Subsurface Analysis and Cycle Stratigraphy of the Upper Cambrian Wilberns Formation, Western Llano Uplift Region, McCulloch County, Texas

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Outcrops of the Wilberns Formation in the Llano Uplift Region of central Texas have hosted numerous studies throughout the years. However, the Moore Hollow Group remains largely unexamined in the subsurface. The Harold Johanson MC-1 core was taken in McCulloch County, Texas, in 1978.

The Wilberns Formation in the core was only 206 feet thick. The Wilberns unconformably overlies the Cambrian Riley Formation, and is overlain by the Ordovician Ellenburger Group. The Wilberns Formation has been subdivided into four members: In ascending order these are the Welge Sandstone Member, the Morgan Creek Limestone Member, the Point Peak Member and the San Saba Member. The Morgan Creek Limestone, Point Peak and San Saba Members were readily identified in the Johanson MC-1 core. These members are characterized by a series of shallowing upward cycles that display micritic bases and packstone to grainstone tops.

The Morgan Creek Limestone Member is 39 feet thick in the Harold Johanson MC-1 core. It is composed mainly of fossiliferous grainstones and packstones, with very short cycles, indicating a very shallow depositional environment with minimal accommodation space. The Point Peak Member is thicker (73 feet thick) than the Morgan Creek Limestone Member and contains the vast majority of mud – rich packstones (flat pebble conglomerates) found in the core. The thick Point Peak Member interval implies an increase in accommodation space. However, the cyclicity found within the Point Peak Member interval indicates that

the depositional environment was still relatively shallow. The San Saba Member is also thick (73 feet), but is mostly composed of mudstones and wackestones and largely lacks the higher energy lithologies found within the Point Peak and Morgan Creek Limestone Members. The cycles in the San Saba Member are much thicker and show an increase in accommodation space and an overall rising sea level. Neither the Point Peak nor the San Saba Members contained cyanobacterial bioherms, which are sometimes found in outcrop sections of these members.

All four members of the Wilberns Formation were thought to be present in the core. What appears to be the Welge Sandstone Member in the core is actually a glauconitic sucrosic dolomite. The dolomite is continuous throughout what was thought to be the Welge Sandstone Member interval. There are several possible explanations for the presence of this dolomite at the base of the Wilberns section. 1) The "Welge Equivalent" dolomite may be the result of a paleotopographic high upon which Welge sand was never deposited. As sea level rose, and the Morgan Creek Limestone Member began to be deposited, a dolomite formed in the basal Morgan Creek at this location. This would mean that the Welge Equivalent is slightly younger than the Welge Sandstone. 2) Due to its high porosity, the Welge sand at this location experienced the passage of diagenetic fluids that completely dolomitized the sandstone.