

St. George Basin Play 3: North Platform Play

Geological Assessment

GRASP UAI: AAAAAJAD

Play Area: 2,600 square miles

Play Water Depth Range: 280-470 feet

Play Depth Range: 3,750-6,250 feet

Play Exploration Chance: 0.125

Play 3, North Platform, St. George Basin 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	145	653
Total Gas (Tcfg)	0.000	0.600	2.634
Total Liquids (Mmbo)	0	38	184
Free Gas** (Tcfg)	0.000	0.592	2.593
Solution Gas (Tcfg)	0.000	0.008	0.041
Oil (Mmbo)	0	23	118
Condensate (Mmbc)	0	15	67
* 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 3, the “North Platform” play, is the third most important play (of four plays) in the St. George Basin OCS Planning Area, with 20% (145 Mmboe) of the Planning Area energy endowment (712 Mmboe). The overall assessment results for play 3 are shown in [table 1](#). Oil and gas-condensate liquids form 26% of the hydrocarbon energy

endowment of play 3. [Table 5](#) reports the detailed assessment results by commodity for play 3.

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

The north platform extends north of the St. George graben for about 10 to 25 miles. This area contains 3,000 to 10,000 feet of Cenozoic sedimentary rocks over the acoustic basement unconformity. The basement just north of the graben is probably composed of Mesozoic and lower Tertiary sedimentary rocks. Farther north, less than 3,000 feet of Cenozoic strata occur over igneous basement.

Potential traps in play 3 include stratigraphic onlap onto basement highs, anticlinal structures within the basement, drape of Tertiary strata over basement highs, and fault-bounded traps. No exploratory wells have tested prospects in the north platform play.

Oligocene sandstones probably have the best reservoir-rock potential, based on seismic correlation from well control in the graben to the south. The top of the oil-generation window is estimated to occur at approximately 12,000 feet. Therefore, thermally-mature source rocks would have to be present in basement strata for the north platform play to be viable.

The best source-rock potential is probably in Jurassic strata beneath the acoustic basement unconformity. That is based on data from

the Arco Y-0511 well, which was drilled in the graben but penetrated the north-bounding fault, passing below the fault into basement rocks of the north platform. Samples from Jurassic shale in that well had TOC values of 0.5 to 2.0 percent and visual kerogen examination reported a high percentage of amorphous material. The source for oil in Cook Inlet is from Middle Jurassic strata (Magoon and Claypool; Magoon and Anders, 1992).

Play 3, North Platform, St. George Basin 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	14	194	640
2	5.1	64	207
3	2.8	33	101
4	1.9	21	62
5	1.43	14	43
6	1.17	11	32
7	1.00	9	25
8	0.89	7	21
9	0.79	6	17
10	0.68	5	15
* 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

A maximum of 16 hypothetical pools is forecast by the aggregation of the risk model and the prospect numbers model for play 3. These 16 pools range in mean conditional (un-risked) recoverable volumes from 2.6 Mmboe (pool rank 16) to 194 Mmboe (pool rank 1). Pool rank 1 ranges in possible conditional recoverable volumes from 14

Mmboe (F95) to 640 Mmboe (F05), or in a gas case from 0.079 Tcfge (F95) to 3.597 Tcfge (F05). [Table 2](#) shows the conditional sizes of the 10 largest pools in play 3.

In the computer simulation for play 3 a total of 20,323 "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 10 contains the largest share (3,833, or 19%) of simulation pools (conditional, technically recoverable BOE resources) for play 3. Pool size class 10 ranges from 16 to 32 Mmboe. The largest simulation pool for play 3 falls within pool size class 17, which ranges in size from 2,048 to 4,096 Mmboe (or 11.5 to 23 Tcfge). [Table 6](#) reports statistics for the simulation pools developed in the *GRASP* computer model for play 3.

