North Aleutian Basin Play 1: Bear Lake-Stepovak (Oligocene-Miocene)

Geological Assessment
GRASP UAI: AAAAA HAB
Play Area: 14,820 square miles
Play Water Depth Range: 15-300 feet
Play Depth Range: 2,000-10,000 feet
Play Exploration Chance: 0.1872

Play 1, Bear Lake-Stepovak (Oligocene-Miocene), North Aleutian 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	1,400	3,749
Total Gas (Tcfg)	0.000	5.586	14.461
Total Liquids (Mmbo)	0	406	1,176
Free Gas** (Tcfg)	0.000	5.473	14.131
Solution Gas (Tcfg)	0.000	0.113	0.330
Oil (Mmbo)	0	271	828
Condensate (Mmbc)	0	136	349
* 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 1, the "Bear Lake-Stepovak" play, is the dominant play in the North Aleutian Basin OCS Planning Area, with 61% (1,400 Mmboe) of the Planning Area energy endowment (2,287 Mmboe). The overall assessment results for play 1 are shown in table 1. Oil and gas-condensate liquids form 29% of the hydrocarbon energy endowment

of play 1. Table 5 reports the detailed assessment results by commodity for play 1.

Table 3 summarizes the volumetric input data developed for the *GRASP* computer model of North Aleutian basin play 1. Table 4 reports the risk model used for play 1. The location of play 1 is shown in figure 1.

The Bear Lake-Stepovak play sequence corresponds in the North Aleutian Shelf COST 1 well to the lower part of the Milky River Formation, all of the Bear Lake Formation, and the upper (sandy) part of the Stepovak Formation. The play sequence ranges in age from late Oligocene through early Pliocene. In onshore areas, rocks correlative to play 1 were penetrated by 9 wells (David River 1/1A, Hoodoo Lake 1, Hoodoo Lake 2, Sandy River 1, Port Heiden 1, Ugashik 1, Becharof Lake 1, Great Basins 1, and Great Basins 2 wells). Offshore, in eastern St. George basin, correlative rocks were penetrated by the St. George Basin COST 2, Monkshood 1, and Bertha 1 wells. The principal point of offshore control is the North Aleutian Shelf COST 1 stratigraphic information test well that was drilled by an industry consortium in 1983.

No pools of oil or gas were encountered in any wells penetrating the Bear Lake-Stepovak sequence in the North Aleutian basin. Minor gas shows are associated with coals in the Bear Lake-Stepovak sequence in the North Aleutian Shelf COST 1 well and in most wells onshore. In the Becharof Lake 1 well, cuttings headspace gas carbon isotopes (AOGCC, 1985) for the Bear Lake and Stepovak Formations range from -19.5 to -65.4 (δ^{13}C [PDB]), indicating mixed thermogenic and biogenic gas. No shows of

oil were noted within the Bear Lake-Stepovak play sequence in the North Aleutian Shelf COST 1 well. Oil shows were noted in the play sequence in the Becharof Lake 1, Sandy River 1, and David River 1/1A wells. Flow tests in the Bear Lake-Stepovak sequence in the Sandy River 1 well recovered gas-cut drilling mud and formation waters.

Most of the oil and gas resources of play 1 are associated with Oligocene- to Miocene-age sandstones in simple domes draped over basement uplifts. Mapped domes range up to 93,000 acres in closure areas. Thick (maximum = 277 ft), highly porous reservoir sandstones sum to 3,305 feet in the North Aleutian Shelf COST 1 well—comprising 61 percent of the 5,390 ft-thick Bear Lake-Stepovak play sequence. No oil source formation has been identified in the North Aleutian basin but coals and shales with Type III (coal-like) organic matter are abundant and could form sources for both biogenic and thermogenic gas, condensate, and perhaps minor oil. For this reason, play 1 is modeled as gas-prone. Oil shows were encountered in the interval from 15,300 to 16,800 feet (corresponds to 0.78% to 1.04% Ro) in the North Aleutian Shelf COST 1 well. Carbon isotopes on extracts from the show interval correlate to extracts and oils from Tertiary-age rocks in northern Cook Inlet as opposed to extracts and oils from known Mesozoic-age oil source rocks on the Alaska Peninsula and beneath Cook Inlet. These data suggest that Mesozoic oil source beds do not underlie North Aleutian basin in the area of play 1. This interpretation is supported by magnetic intensity data that suggest that play 1 is underlain by a substrate of Mesozoic volcano-plutonic rocks. The hypothesized petroleum system for play 1 assumes that gas and minor liquids migrate out of Tertiary rocks in the deep parts of North Aleutian basin and rise along faults bounding basement uplifts to charge shallow reservoir beds draped over uplifts.

