Hope Basin Play 4: Deep (>10,000 ft) Basal Sandstones
Correlative to Chukchi Sea Play 29

Geological Assessment

GRASP UAI: AAAAA FAE
Play Area: 2,158 square miles
Play Water Depth Range: 115-165 feet
Play Depth Range: 10,000-11,500 feet
Play Exploration Chance: 0.01176

Play 4, the "Deep Basal Sandstone" play, is a subordinate play in the Hope Basin OCS Planning Area, with negligible technically recoverable petroleum resources.

Table 1 summarizes the volumetric input data developed for the *GRASP* computer model of Hope basin play 4 before the decision was reached to not pursue further quantification. Table 2 reports the risk model used for play 4. The location of play 4 is shown in figure 1.

Plays 3 and 4 were defined to acknowledge the possible existence of sandstones (presence inferred by analogy to Norton basin) creating potential traps at the base of the sedimentary fill of Hope and Kotzebue basins. The two plays are separated at a burial depth of 10,000 feet. Density log porosities of sandstones in the Kotzebue basin wells are projected[1] to fall below 10 percent at burial depths greater than 10,000 feet. Because most types of sandstones cannot house extractable petroleum when porosities fall below 10 percent, the model reflects our view that it is improbable that viable (sufficiently porous and permeable) sandstone reservoirs were preserved in the Deep Basal Sand (4) play. Potential source rocks for prospects in plays 3 and 4 would include the gas-prone organic material detected in Early Sequence samples in the two Kotzebue basin wells. Other petroleum sources of a speculative nature might include older, un-sampled rocks in the deeper parts of Hope basin, or basement rocks. The Deep Basal Sand play (4) lies entirely within the area where rocks are projected to have achieved sufficient thermal maturity to generate thermogenic oil or gas (below 7,300 ft subsea or 0.6% Ro isograd). Given viable organic sources within the Eocene rocks that appear to floor Hope basin, prospects involving the basin-floor sandstones of play 4 would be best positioned to capture expelled thermogenic hydrocarbons.

Owing to high risks associated with preservation of sandstone porosity and the small numbers of identified prospects in the very small play area within the Hope Basin Planning Area, play 4 is presently (2006) assessed with negligible quantities of undiscovered technically-recoverable oil and gas resources.

[1] *extrapolated below well data using a Norton basin porosity decline rate*

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

Basin: Hope Basin Planning Area
Play Number: 04 (Not Assessed)
Play UAI Number: AAAAA FAE

Assessor: K.W. Sherwood
Play Name: Deep (>10,000 ft) Basal Sandstones (Not Assessed)

Date: January 2005

Play Area: mi^2 (million acres) 2,158 (1.381)
Reservoir Thermal Maturity: % Ro 0.88-1.02

Play Depth Range: feet 10,000 - 11,500 (mean = 10,500)
Expected Oil Gravity: ^{o} API 40
Play Water Depth Range: feet 115 - 165 (mean = 140)

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*	5576		8302		20437	26166/20919			50314				55410
Prospect Area (acres)-Model Output**	5582	7507	8944	13200	19928	22630/12026	30157	36846	41212	46669			55379
Fill Fraction (Fraction of Area Filled)	0.04	0.09	0.10	0.12	0.15	0.16/0.05	0.19	0.21	0.23	0.26			0.50
Productive Area of Pool (acres)***	424	999	1237	1842	2978	3590/2388	4663	5815	6775	8247	9600	10500	18291
Pay Thickness (feet)	18	36	40	48	60	63/20	74	83	90	101	115	125	195

* model fit to prospect area data in *BESTFIT*
** output from *@RISK* after aggregation with fill fraction
*** from *@RISK* aggregation of probability distributions for prospect area and fill fraction

MPRO Module (Numbers of Pools)

Input Play Level Chance	0.4
Output Play Level Chance*	0.1429

*From "0 Pools" Probability Reported in MPRO Module

Prospect Level Chance	0.0294

Exploration Chance	0.01176

Risk Model	Play Chance	Petroleum System Factors	Prospect Chance
		Seal Integrity (many faults-traps fault bounded)	0.7
		Reservoir Presence (unknown)	0.8
		Chance Porosity > 10%	0.15
	0.5	Source Presence	
	0.8	Source Maturity (small generation volume)	
		Migration (primarily vertical and along faults; source beds may lie above reservoir)	0.35

Fractile	F99	F95	F90	F75	F50	Mean/Std. Dev.	F25	F15	F10	F05	F02	F01	F00
Numbers of Prospects in Play	9	10	12	13	14	14.90/2.41	16	17	17.5	18	19	20	27
Numbers of Pools in Play						0.18/0.47			1	1	2	2	6

Zero Pools at F14.29

Minimum Number of Pools	1 (F10)

Mean Number of Pools	0.18

Maximum Number of Pools	6

Play 29 not assessed (assigned negligible resources) because mean number of pools < 1.0 (B. Dickerson Rule)

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)	18	33	37	46	61	70/35	83	100	115	138	160	170	335
Gas Recovery Factor (Mcfg/acre-foot)	245	368	395	449	535	560/148	644	711	759	835	900	950	1268
Gas Oil Ratio (Sol'n Gas)(cf/bbl)	1400	1445	1452	1464	1476		1488	1496	1500	1507	1515	1520	1550
Condensate Yield ((bbl/Mmcfg)	13	18	19	22	25	25/5	28	30	31	33	36	38	50

Pool Size Distribution Statistics from *POOLS* (1,000 BOE): **μ (mu)=** Not Run **σ^2 (sigma squared)=** Not Run

Random Number Generator Seed= 619655

BOE Conversion Factor (cf/bbl)	5620
Probability Any Pool is 100% Oil	0
Probability Any Pool is 100% Gas	0.9

Probability Any Pool Contains Both Oil and Free Gas (Gas Cap)	0.1
Fraction of Pool Volume Gas-Bearing in Oil Pools with Gas Cap	0.5

Table 1. Input data for Hope basin play 4, 2006 assessment. Play 4 was assigned negligible resources because the play offers less than 1 pool at the mean number of pools.

