Delaware Mountain Group Basinal Sandstone Play

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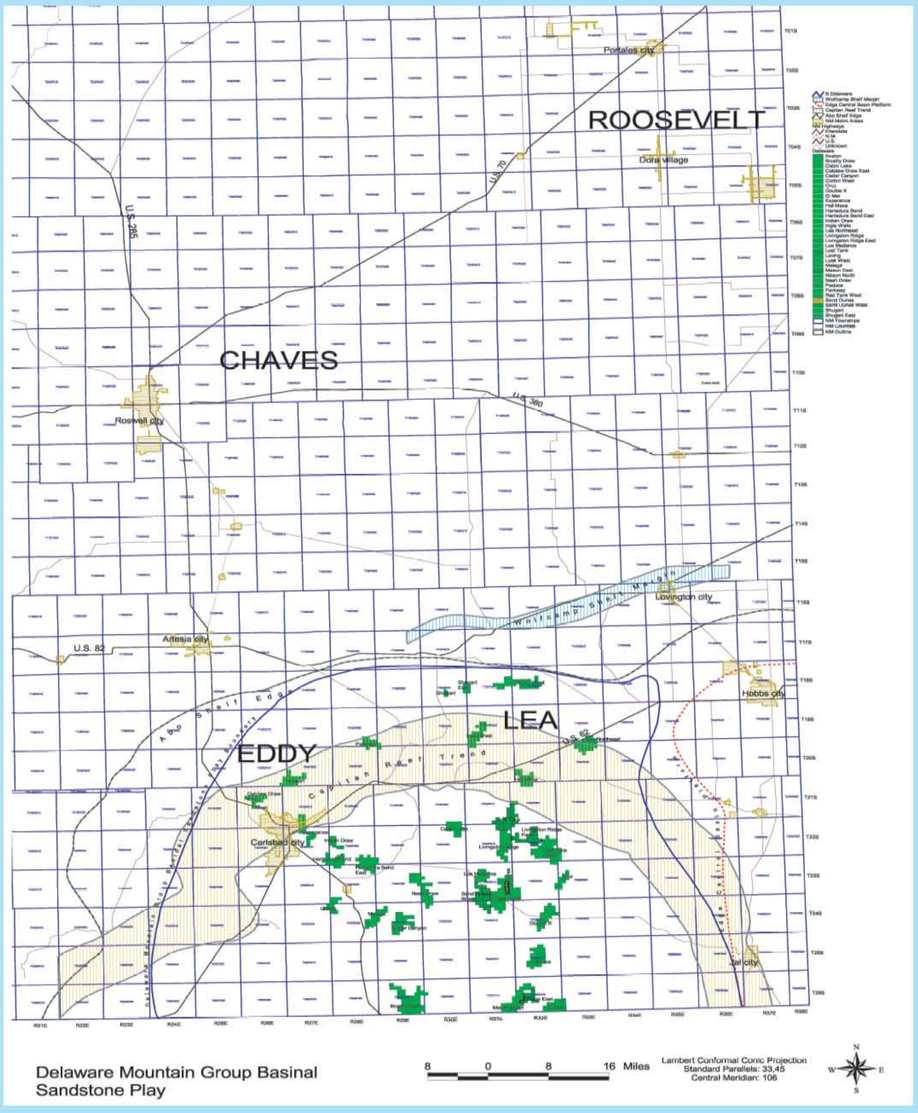
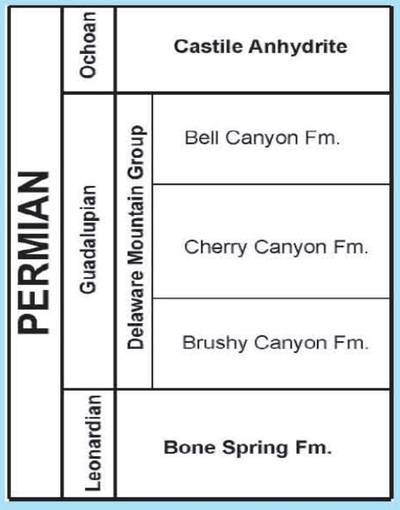
Play Geology

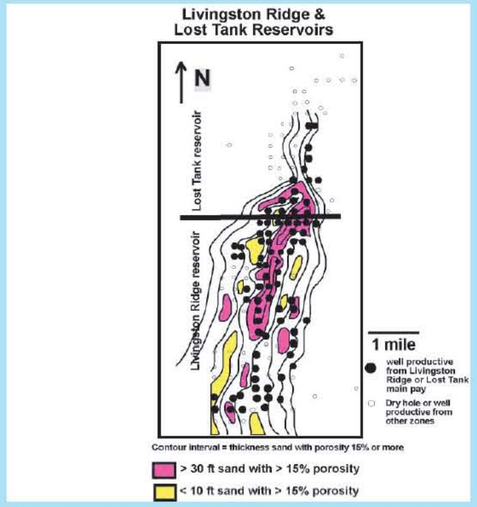
Reservoirs in the Delaware Mountain Group Basinal Sandstone Play lie within the Delaware Basin and stretch from the northern part of the basin in Eddy and Lea Counties south into Texas. Production is from submarine fan sandstones in the Bell Canyon, Cherry Canyon, and Brushy Canyon Formations. Traps are mostly stratigraphic and formed by submarine fan sandstones deposited in channels and on fan lobes. There are 155 known, discovered Delaware Mountain reservoirs in New Mexico, 33 of which have produced > 1 MMBO. Cumulative production from these 33 reservoirs was 112 MMBO as of 2000.