Three major risk factors for play 1 relate to: **1) seal** (reservoir sequence is very sand-rich and is not capped by a regional seal); **2) source adequacy** (no attractive source formation in known Tertiary-age rocks; Mesozoic rocks beneath play 1 are pervasively invaded by plutons and cannot form a source for petroleum); and **3) petroleum migration to reservoirs** (a major seal sequence—bentonitic shales of the lower Stepovak Formation—floors the reservoir sequence and is only sparsely pierced by faults).

Play 1, Bear Lake-Stepovak, North Aleutian 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	187	827	2495
2	106	378	816
3	65	245	542
4	41	174	382
5	26	130	290
6	17	99	227
7	12	78	184
8	9	63	153
9	7	53	129
10	6	44	110

* 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 34 hypothetical pools is forecast by the aggregation of the risk model and the prospect numbers model for play 1.

These 34 pools range in mean conditional (un-risked) recoverable volumes from 6 Mmboe (pool rank 34) to 827 Mmboe (pool rank 1). Pool rank 1 ranges in possible conditional recoverable volumes from 187 Mmboe (F95) to 2,495 Mmboe (F05), or in a gas case from 1.05 Tcfge (F95) to 14.02 Tcfge (F05). Table 2 shows the conditional sizes of the 10 largest pools in play 1.

In the computer simulation for play 1 a total of 73,007 "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 12 contains the largest share (15,882, or 22%) of simulation pools (conditional, technically recoverable BOE resources) for play 1. Pool size class 12 ranges from 64 to 128 Mmboe. The largest simulation pool for play 1 falls within pool size class 19, which ranges in size from 8,192 to 16,384 Mmboe (or 46 to 92 Tcfge). Table 6 reports statistics for the simulation pools developed in the *GRASP* computer model for play 1.

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

Basin: North Aleutian Basin **Assessor(s)**: K.W. Sherwood, D. Comer, J. Larson   **Date**: December 2004
Play Number: 1 **Play Name**: Bear Lake-Stepovak (Oligocene-Miocene)
Play UAI Number: AAAAA HAB

Play Area: 14,820mi^2 (9.5 million acres)   **Play Depth Range**: 2,000-10,000 feet (mean = 6,000 ft)
Reservoir Thermal Maturity: 0.25%-0.48% Ro   **Expected Oil Gravity**: 35° API
Play Water Depth Range: 15-300 feet (mean = 250 ft)

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*	3227		4249		10661	13794/11325			26750				92660
Prospect Area (acres)-Model Output**	989	3408	4394	6710	10825	13560/10075	17299	22441	26058	33526	40000	44000	88280
Fill Fraction (Fraction of Area Filled)	0.17	0.28	0.3	0.34	0.4	0.41/0.10	0.48	0.51	0.53	0.6	0.65	0.69	1
Productive Area of Pool (acres)	247	1310	1706	2638	4299	5742/4972	7173	9421	11081	14063	17500	21000	51718
Pay Thickness (feet)	3	21	29	52	98	151/180***	184	258	324	340	375	400	550

* model fit to prospect area data in *BESTFIT*   *** original fit to Cook Inlet data
** output from *@RISK* after aggregation with fill fraction

MPRO Module (Numbers of Pools)

Input Play Level Chance	0.72	Prospect Level Chance	0.26	Exploration Chance	0.1872
Output Play Level Chance*	0.7197				

* First Occurrence of Non Zero Pools As Reported in PSUM Module

Risk Model	Play Chance	Petroleum System Factors	Prospect Chance
	0.8	Seal (no regional seal over reservoir sequence)	0.5
	0.9	Source (mainly Tertiary coals and Type III shales)	0.65
		Migration (regional shale seal between source & reservoir)	0.8

Fractile	F99	F95	F90	F75	F50	Mean/Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Numbers of Prospects in Play	24	28	30	32	38	39/7.95	43	46	49	52	56	60	80
Numbers of Pools in Play					8	7.30/5.40	11	13	14	15	17	19	34

