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Chicot Aquifer in Jefferson Davis Parish, Louisiana

Rapid urban growth and increased use of ground water for agriculture and industry has brought the issue of aquifer sustainability to the forefront in many areas of the country and throughout the world. A drought season in 1998 resulted in farmers finding salt water flowing in their fresh water wells in some coastal areas of Louisiana. The Louisiana Legislature subsequently formed a water commission and advisory group to address the water issues of the state. The Louisiana Geological Survey is conducting a reservoir characterization and modeling study of the Chicot Aquifer system. The study began in Acadia Parish as part of a general plan to develop a digital 3-D model of the Chicot Aquifer stratigraphy. This 3-D model will ultimately become the geologic stratigraphic element of a Telescopic Mesh Resolution (TMR) model within a MODFLOW model developed by the U.S. Geological Survey.

The Chicot aquifer has been delineated from many years of study by the USGS, and the DOTD. Information and published data for this project were obtained from the Louisiana Geological Survey (LGS) reports and bulletins, U.S. Geological Survey (USGS) technical reports and data files, Louisiana Department of Transportation and Development (DOTD) technical reports and well registration data base, the Department of Natural Resources (DNR) oil and gas well log library, and published reports in scientific journals and bulletins.

Oil, gas, and water well electric logs and drillers' logs were used to identify the different stratigraphic and hydrochemical facies of the Chicot Aquifer in Jefferson Davis. The fresh water/salt water interface, or the beginning of the transition zone into more saline water, was shown by the significant reduction in the resistivity displayed on the electric logs. An approximate position of the base of the fresh water was determined from the resistivity curve with 40 ohms as the cut-off point. The Evangeline Aquifer in Jefferson Davis Parish, which is located just below the Chicot contains no fresh water provides an identifying log response that aids in determining the base of the Chicot Aquifer system.

The Chicot aquifer is Pleistocene in age, and is composed of fine sand and gravel interspersed with thin intermittent clay layers to very thick confining clay layers. In Acadia parish the freshwater zone is divided into an Upper and Lower Chicot units separated by numerous clay lenses referred to as the Upper/Lower confining zone. This is not a continuous clay layer, but is a zone of intermittent clay lenses with a lower transmissivity than in the Upper and Lower Chicot units. In Jefferson Davis Parish the Upper and Lower Chicot units grade into a zone of undifferentiated sand. Confining or intermittent clays do not divide this undifferentiated zone. To the west is a gradational trend developing a differentiation into the 200-foot sand, 500-foot sand, and 700-foot sand. A confining clay layer referred to as the 200/500-foot confining and the 500/700 confining layers separated each of the sand units.