943	263469.834000	178.381744	
14	256	512	983	4.059635	0.0983	0.197667	983	0	0	1	3	0	0	0	0	1	3	256.264067	511.221384	348135.897000	354.156555	
15	512	1024	489	2.019493	0.0489	0.098331	489	0	0	1	2	0	0	0	0	1	2	512.020506	1022.230000	344961.927000	705.443604	
16	1024	2048	171	0.706203	0.0171	0.034386	171	0	0	1	2	0	0	0	0	1	2	1024.836000	2009.508000	234886.988000	1.373608	
17	2048	4096	45	0.185843	0.0045	0.009049	45	0	0	1	1	0	0	0	0	1	1	2063.758000	3751.207000	120757.427000	2.683498	
18	4096	8192	3	0.01239	0.0003	0.000603	3	0	0	1	1	0	0	0	0	1	1	4579.193000	7020.331000	16870.483000	5.623494	
19	8192	16384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	0.000000	0.000000	
20	16384	32768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	0.000000	0.000000	
21	32768	65536	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	0.000000	0.000000	
22	65536	131072	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	0.000000	0.000000	
23	131072	262144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	0.000000	0.000000	
24	262144	524288	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	0.000000	0.000000	
25	524288	1048576	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000	0.000000	0.000000	
Not Classified			55	0.227141	0.0055	0.01106	Below Class	55	0	0	0	0	0	0	0	0	0	Below Class	0.002851	0.031115	1.027446	18.680833
Totals			24214	99.999992	2.4214	4.869093	Above Class	0	0	0	0	0	0	0	0	0	0	Above Class	0.000000	0.000000	0.000000	0.000000

Number of Pools not Classified: 55	Min and Max refer to numbers of pools of the relevant size class that occur within any single trial in the simulation.	Min and Max refer to aggregate resources of the relevant size class that occur within any single trial in the simulation.
Number of Pools below Class 1: 55		
Number of Trials with Pools: 4973		

Table 6. Statistics for simulation pools created in computer sampling run for Beaufort Sea play 5, 2006 assessment.

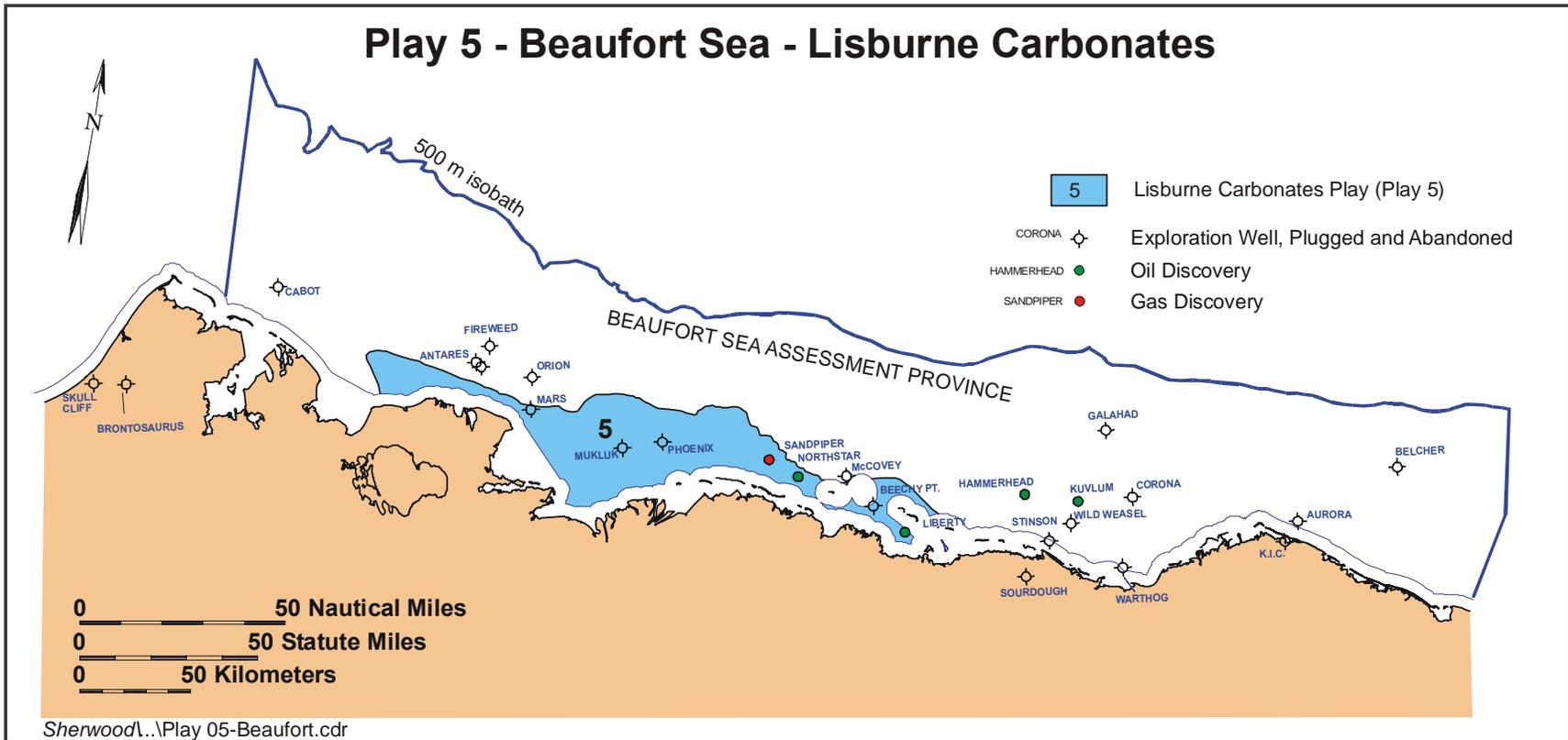


Figure 1. Map location of Beaufort Sea play 5, 2006 assessment.