Zero Pools at F72.00

Minimum Number of Pools	4 (F70)	Mean Number of Pools	7.3	Maximum Number of Pools	34

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)	89	212	247	319	424	465/209	564	657	728	848	1008	1130	1516
Gas Recovery Factor (Mcfg/acre-foot)	279	578	657	812	1029	1093/399	1304	1480	1613	1832	2114	2327	2584
Gas Oil Ratio (Sol'n Gas)(cf/bbl)	56	162	195	267	376	426/220	531	638	723	871	1073	1100	1110
Condensate Yield ((bbl/Mmcfg)	1	14	17	21	25	25/7	29	32	34	35	37	39	50

Pool Size Distribution Statistics from *POOLS* (1,000 BOE): μ (mu)= 11.439 σ^2 (sigma squared)= 1.628   Random Number Generator Seed= 297,150

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	0.1	Fraction of Pool Volume Gas-Bearing in Oil Pools with Gas Cap	0.9
Probability Any Pool is 100% Gas	0.8		

Table 3. Input data for North Aleutian basin play 1, 2006 assessment.

Risk Analysis Form - 2006 National Assessment

Assessment Province:	North Aleutian Basin OCS Planning Area	Play Number, Name:	1. Bear Lake-Stepovak (Oligocene-Miocene)
Assessor(s):	K.W. Sherwood, D. Comer, J. Larson	Play UAI:	AAAAA HAB
Date:	1-Jan-05		

For each component, a *quantitative* probability of success (i.e., between zero and one, where zero indicates no confidence and one indicates absolute certainty) based on consideration of the *qualitative* assessment of **ALL** elements within the component was assigned. This is the assessment of the probability that the minimum geologic parameter assumptions have been met or exceeded.

			Play Chance Factors	Averge Conditional Prospect Chance[1]
1. Hydrocarbon Fill component (1a * 1b * 1c)		1	*0.9000*	*0.5200*
a. Presence of a Quality, Effective, Mature Source Rock				
Probability of efficient source rock in terms of the existence of sufficient volume of mature source rock of adequate quality located in the drainage area of the reservoirs.		1a	0.90	0.65
b. Effective Expulsion and Migration				
Probability of effective expulsion and migration of hydrocarbons from the source rock to the reservoirs.		1b	1.00	0.80
c. Preservation				
Probability of effective retention of hydrocarbons in the prospects after accumulation.		1c	1.00	1.00
2. Reservoir component (2a * 2b)		2	*1.0000*	*1.0000*
a. Presence of reservoir facies				
Probability of presence of reservoir facies with a minimum net thickness and net/gross ratio (as specified in the resource assessment).		2a	1.00	1.00
b. Reservoir quality				
Probability of effectiveness of the reservoir, with respect to minimum effective porosity, and permeability (as specified in the resource assessment).		2b	1.00	1.00
3. Trap component (3a * 3b)		3	*0.8000*	*0.5000*
a. Presence of trap				
Probability of presence of the trap with a minimum rock volume (as specified in the resource assessment).		3a	1.00	1.00
b. Effective seal mechanism				
Probability of effective seal mechanism for the trap.		3b	0.80	0.50

	Play Chance Factors	Averge Conditional Prospect Chance[1]
Overall Play Chance (Marginal Probability of hydrocarbons, MPhc)	*0.7200*	
(1 * 2 * 3) *Product of All Subjective Play Chance Factors*		

	Play Chance Factors	Averge Conditional Prospect Chance[1]
Average Conditional Prospect Chance[1]		*0.2600*
(1 * 2 * 3) *Product of All Subjective Conditional Prospect Chance Factors*		
[1] *Assumes that the Play exists (where all play chance factors = 1.0)*		
Must be consistent with play chance and prospect distribution -- See discussion on Page 3 of Guide		

Exploration Chance	*0.1872*
(Product of Overall Play Chance and Average Conditional Prospect Chance)	

