

MINERALOGICAL EXAMINATION OF SHALE IN CORE FROM THE GEOPRESSURED FRIO FORMATION, BRAZORIA COUNTY, TEXAS

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ABSTRACT

Core samples from the geopressured portion of the Frio Formation were collected from 5,415 to 5,430 m and studied in approximately one meter intervals by XRD, FTIR, thin sections, and SEM with EDX. The subsurface pressure of these samples is 12,500 psi and temperature is 161°C. Additional core samples were examined by XRD from 3,585 to 3,601 m (7,500 psi, 92°C) and 3,709 to 3,726 m (8,800 psi, 124°C) from a nearby well. While the Frio Formation sandstone mineralogy is well described, data is sparse on the mineralogy of the shales which comprise about 80% of the Frio Formation. The shale is composed of 35% quartz, 10% orthoclase/albite, 5% illite, 17% Na-montmorillonite, 30% Ca-montmorillonite, with traces of kaolinite, pyrite, chlorite and biotite. XRD examination of the <2 μ m size fraction showed distinct differences between the clay mineralogy of the shales and sandstones. The sandstones <2 μ m fraction is composed of predominantly kaolinite with little or no montmorillonite and illite. In contrast, the shales <2 μ m fraction is composed of predominantly montmorillonite with less than 10% each of kaolinite and illite. Shale layers that are less than 2 feet thick showed higher proportions of kaolinite relative to montmorillonite and illite. SEM photos show authigenic dolomite, pyrite, anhydrite, and illite. Microfractures are present in all samples. Several of these fractures are filled with authigenic anhydrite.