Risk Analysis Form - 2006 National Assessment

Assessment Province:	Hope Basin OCS Planning Area	**Play Number, Name:**	4. Deep (>10,000 ft) Basal Sandstones
Assessor(s):	Kirk W. Sherwood	**Play UAI:**	AAAAA FAE
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**	***0.4000***	***0.3500***
	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	0.40	1.00
	b. Effective Expulsion and Migration			
	Probability of effective expulsion and migration of hydrocarbons from the source rock to the reservoirs.	1b	1.00	0.35
	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***	***0.1200***
	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	0.80
	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	0.15
3.	**Trap component** (3a * 3b)	**3**	***1.0000***	***0.7000***
	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	1.00	0.70

Overall Play Chance (Marginal Probability of hydrocarbons, MPhc)	***0.4000***	
(1 * 2 * 3) *Product of All Subjective Play Chance Factors*		
Average Conditional Prospect Chance[1]		***0.0294***
(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	***0.0118***	
(Product of Overall Play Chance and Average Conditional Prospect Chance)		

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

1a: 0.5 (Source Presence) X 0.8 (Source Maturity) = 0.40

Play 04 not assessed because mean number of pools reported by MPRO is less than 1.0

Table 2. Risk model for Hope basin play 4, 2006 assessment.

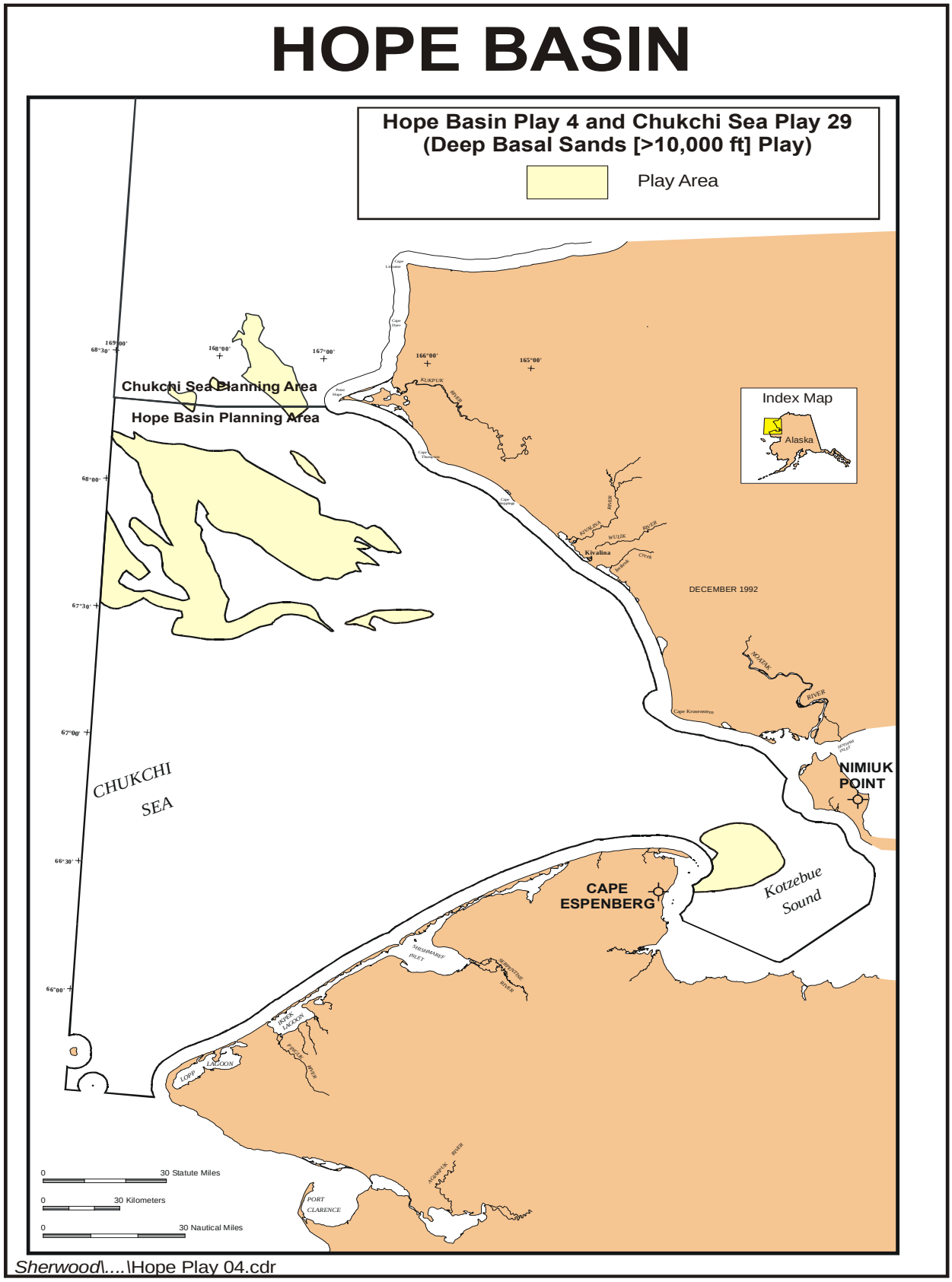

Figure 1. Map location of Hope basin play 4, 2006 assessment.