Comments: *See guidance document for explanation of the Risk Analysis Form*

Table 4. Risk model for North Aleutian basin play 1, 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: AAAAAHAB			**Play No.**		**1**	
World	Level	-	World	Level	Resources	
Country	Level	-	UNITED	STATES	OF	AMERICA
Region	Level	-	MMS	-	ALASKA	REGION
Basin	Level	-	**NORTH**	**ALEUTIAN**	**BASIN**	
Play	**Level**	**-**	**Play**		**1 Bear Lake/Stepovak**	
Geologist	Sherwood	/	Comer	Larson	**(Miocene/Oligocene)**	
Remarks		2005 Assessment				
Run Date & Time:		Date	19-Sep-05 Time		14:07:33	

Summary of Play Potential

Product	MEAN	Standard Deviation
BOE (Mboe)	1,400,300	1,315,300
Oil (Mbo)	270,650	543,910
Condensate (Mbc)	135,670	131,380
Free (Gas Cap & Nonassociated) Gas (Mmcfg)	5,473,000	5,179,500
Solution Gas (Mmcfg)	113,400	253,300

　　10000 (Number of Trials in Sample)
　　0.7197 (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	428,920	42,337	47,443	1,885,700	20,217
65	743,300	78,470	79,426	3,255,800	34,234
60	924,590	138,610	96,260	3,820,400	55,817
55	1,097,800	129,240	116,560	4,733,800	54,424
50	1,257,300	173,560	130,540	5,288,300	68,775
45	1,413,900	223,890	145,030	5,780,900	92,082
40	1,572,100	178,060	168,570	6,803,600	83,602
35	1,741,000	320,800	169,140	6,899,000	131,980
30	1,938,000	338,620	192,430	7,778,300	128,660
25	2,152,100	385,320	211,850	8,572,800	165,660
20	2,392,100	454,090	232,130	9,390,100	196,910
15	2,685,800	537,920	259,840	10,398,000	213,010
10	3,112,300	772,520	281,990	11,246,000	318,880
8	3,334,300	684,590	309,860	12,880,000	270,200
6	3,582,000	879,440	319,690	13,042,000	349,760
5	3,749,400	827,680	348,590	14,131,000	329,810
4	3,953,900	910,010	363,860	14,702,000	359,430
2	4,668,800	1,402,400	384,240	15,555,000	643,150
1	5,437,300	1,558,300	457,940	18,535,000	691,720
0.1	8,560,300	4,002,000	583,870	20,923,000	1,412,700
0.01	9,881,800	6,417,300	368,060	13,617,000	3,785,600
0.001	12,563,000	10,221,000	177,420	6,752,700	5,413,500

Table 5. Assessment results by commodity for North Aleutian basin play 1, 2006 assessment.

Basin: NORTH ALEUTIAN BASIN
Play 1 - Bear Lake/Stepovak (Miocene/Oligocene)
UAI Key: AAAAAHAB

