
Benton Field, Bossier Parish, Louisiana: Revitalization of an Old Field in the Lower Cotton Valley

Johnny R. Dean

Empresa Energy IV, LLC, 9821 Katy Frwy., Ste. 910, Houston, Texas 77024

GCAGS Explore & Discover Article #00322*

http://www.gcags.org/exploreanddiscover/2018/00322_dean.pdf

Posted September 29, 2018.

* Article based on a full paper published in the *GCAGS Transactions* (see footnote reference below), which is available as part of the entire 2018 *GCAGS Transactions* volume via the GCAGS Bookstore at the Bureau of Economic Geology (www.beg.utexas.edu) or as an individual document via AAPG Datapages, Inc. (www.datapages.com), and delivered as an oral presentation at the 68th Annual GCAGS Convention and 65th Annual GCSSEPM Meeting in Shreveport, Louisiana, September 30–October 2, 2018.

ABSTRACT

Benton Field, located in Bossier Parish, Louisiana, was discovered in 1944 by Barnsdall Oil Company. The primary reservoirs of the original field were the structurally trapped Upper Jurassic “D” and Bodcaw sands of the Cotton Valley Group. Nearing the end of its productive life, the original “D” and Bodcaw unit has now produced approximately 4.1 million barrels (bbl) of oil and 359 billion cubic ft (bcf) of gas, as well as substantial natural gas liquids. From 1945 to 2007, seven wells were drilled vertically through Cotton Valley Lower Taylor sands in the Benton Field. Five of those wells tested gas and oil and established nominal production from the tight Lower Taylor sand. In 2017 Empresa Energy IV, LLC completed three horizontally drilled Lower Taylor wells on the Benton structure. On completion, peak flow rates of the three wells ranged from 1054 barrels of oil equivalent per day (boepd) to 2625 poepd. From March 2017, through February 2018, the wells have produced 2.0 bcf of gas, 236 thousand bbl of oil and 46 thousand bbl natural gas liquids.

In Benton Field and the immediate surrounding area, the Lower Taylor sand is the lowermost sand of the Cotton Valley Group. It rests conformably on the Bossier Shale and is overlain by an unnamed shale which separates it from the overlying Upper Taylor sands. Gross thickness of the Lower Taylor sand ranges from approximately 70 to 90 ft over most of the field area. The Lower Taylor is slightly over-pressured, having a pressure gradient of 0.58 psi/ft. The Lower Taylor sand exhibits an overall coarsening upward, and depositional environments range from lower to upper shoreface. The majority of the Lower Taylor sand is a very fine- to fine-grained subarkose containing occasional thin calcareous shell debris beds. Locally, a high porosity limey pebble conglomerate or sublitharenite lithofacies is also observed. Petrophysical evaluation of well logs over the Lower Taylor pay in the field show a mean effective porosity of 7.4% and calculated mean effective unstimulated permeability of 0.135 md. At Benton Field the Lower Taylor forms a progradational parasequence set in the lower half of the Taylor sequence. Four to five progradational parasequences are observed from well logs in the field. Regional mapping places the Lower Taylor in a northeast trending shoreline which crosses the Benton structure medially, forming a simple structural-stratigraphic trap.

Development of the Lower Taylor reservoir in Benton Field is a significant revitalization of an old field. Commercial development of the tight, low permeability reservoir has been made possible by modern horizontal drilling and completion techniques, pointing to further potential for similar Lower Cotton Valley reservoirs in northwest Louisiana.