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

Basin: St. George Basin
 Play Number: 3
 Play UAI Number: AAAAAJAD

Assessor: Comer
 Play Name: North Platform Play

Date: March, 2005

Play Area (mi²; millions of acres): 2,600 (1.664)
 Reservoir Thermal Maturity, % Ro:

Play Depth Range, feet: 3750 - 5000 - 6250
 Expected Oil Gravity, ° API: 35
 Play Water Depth Range, feet: 280 - 375 - 470
 Prospect Distance from shore, miles: 340

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	0				18271	~ ~ ~				59000			~
Prospect Area (acres)-Model Output	118	5658	7330	11298	18271	23553 / 19160	29547	38242	45542	59000	78960	95891	103292
Fill Fraction (Fraction of Area Filled)	0.06	0.11	0.13	0.16	0.2	0.21192 / 0.074237	0.25	0.28	0.31	0.35	0.4	0.44	0.71
Productive Area of Pool (acres)	13	448	720	1596	3860	8621.67 / 13461.78	9338	15002	20682	33285	56864	81265	90000
Pay Thickness (feet)	48	80	87	101	120	123.848 / 31.888	142	155	165	181	200	215	303

MPRO Module (Numbers of Pools)

Play Level Chance	0.5	Prospect Level Chance	0.25	Exploration Chance	0.125
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Risk Model	Play Chance	Petroleum System Factors	Prospect Chance
		[See Risking Sheet]	

Fractile	F100	F95	F90	F75	F50	Mean / Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Numbers of Prospects in Play	6	10	11	13	15	16.27 / 4.00	18	20	21	23	26	26	27
Numbers of Pools in Play	~	~	~	F49.19= 0	F45 = 2	2.03 / 2.48	4	5	6	7	8	9	16

Minimum Number of Pools	0	Mean Number of Pools	2.03	Maximum Number of Pools	16
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POOLS/PSRK/PSUM Module (Play Resources)

Fractile	F100	F95	F90	F75	F50	Mean / Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Oil Recovery Factor (bbl/acre-foot)	39	79	90	111	141	150.109 / 55.177	179	203	221	251	290	319	519
Gas Recovery Factor (Mcfg/acre-foot)	37	108	131	180	255	292.939 / 166.945	362	437	497	600	742	855	1760
Gas Oil Ratio (Sol'n Gas)(cf/bbl)	67	160	187	241	321	351.791 / 158.841	427	498	552	644	766	859	1550
Condensate Yield (bbl/Mmmcf)	10	18	19	22	25	25.530 / 5.344	29	31	32	35	38	40	50

Pool Size Distribution Statistics from POOLS (1,000 BOE): μ (mu) = 10.1701272 σ^2 (sigma squared) = 2.09903177 Random Number Generator Seed = 137826

BOE Conversion Factor (cf/bbl)	5620	Probability Any Pool Contains Both Oil and Free Gas (Gas Cap)	0.1
Probability Any Pool is 100% Oil	0	Fraction of Pool Volume Gas-Bearing in Oil Pools with Gas Cap	0.3
Probability Any Pool is 100% Gas	0.9		

Table 3. Input data for St. George basin play 3, 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: AAAAAJAD	Play No. 3	
World Level -	World Level Resources	
Country Level -	UNITED STATES OF AMERICA	
Region Level -	MMS - ALASKA REGION	
Basin Level -	ST. GEORGE BASIN	
Play Level -	3 North	Platform Play
Geologist Comer		
Remarks North	Platform	
Run Date & Time: Date	19-Sep-05 Time	14:11:10

Summary of Play Potential

Product	MEAN	Standard Deviation
BOE (Mboe)	145,240	272,020
Oil (Mbo)	23,252	110,270
Condensate (Mbc)	15,194	28,995
Free (Gas Cap & Nonassociated) Gas (Mmcfg)	592,000	1,106,900
Solution Gas (Mmcfg)	8,180	42,489

10000 (Number of Trials in Sample)