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	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0		0.000000	0.000000	0.000000	0.000000
2	0.0625	0.125	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0		0.000000	0.000000	0.000000	0.000000
3	0.125	0.25	4	0.005479	0.0004	0.000556		0	0	4	0	0	0	0	1	1	1	1		0.191108	0.222781	0.844078	211.019471
4	0.25	0.5	8	0.010958	0.0008	0.001111		0	0	8	0	0	0	0	1	1	1	1		0.315271	0.435919	3.077366	384.670764
5	0.5	1	53	0.072596	0.0053	0.007363		4	5	44	1	1	1	1	1	1	1	1		0.503212	0.981680	41.302323	779.289126
6	1	2	207	0.283534	0.0207	0.028758		11	5	191	1	1	1	1	1	2	1	2		1.045681	1.999298	322.251529	1.556771
7	2	4	604	0.827318	0.0604	0.083912		49	24	531	1	1	1	1	1	3	1	3		2.004109	3.993643	1833.323000	3.035303
8	4	8	1630	2.232663	0.163	0.226452		146	73	1411	1	2	1	1	1	3	1	4		4.007199	7.999241	9832.676000	6.032317
9	8	16	3893	5.332366	0.3893	0.540845		378	173	3342	1	2	1	2	1	5	1	5		8.001595	15.993918	47019.755000	12.078026
10	16	32	7896	10.815401	0.7896	1.096971		741	442	6713	1	3	1	2	1	8	1	9		16.008270	31.999954	188860.439000	23.918495
11	32	64	12596	17.253139	1.2596	1.749931		1231	754	10611	1	3	1	3	1	9	1	10		32.002188	63.999774	595032.012000	47.239761
12	64	128	15882	21.754078	1.5882	2.206446		1584	1249	13049	1	3	1	3	1	9	1	10		64.000789	127.999197	1470750.000000	92.604805
13	128	256	14566	19.951511	1.4566	2.023618		1497	1508	11561	1	3	1	4	1	8	1	9		128.006532	255.984369	2652561.000000	182.106323
14	256	512	9798	13.42063	0.9798	1.361211		1094	1476	7228	1	3	1	4	1	7	1	8		256.039420	511.993714	3493126.000000	356.514221
15	512	1024	4321	5.918611	0.4321	0.600306		434	902	2985	1	2	1	3	1	5	1	6		512.011330	1023.691000	2989632.000000	691.884277
16	1024	2048	1282	1.755996	0.1282	0.178105		101	448	733	1	1	1	2	1	3	1	4		1024.537000	2047.337000	1756141.000000	1.369845
17	2048	4096	238	0.325996	0.0238	0.033065		23	98	117	1	2	1	1	1	2	1	2		2050.438000	4008.320000	639316.445000	2.686204
18	4096	8192	28	0.038352	0.0028	0.00389		1	20	7	1	1	1	1	1	1	1	1		4125.396000	6655.965000	147362.867000	5.262959
19	8192	16384	1	0.00137	0.0001	0.000139		0	1	0	0	0	1	1	0	0	1	1		11537.666000	11537.666000	11537.666000	11.537666
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			0	0	0	0	Below Class	0	0	0									Below Class	0.000000	0.000000	0.000000	0.000000
	Totals		73007	100.000008	7.3007	10.142679	Above Class	0	0	0									Above Class	0.000000	0.000000	0.000000	0.000000

Number of Pools not Classified: 0
Number of Pools below Class 1: 0
Number of Trials with Pools: 7198

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.

Table 6. Statistics for simulation pools created in computer sampling run for North Aleutian basin play 1, 2006 assessment.
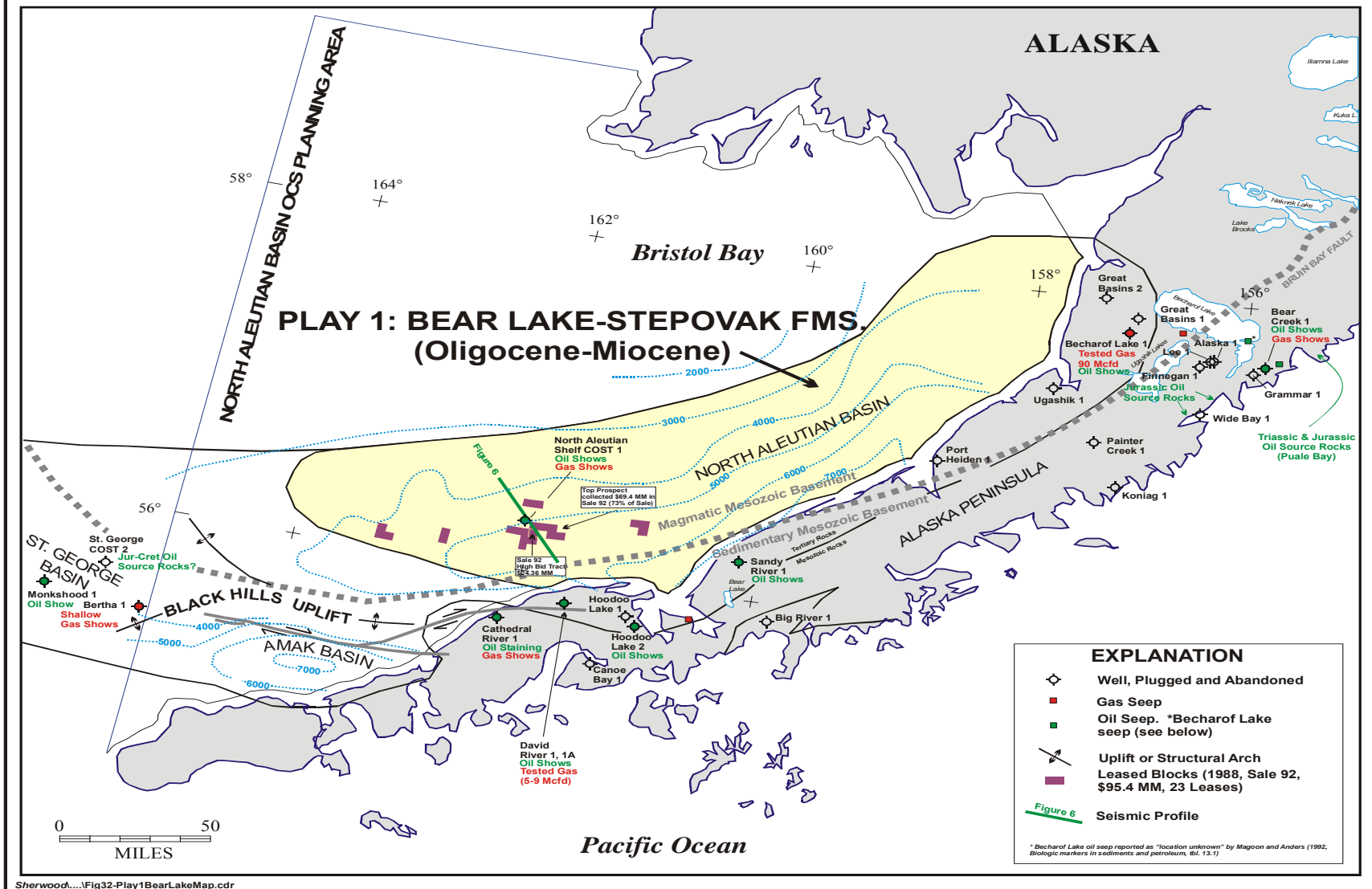
PLAY 1: BEAR LAKE-STEPOVAK (Oligocene-Miocene)

