

Cenozoic Mississippi Fan Fold Belt Play

UPL-LL X2, #9992

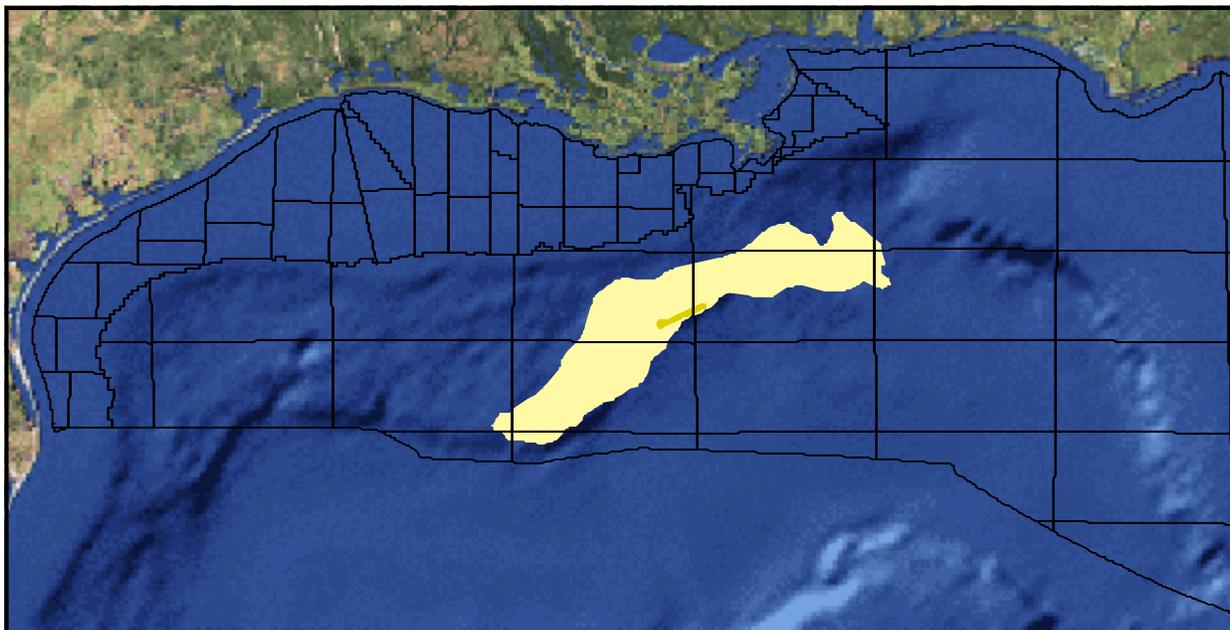


Figure 352. UPL-LL X2 map showing location of play. Play limit shown in light yellow; hydrocarbon limit shown in dark yellow.

Overview

The Cenozoic Mississippi Fold Belt Play (UPL-LL X2) contains reserves of 1,628.867 Bcfg and 301.124 MMbo (590.958 MMBOE) in 10 sands in three unproved fields. Where easily recognized, basinward of the Sigsbee Salt Canopy, UPL-LL X2 extends from the Walker Ridge Area northeastward to the southeastern part of the Mississippi Canyon Area (Figure 352). The play also extends landward beneath the Sigsbee Salt Canopy, but its true extent in this area is speculative.

Description

Much of the following information is taken from Post et al. (in press).

UPL-LL X2 is defined by (1) east-northeast to south-southwest trending salt-cored folds, (2) deformation that occurred as an early folding stage in the late Oligocene to middle Miocene, a main growth/faulting/folding stage from middle Miocene to late Miocene, and a minor thrusting stage from late Miocene through Pliocene, and (3) deep-sea fan deposition.

Easily recognized in the Walker Ridge to Mississippi Canyon Area on seismic data where it occurs in front of the Sigsbee Salt Canopy, UPL-LL X2 also occurs beneath the Sigsbee Salt Canopy where seismic data poorly image the fold belt, making its exact extent unknown (Figure 352).

UPL-LL X2 contains some of the largest Cenozoic discoveries made in the GOM since 1995 (e.g., Atwater 575 Field [Neptune], Green Canyon 699 Field [Atlantis], and Green Canyon 826 Field [Mad Dog]). Company estimates of gross resource potential for the Mad Dog drilling unit (Green Canyon 825, 826, and the northern half of 782) were in excess of 400 MMBOE and as much as 800 MMBOE (Unocal press release of April 12, 1999). These discoveries occur immediately in front of and extend a short distance under the Sigsbee salt canopy. The large, untested area of this play that lies totally beneath the salt canopy has stratigraphy similar to that of the tested area immediately adjacent to the front of the salt canopy, with traps and cross-stratal migration pathways possibly related to canopy emplacement. Thus far, hydrocarbons have been found in rocks of early and middle Miocene age.

To the southwest, from the Alaminos Canyon Area into Mexican national waters, a second fold belt play occurs, the Cenozoic Perdido Fold Belt Play (UPL-LL X1). Northeast-southwest trending folds that formed mainly during the Oligocene and Miocene characterize UPL-LL X1. This play also extends an unknown distance beneath the Sigsbee Salt Canopy. A clockwise regional migration of Cenozoic depocenters (Feng and Buffler, 1996; Peel et al., 1995) from south Texas in the Paleogene to southeast Louisiana in the Plio-Pleistocene determines the timing of the folding in the two fold belts. The boundary between the two fold belts lies beneath the salt canopy in the Keathley Canyon and Walker Ridge Areas. The connection and relationship between the fold belts remains speculative.

