

Lower Pleistocene Fan 2 Play

LPL F2, #0782

Valvulineria "H" and *Lenticulina* 1

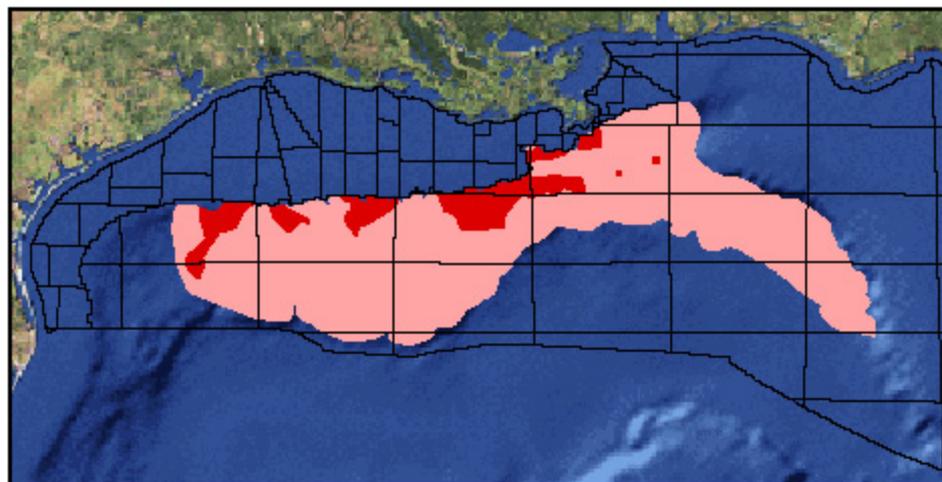


Figure 164. LPL F2 map showing location of play. Play limit shown in light red; hydrocarbon limit shown in dark red.

Overview

The Lower Pleistocene Fan 2 Play (LPL F2) contains reserves of 3,146,770 Bcfg and 942,994 MMbo (1,502,917 MMBOE) in 121 sands in 32 fields. Comparing all 65 GOM plays, LPL F2 ranks fifth in oil reserves (8%). Additionally, comparing the nine F2 fan plays, LPL F2 ranks first in oil reserves (27%) and gas reserves (24%). The play extends continuously across the modern GOM slope from the East Breaks and Alaminos Canyon to Destin Dome and Desoto Canyon Areas, and to the south and east of the Desoto Canyon Area to the Henderson and Vernon Basin Areas (Figure 164).

Description

LPL F2 is defined by (1) a deep-sea fan depositional style representing sediments deposited basinward of the shelf edges associated with the LPL Chronozone, (2) a structural regime of allochthonous, small salt sheets or large salt canopies with intervening salt-withdrawal basins on the western and central GOM slope and high relief salt structures on the southeastern GOM slope, and (3) the

LPL-1 and LPL-2 Chronozones, the tops of which are defined by the *Valvulineria* "H" and *Lenticulina* 1 biozones, respectively (Figure 8).

LPL F2 extends continuously downdip of the modern GOM shelf edge from the central East Breaks and Alaminos Canyon Areas to the southwestern Destin Dome and western Desoto Canyon Areas east of the modern Mississippi River Delta, and south and east of the Desoto Canyon Area to the Henderson and Vernon Basin Areas (Figure 164). Hydrocarbons have been encountered in the East Breaks, Alaminos Canyon, Garden Banks, Green Canyon, Ewing Bank, and Mississippi Canyon Areas. Located on the modern GOM slope, LPL F2 is not nearly as well explored as plays on the modern shelf. However, because it is one of the shallowest plays in the deepwater GOM, exploratory wells in deepwater usually penetrate LPL F2. The ancestral Mississippi River Delta System dominated deposition of the play's sediments.

Play Limits

LPL F2 is limited updip by the Lower Pleistocene Fan 1 Play (LPL F1) and by the deposits of the

Lower Pleistocene Progradational Play (LPL F1). LPL F2 does not extend farther to the west because of an apparent lack of shelf source sands in offshore Texas during LPL time. To the east, the play overlaps the lower Cretaceous carbonate slope. Downdip in the western and central GOM, LPL F2 is limited by the farther downdip occurrence of either (1) the Sigsbee Salt Canopy Escarpment, where the farthest extent of large salt bodies overrides the abyssal plain or (2) the downdip limit of the Perdido Fold Belt and Mississippi Fan Fold Belt Plays. Downdip in the eastern GOM, LPL F2 is limited by the southern extent of Louann Salt deposition, as defined by the downdip extent of the Salt Roller/High-Relief Salt Structure Play (UK5-UJ4 S1) (Lore et al., 2001).

Depositional Style

LPL F2 is characterized by deep-sea fan systems deposited basinward of the LPL-1 shelf edge, the farthest updip shelf edge associated with the LPL Chronozone. Component facies include channel/levee complexes, sheet-sand lobes, interlobe/fringe sediments, and slump sediments that were deposited on the LPL-1 and LPL-2 upper and lower slopes, in topographically low areas between salt structure highs, and abyssal plains. These deep-sea fan systems are often overlain by thick shale intervals representative of zones of sand bypass on the shelf, or sand-poor zones on the slope.

The LPL deep-sea fan interval varies from approximately 50 to more than 12,400 ft in thickness, with net sand thicknesses as much as approximately 2,600 ft. Although individual sands are commonly from a few to tens of feet thick, they can exceed hundreds of feet in thickness. Sand-dominated successions comprising deposits of multiple sheet-sand lobes are more than 1,000 ft thick, with intervening shale sequences reaching as much as several thousands of feet in thickness. Thick, upward-coarsening and thinner, upward-fining log patterns of sand-dominated intervals represent sheet-sand lobe progradation and channel fill/abandonment, respectively, in proximal-fan areas. Irregularly stratified sand successions displaying spiky log patterns suggest deposition in distal-fan areas.