0.4917 (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	0	0	0	0	0
45	34,193	2,509	3,960	155,070	736
40	66,217	4,875	7,551	300,380	1,921
35	103,520	8,153	11,830	466,570	2,911
30	144,660	8,956	16,848	664,610	3,337
25	189,240	24,890	20,133	801,990	8,542
20	247,930	30,812	26,562	1,061,300	9,688
15	325,200	41,571	35,637	1,377,000	16,671
10	435,460	60,785	46,804	1,819,400	23,236
8	498,630	69,730	53,781	2,084,100	24,045
6	594,390	98,583	61,852	2,403,700	35,093
5	653,110	117,620	66,866	2,593,100	40,539
4	738,990	154,740	73,060	2,820,200	52,762
2	1,030,000	221,720	102,640	3,888,600	76,985
1	1,314,300	286,150	126,000	4,973,700	96,706
0.1	2,458,100	0	298,190	12,139,000	0
0.01	2,868,600	1,174,300	255,070	7,808,800	279,930
0.001	3,057,400	445,460	302,390	12,789,000	190,250

Table 5. Assessment results by commodity for St. George basin play 3, 2006 assessment.

Basin: ST. GEORGE BASIN Play 03 - North Platform Play UAI Key: AAAAAJAD							Model Simulation "Pools" Reported by "Fieldsiz.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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000				
2	0.0625	0.125	6	0.029523	0.0006	0.00122	0	0	6	0	0	0	0	0	1	1	1	1	1	0.066098	0.115619				
3	0.125	0.25	20	0.098411	0.002	0.004067	0	0	20	0	0	0	0	0	1	1	1	1	1	0.127643	0.241223				
4	0.25	0.5	63	0.309994	0.0063	0.01281	2	0	61	1	1	0	0	0	1	1	1	1	1	0.250396	0.496815				
5	0.5	1	199	0.979186	0.0199	0.040464	1	0	198	1	1	0	0	0	1	2	1	1	2	0.500834	0.999207				
6	1	2	546	2.686611	0.0546	0.111021	7	0	539	1	1	0	0	0	1	3	1	1	3	1.002976	1.999821				
7	2	4	1168	5.747183	0.1168	0.237495	30	0	1138	1	1	0	0	0	1	3	1	1	3	2.001541	3.997569				
8	4	8	2174	10.69724	0.2174	0.44205	87	0	2087	1	3	0	0	0	1	4	1	1	4	4.000043	7.996652				
9	8	16	3242	15.95237	0.3242	0.659211	187	0	3055	1	3	0	0	0	1	5	1	1	5	8.000513	15.995023				
10	16	32	3833	18.860405	0.3833	0.779382	309	0	3524	1	2	0	0	0	1	6	1	1	6	16.000742	31.988319				
11	32	64	3595	17.689318	0.3595	0.730988	390	0	3205	1	2	0	0	0	1	5	1	1	5	32.000823	63.990556				
12	64	128	2692	13.246076	0.2692	0.547377	372	0	2320	1	2	0	0	0	1	5	1	1	5	64.004332	127.986823				
13	128	256	1584	7.794125	0.1584	0.322082	260	0	1324	1	2	0	0	0	1	3	1	1	4	128.104856	255.518199				
14	256	512	800	3.936427	0.08	0.162668	171	0	629	1	2	0	0	0	1	4	1	1	4	256.100695	511.882192				
15	512	1024	305	1.500763	0.0305	0.062017	88	0	217	1	2	0	0	0	1	2	1	1	2	513.237836	1021.214000				
16	1024	2048	85	0.418245	0.0085	0.017283	33	0	52	1	1	0	0	0	1	2	1	1	2	1025.016000	1968.472000				
17	2048	4096	11	0.054126	0.0011	0.002237	6	0	5	1	1	0	0	0	1	1	1	1	1	2081.537000	2601.698000				
18	4096	8192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000				
19	8192	16384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000				
20	16384	32768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000				
21	32768	65536	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000				
22	65536	131072	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000				
23	131072	262144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000				
24	262144	524288	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000				
25	524288	1048576	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000000	0.000000				
Not Classified			0	0	0	0	Below Class											Below Class			0.000000				
Totals			20323	100	2.0323	4.132371	Above Class											Above Class			0.000000				
Number of Pools not Classified: 0																						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: 0																									
Number of Trials with Pools: 4918																									

Table 6. Statistics for simulation pools created in computer sampling run for St. George basin play 3, 2006 assessment.