Play Limits

To the southwest, the play appears to be bounded by the older, GOM fold belt play, UPL-LL X1. To the northeast, the limit of UPL-LL X2 may be coincident with the "Pearl River Transfer" (MacRae and Watkins, 1996).

Depositional Style

Deepwater fold belts are usually located at the toe of the slope and/or near the basinward depositional limit of salt. These fold belts represent the downslope part of a balanced and linked system wherein upslope extension results in downdip contraction. Differential loading from sediment progradation causes extension in the upslope part of the system. Gravity gliding and/or spreading above a salt detachment translates into the contraction that results in the formation of a fold belt (Letouzey et al., 1995; Rowan et al., 2000).

A regional early stage of fold development occurred from the late Oligocene to middle Miocene. However, the timing of the main folding and thrusting event for UPL-LL X2 is related to the development of the thick middle to late Miocene siliciclastic depocenters in southeast Louisiana. Fold growth continued with only minor thrusting from the late Miocene through Pliocene. Although fold belt structures generally extend basinward to the depositional limit of the salt decollement layer, there are indications in the northeastern part of the play area that folding may extend beyond the salt limit. Continued updip extension during the Pleistocene to Recent caused downdip compression, even though the supply of mobile salt became

exhausted; the detachment shifted to an incompetent unit above salt, probably a shale unit.

UPL-LL X2 is characterized by deep-sea fan systems deposited basinward of their coeval shelf edge. Component facies include channel/levee complexes, fan lobes, interchannel/fringe lobe sediments, distal fringe sheet sands, and slump sediments. These fan systems were deposited on the upper and lower slope in areas between salt-cored folds, and on the abyssal plain.

Structural Style

Linear, salt-cored, buckle folds with landward-dipping, typically listric reverse faults that cut the basinward limb of the fold characterize the UPL-LL X2 structural style.

Quantitative Attributes

On the basis of reserves calculations, UPL-LL X2 contains 51% oil and 49% gas. The 10 sands in the play each contain one reservoir, seven of which are nonassociated gas and three of which are undersaturated oil. All reserves are unproved and estimated to be 1,628.867 Bcfg and 301.124 MMbo (590.958 MMBOE) (Table 171). These reserves account for over 99% of the reserves for the two fold belt plays.

Table 172 summarizes that water depths of the fields in the play range from 6,133-6,560 ft, and play interval discovery depths vary from 12,906-20,500

	No. of Sands	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)
Proved	0	0.000	0.000	0.000
Cum. production	0	0.000	0.000	0.000
Remaining proved	0	0.000	0.000	0.000
Unproved	10	301.124	1,628.867	590.958

Table 171. UPL-LL X2 reserves and cumulative production.

10 Sands	Min	Mean	Max
Water depth (ft)	6,133	6,230	6,560
Subsea depth (ft)	12,906	17,017	20,500
Reservoirs per sand	1	1	1
Porosity	24%	27%	30%
Water saturation	16%	24%	48%

Table 172. UPL-LL X2 sand attributes. Values are volume-weighted averages of individual reservoir attributes.

ft, subsea. Additionally, porosity and water saturation range from 24-30% and 16-48%, respectively.

Exploration and Production History

All the sands in the UPL-LL X2 have been discovered since the first Atlas database cutoff of January 1, 1995 (Figure 353). The first sand, and

second largest in the play, was discovered in 1995 in the Neptune Field. The other nine sands were all discovered in 1998.

The largest sand in the play was discovered in 1998 in the Mad Dog Field and contains an estimated 275.076 MMBOE (Figure 354). The play also contains a 100-plus MMBOE sand in the Neptune Field. The mean sand size for the play is 59.096 MMBOE. No production has occurred from the play as of this study.

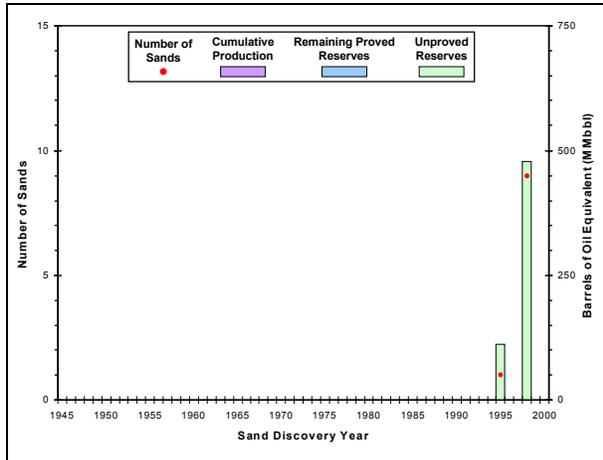


Figure 353. UPL-LL X2 exploration history graph showing reserves and number of sands discovered by year.

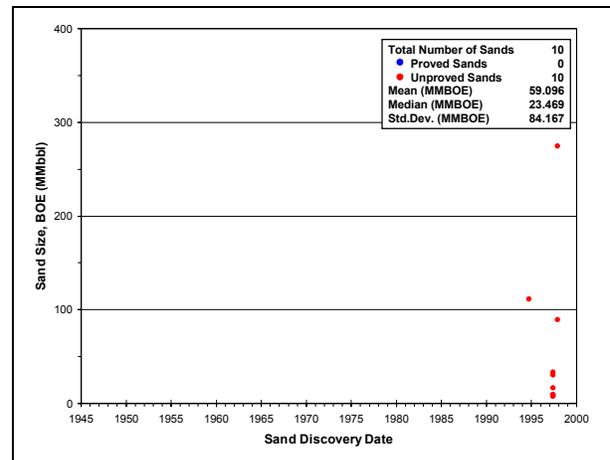


Figure 354. UPL-LL X2 sand discovery graph showing the size of sands discovered by year.