Structural Style

Over half of the fields in LPL F2 are structurally associated with salt bodies, mostly of intermediate

and deep depths, with hydrocarbons trapped on salt flanks or in sediments draped over salt. Other fields are structurally associated with anticlines and normal faults, while some fields contain hydrocarbon accumulations trapped by permeability barriers and updip pinchouts or facies changes.

Quantitative Attributes

On the basis of reserves calculations, LPL F2 is 63% oil and 37% gas. The 121 sands in the play comprise 196 reservoirs, of which 81 are nonassociated gas, 120 are undersaturated oil, and 15 are saturated oil. Proved reserves are estimated at 2,678,230 Bcfg and 791,193 MMbo (1,267,746 MMBOE) in 95 sands in 23 fields (Table 75). Unproved reserves are estimated at 468,540 Bcfg and 151,801 MMbo (235,171 MMBOE) in 26 sands in 9 fields. These proved plus unproved reserves account for 16% of the reserves for the LPL Chronozone.

	No. of Sands	Oil (MMbbbl)	Gas (Bof)	BOE (MMbbbl)
Proved	95	791,193	2,678,230	1,267,746
Cum. production	63	307,949	1,051,301	495,013
Remaining proved	85	483,244	1,626,928	772,733
Unproved	26	151,801	468,540	235,171

Table 75. LPL F2 reserves and cumulative production.

Cumulative production from LPL F2 totals 1,051,301 Bcfg and 307,949 MMbo (495,013 MMBOE) from 63 sands in 17 fields. LPL F2 production accounts for only 7% of the LPL Chronozone's total production. Remaining proved reserves in the play are 1,626,928 Bcfg and 483,244 MMbo (772,733 MMBOE) in 85 sands in 23 fields.

Table 76 summarizes that water depths of the fields in LPL F2 range from 863-8,845 ft, and play interval discovery depths vary from 4,984-17,850 ft, subsea. Additionally, porosity and water saturation range from 23-37% and 16-50%, respectively.

121 Sands	Min	Mean	Max
Water depth (ft)	663	1,944	6,845
Subsea depth (ft)	4,984	11,157	17,850
Reservoirs per sand	1	2	7
Porosity	23%	30%	37%
Water saturation	16%	26%	50%

Table 76. LPL F2 sand attributes. Values are volume-weighted averages of individual reservoir attributes.

Exploration History

LPL F2 has a 24-year history of discoveries, which is relatively short when compared with plays located on the modern shelf (Figure 165). The first sands in the play were discovered in 1975 in the Mississippi Canyon 194 Field (Cognac). The maximum number of sands discovered in any year occurred in 1991 with 16 sands from five fields. However, the maximum yearly reserves of 202.180

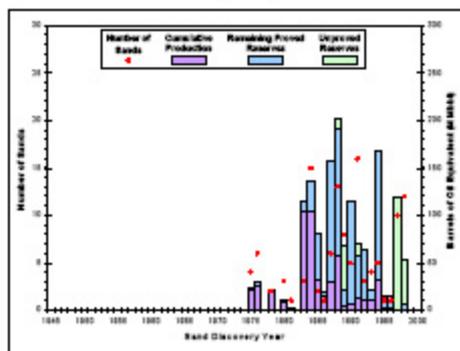


Figure 165. LPL F2 exploration history graph showing reserves and number of sands discovered by year.

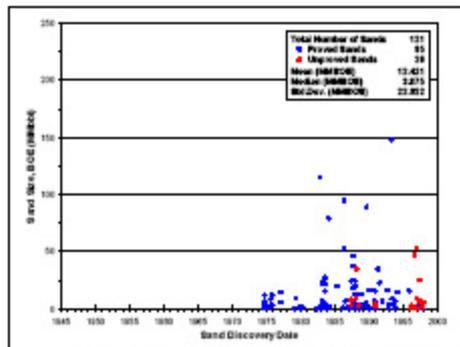


Figure 166. LPL F2 sand discovery graph showing the size of sands discovered by year.

MMBOE were added in 1988 with the discovery of 13 sands from six fields. The number of sand discoveries per year has fluctuated throughout the play's history, with peak years of 1984, 1988, and 1991. Another local peak occurred in 1997 and 1998, when a total of 22 sands were discovered. In fact, since the first Atlas database cutoff of January 1, 1995, 24 sands have been discovered, the largest of which is estimated to contain 53.143 MMBOE in the Green Canyon 158 Field (Brutus).

The largest sand in the play was discovered in 1994 in the Green Canyon 244 Field (Troika) and contains an estimated 148.123 MMBOE (Figure 166). The only other 100-plus MMBOE sand in the play was discovered in the Green Canyon 85 Field (Bullwinkle) in 1993. The mean sand size for the play is 12.421 MMBOE.

Production History

LPL F2 has a 17-year history of production (Figure 167). Oil and gas production curves are very similar, both beginning in 1982 and generally increasing throughout the play's history, reaching their highest values ever in 1998.

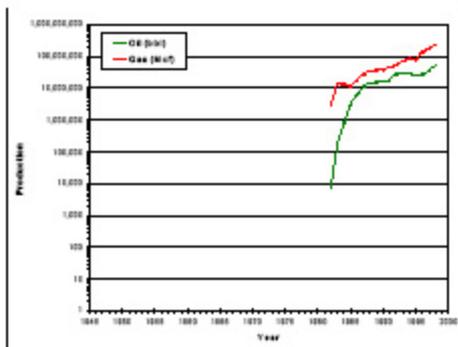


Figure 167. LPL F2 production graph showing oil and gas production by year.