ALASKA

Iliamna Lake

Kuka L.

58°

164°

162°

Bristol Bay

160°

158°

156°

Naknek Lake

Lake Brooks

NORTH ALEUTIAN BASIN OCS PLANNING AREA

BRUIN BAY FAULT

Great Basins 2

Great Basins 1

Bear Creek 1
Oil Shows
Gas Shows

PLAY 1: BEAR LAKE-STEPOVAK FMS.
(Oligocene-Miocene)

Becharof Lake 1
Tested Gas
90 Mcfd
Oil Shows

Alaska 1

Finnegan 1
Jurassic Oil
Source Rocks

Grammar 1

2000

Ugashik 1

Wide Bay 1

3000

4000

NORTH ALEUTIAN BASIN

North Aleutian
Shelf COST 1
Oil Shows
Gas Shows

Port
Heiden 1

Painter
Creek 1

Triassic & Jurassic
Oil Source Rocks
(Puale Bay)

5000

6000

7000

Top Prospect
collected $69.4 MM in
Sale 92 (73% of Sale)

Magmatic Mesozoic Basement

Koniag 1

56°

St. George
COST 2
Jur-Cret Oil
Source Rocks?

Sale 92
High Bid Tract
$74.36 MM

Tertiary Rocks

Mesozoic Rocks

Sedimentary Mesozoic Basement

ALASKA PENINSULA

ST. GEORGE
BASIN

Sandy
River 1
Oil Shows

Figure 6

Monkshood 1
Oil Show   Bertha 1
Shallow
Gas Shows

BLACK HILLS   UPLIFT

4000

Bear
Lake

Hoodoo
Lake 1

Big River 1

5000

Cathedral
River 1
Oil Staining
Gas Shows

Hoodoo
Lake 2
Oil Shows

AMAK BASIN

7000

6000

Canoe
Bay 1

David
River 1, 1A
Oil Shows
Tested Gas
(5-9 Mcfd)

EXPLANATION

◇   Well, Plugged and Abandoned

■   Gas Seep

■   Oil Seep. *Becharof Lake
     seep (see below)

     Uplift or Structural Arch

▬   Leased Blocks (1988, Sale 92,
     $95.4 MM, 23 Leases)

━ Figure 6   Seismic Profile

* Becharof Lake oil seep reported as "location unknown" by Magoon and Anders (1992,
Biologic markers in sediments and petroleum, tbl. 13.1)

0   50

MILES

Pacific Ocean

Sherwood\....\Fig32-Play1BearLakeMap.cdr

Figure 1. Map location of North Aleutian basin play 1, 2006 assessment.