Reservoirs with > 1 MMBO cumulative production in the Delaware Mountain Group Basinal Sandstone Play.

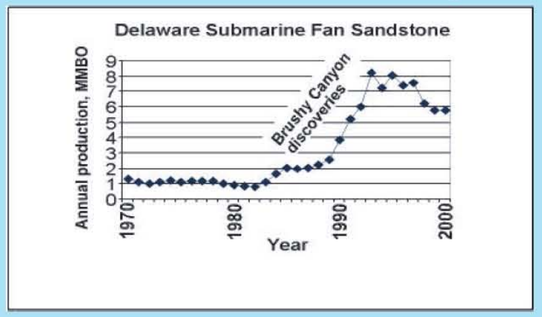


Production is obtained from all 3 formations in the Delaware Mountain Group - Bell Canyon, Cherry Canyon and Brushy Canyon. Most Bell Canyon reservoirs were found before 1970. Most Cherry Canyon reservoirs were found after 1970. Most Brushy Canyon reservoirs were found in the 1980's and 1990's.



This map of net thickness of sandstone with porosity > 15% in the Livingston Ridge and Lost Tank Brushy Canyon reservoirs shows how many reservoirs work, with better production confined to sand-filled submarine-fan channels. After May (1996).

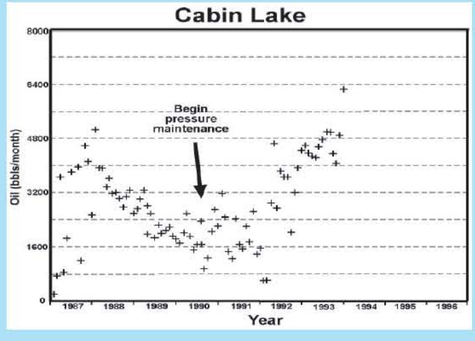
Production History



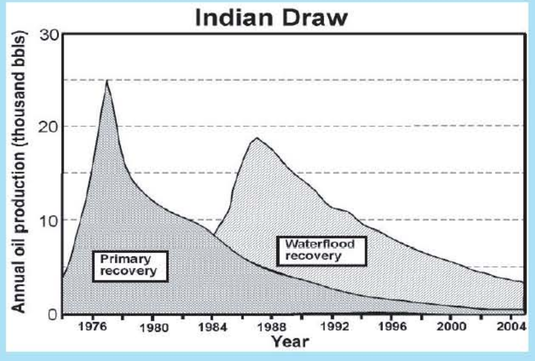
Production from this play has been declining over the past decade as primary production declines within existing reservoirs. Currently, most production is obtained from Brushy Canyon reservoirs discovered in the mid-1980's to early 1990's with many earlier found Bell Canyon reservoirs nearing depletion. The increase in production during the late 1980's and early 1990's was a result of discovery of numerous Brushy Canyon reservoirs.

This graph shows the decline in oil production from the average well in the Livingston Ridge Brushy Canyon reservoir from more than 3000 bbls/month after completion to less than 500 bbls/month 5 years (60 months) after well completion. Steep production declines result from early pressure depletion in these solution gas drive reservoirs. If the minimum economic production rate is considered to be 3 BOPD, then a typical Livingston Ridge reservoir may recover 91 MBO over a productive life of 108 months. From Broadhead et al. (1998).

Enhanced Production Methods



Injection of water for pressure maintenance by Phillips Petroleum at the Cabin Lake reservoir resulted in increased oil production from existing wells. Pressure maintenance in these solution gas drive pools should take place before a secondary gas cap is formed and may prevent premature well abandonment that can result from low production rates that accompany pressure and gas depletion. From Broadhead et al. (1998). Pressure maintenance has similar effect at the Nash Draw reservoir (M. Murphy, personal communication, 2003).



Although the less permeable and more heterogeneous Delaware reservoirs may not be suitable for waterflooding, this EOR technique can have startling success in proximal Cherry Canyon and Brushy Canyon reservoirs. In the Indian Draw Cherry Canyon reservoir, discovered in 1973, an estimated 1.9 MMBO could be recovered by primary production and an additional 1.6 MMBO, or 81% of primary production, will be recovered as a result of waterflood operations. Waterflooding this reservoir will therefore prevent premature well and reservoir abandonment and will result in recovery of significant oil resources. From Broadhead et al. (1998).