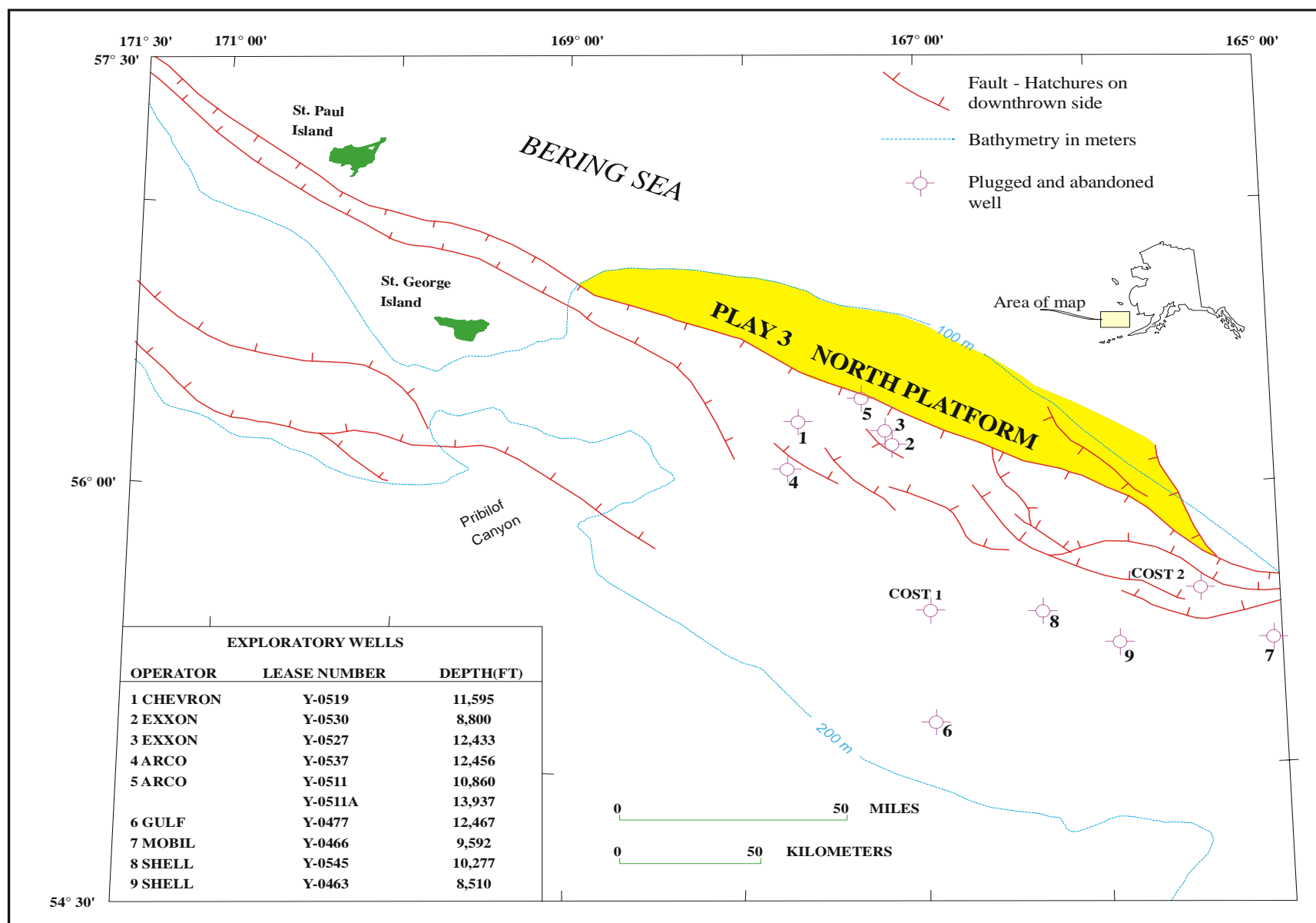


Figure 1. Map location of St. George basin play 3, 2006 assessment.