ALASKA FEDERAL OFFSHORE
Descriptions of Geologic Plays
1995 National Resource Assessment
U.S. Minerals Management Service

NAVARIN BASIN ASSESSMENT PROVINCE
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Seven plays based on a facies-cycle wedge model (White, 1980) have been identified in the Navarin basin assessment province. In the facies-cycle wedge model, the base of a wedge is made up of a succession of facies deposited during a marine transgression. The middle of the wedge represents the peak of the transgression, and the top of the wedge represents a subsequent marine regression.

The plays proposed for Navarin basin include: 1) Miocene transgressive shelf sands (wedge base); 2) regressive shelf sands (wedge top); 3) Oligocene tectonic sands (wedge middle); 4) turbidite and submarine fan sands (wedge middle); 5) Eocene transgressive shelf sands (wedge base); 6) subunconformity nonmarine and marginal marine sands (subunconformity); and 7) Paleocene marine sands (apparent wedge top).

Play 1 (UANA0100[1]). Miocene Transgressive Shelf Sands (wedge base): Data from the COST No.1 well indicate that during the early Miocene a basin-wide regression ended and a basin-wide transgression began. The basin subsided slowly at a nearly constant rate through the late Miocene. Local basin highs previously exposed to wave-base erosion were inundated. The postulated regional sediment source terrane consisted of a low-lying borderland drained by sluggish streams. The reservoir sand for the play was derived from newly eroded and reworked volcaniclastic sediments transported into a shelf-wide depositional system (outer to inner neritic). It is probable that at the marine margin a limited supply of sand and an abundant supply of mud existed. A transgressive event under these conditions may have led to the deposition of a discontinuous series of beach sands that impinged on the unconformity and wedged out basinward, forming the play 1 reservoir. This play extends from the lower to the upper Miocene, and is located around the edge of the Navarin basin.

Play 2 (UANA0200). Regressive Shelf Sands (wedge top): Data from the Navarin COST

[1]*The "UA" Code is the "Unique Assessment Identifier" for each play, and is the principal guide to GRASP data files.*

No.1 well indicate that a basin-wide regression began during the late Oligocene and culminated during the early Miocene. The regression was due to a sea level drop; no major tectonic uplift occurred during this time period.

During the gradual emergence (marine regression), sand deposits that came to be exposed above sea level were eroded and redeposited seaward. This process continued throughout the regression, leaving the remaining accumulation of sand at the lowest stand of the sea. The typical regressive marginal marine beach or bar sand bodies that resulted probably had a very limited width but often may have had a linear extent of many miles. These conditions, along with structural control (faults and folds) on the Navarin basin depositional surface, and in combination with longshore drift, may have both trapped and concentrated local accumulations of sand and elsewhere locally inhibited sand deposition in the play 2 sequence. The largest sand bodies in the play probably coincide with large post- or synsedimentary structures.

Play 2 includes the best reservoir sands found in the 9 wells drilled in the basin. Over 200 feet of good reservoir sands with porosities of 15 to 20 percent were found in the COST No.1 well. These occur in five beds ranging in thickness from 21 to 100 feet (Turner and others, 1984). This play extends from the upper Oligocene to the lower Miocene and is located around the edge of Navarin basin.

Play 3 (UANA0300). Oligocene Tectonic Sands (wedge middle): Tectonic subsidence beginning in the early to middle Eocene caused a basin-wide marine transgression. In the vicinity of the COST No.1 well this subsidence was temporarily interrupted by two local tectonic uplifts: one lasting from late Eocene through earliest Oligocene and the other during the early Oligocene. Other such local events may have occurred at different locations and at different times in the basin during this interval (late Eocene to late Oligocene). Highs formed during up-warping were eroded, and the resulting sediments sorted and redeposited. Sand deposits exposed above sea level were probably eroded and redeposited seaward, leaving the largest accumulations of sand in the play 3 sequence at the low sea-stand margin. This play extends from the upper Eocene to the upper Oligocene, and is located around the edge of the Navarin basin.

Play 4 (UANA0400). Turbidite and Submarine Fan Sands (wedge middle): The centers of the subbasins remained submerged during most or all of the Tertiary, and it is probable that turbidity currents deposited sand in them. In addition to evidence for such turbidites seen on Navarin basin seismic sections, coarse-grained materials, including conglomerates, were dredged from Eocene to early Oligocene rocks on the continental slope. Studies of other strike-slip basins (Hornelen basin, Norway; Little Sulphur Creek and Ridge basins, California) also support this hypothesis. Play 4 extends from the upper Eocene to the lower Miocene, and is found mainly in the centers of the subbasins.

Play 5 (UANA0500). Eocene Transgressive Shelf Sands: The reservoir sands for this play were deposited as a result of a basin-wide transgression lasting from the middle Eocene to the late Eocene or early Oligocene. An abundant supply of mud and a limited supply of sand

probably lead to the deposition of a series of beach sands that impinged on the unconformity and wedged out basinward. Sand supply was probably insufficient to form a continuous blanket over the unconformity. Sand bodies may have formed around local highs. The vertical extent of play 5 is from the middle or upper Eocene to possibly as high as the lower Oligocene. Most of the Navarin basin is included in the play area.

Play 6 (Not Quantified). Nonmarine and Marginal Marine Sands (subunconformity): A regression during the Late Cretaceous led to the deposition of nonmarine and marginal marine sands. At the OCS Y-0599 well these sands were deposited beginning in the Maastrichtian and possibly continuously into Eocene time. At other well locations the nonmarine sands appear to be confined to the Paleocene to early Eocene. The distribution of these nonmarine and marginal marine facies is unknown, and no source rock has been identified. This play was not evaluated because of an extremely low play chance.

Play 7 (Not Quantified). Paleocene Marine Sands (apparent wedge top): Data from the OCS Y-0673 well indicate that marine sands were deposited in parts of the basin during the Paleocene. However, the distribution of this facies is unknown, and no source rock was identified. This play was not evaluated because of an extremely low play chance.

OIL AND GAS ENDOWMENTS OF NAVARIN BASIN PLAYS

Risked, Undiscovered, Conventionally Recoverable Oil and Gas

PLAY NO.	PLAY NAME (UAI * CODE)	OIL (BBO)			GAS (TCFG)		
		F95	MEAN	F05	F95	MEAN	F05
1.	Miocene Transgressive Shelf Sands (UANA0100)	0.000	0.078	0.206	0.000	0.666	1.951
2.	Regressive Shelf Sands (UANA0200)	0.000	0.272	0.605	0.000	2.432	5.655
3.	Oligocene Tectonic Sands (UANA0300)	0.000	0.020	0.054	0.000	0.196	0.599
4.	Turbidite and Submarine Fan Sands (UANA0400)	0.000	0.116	0.275	0.000	2.518	6.236
5.	Eocene Transgressive Shelf Sands (UANA0500)	0.000	0.011	0.036	0.000	0.335	1.024
	FASPAG AGGREGATION	***0.000***	***0.496***	***1.214***	***0.000***	***6.147***	***18.176***

* *Unique Assessment Identifier, code unique to play.*

REFERENCES CITED

Turner, R.F., McCarthy, C.M., Steffy, D.A., Lynch, M.B., Martin, G.C., Sherwood, K.W., Flett, T.O., and Adams, A.J., 1984, Geological and operational summary, Navarin Basin COST No. 1 well, Bering Sea, Alaska: Turner, R.F., ed., U.S. Minerals Management Service, Alaska OCS Region, OCS Report MMS 84-0031, 245 p.