1997

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A DEEP-TO-SHALLOW TRANSITION IN THE FORT PAYNE FORMATION (LOWER MISSISSIPPIAN), KENTUCKY HIGHWAY 61, CUMBERLAND COUNTY, KENTUCKY

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INTRODUCTION

The Fort Payne Formation of the Cumberland Saddle region of south-central Kentucky and north-central Tennessee is part of a vast marine sedimentation system that extended over much of North America during the Early Carboniferous Period. The Fort Payne Formation as exposed along Kentucky Highway 61 near Burkesville, Kentucky, is one of the most distinctive, thickly bedded carbonate successions in North America. The Fort Payne Formation is characterized by lateral facies changes, storm deposits, and a variety of associated fauna. The Fort Payne Formation is approximately 270 feet thick in this section and is composed of a variety of carbonate lithologies, including wackestones, packstones, and mudstones. The Fort Payne Formation is characterized by a distinct transition from deep water to shallow water environments, as evidenced by the presence of storm deposits, wackestones, and packstones. The Fort Payne Formation is significant for its potential as a source of hydrocarbons and as a record of marine transgression and regression.

FOSSILIZER GREEN SHALE

The Fossilizer Green Shale is a thickly bedded, dark green shale unit that is characteristic of the Fort Payne Formation. The Fossilizer Green Shale is composed of fine-grained, clayey sediments that are rich in organic matter. The Fossilizer Green Shale is a significant marker horizon in the Fort Payne Formation, as it marks the transition from deep water to shallow water environments. The Fossilizer Green Shale is typically found at the base of the Fort Payne Formation, and is characterized by a distinct change in facies from deep water wackestones to shallow water packstones.

ARCHAEOLOGICAL DOLOSTONES

The Archaean Dolostones are a distinctive feature of the Fort Payne Formation along Kentucky Highway 61. The Archaean Dolostones are characterized by cross-bedded, fine-grained packstones that are rich in organic matter. The Archaean Dolostones are significant for their potential as a source of hydrocarbons, as they are composed of fine-grained, organic-rich sediments. The Archaean Dolostones are characterized by a distinct transition from deep water to shallow water environments, as evidenced by the presence of storm deposits, wackestones, and packstones. The Archaean Dolostones are significant for their potential as a source of hydrocarbons and as a record of marine transgression and regression.

LITHOLOGICAL CHARACTERIZATION

Paleontology and Age

Fossiliferous green shales associated with the mounds, steep depositional dips and wedging of beds, and listric depositional environments, possible equivalence with modem

The Fort Payne is approximately 270 feet thick in this section and is

In Kentucky, the Fort Payne and its equivalents overlie a black shale (in Kentucky called the Chattanooga Shale) distinctive, fossiliferous, green clay shales associated with the mounds; detrital crinoidal packstones; argillaceous dolosiltstones, the most common lithology in the Fort Payne; and a dark, organic-rich shale, which caps a persistent

NORTH

begs the question: was the Fort Payne deposited as a clinoform in deep water in front of the Borden Sea? Six miles south of Burkesville, Ky., on Kentucky Highway 61, a complete section of the Fort Payne, from the west side of road steeply dipping, nearly similar facies transitions from the Warsaw Formation, into rocks represented by the Warsaw Formation. Figure 1. Location of study area and outcrops along Kentucky Highway 61, Cumberland County, Kentucky.

The 2-mile-long section crosses a gently undulating area, between the north-central and southern parts of the section. The Fort Payne section is approximately 270 feet thick in this section and is composed of a variety of carbonate lithologies, including wackestones, packstones, and mudstones. The Fort Payne Formation is characterized by a distinct transition from deep water to shallow water environments, as evidenced by the presence of storm deposits, wackestones, and packstones. The Fort Payne Formation is significant for its potential as a source of hydrocarbons and as a record of marine transgression and regression.

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Figure 2. Stratigraphy of study area. The 2-mile-long section crosses a gently undulating area, between the north-central and southern parts of the section. The Fort Payne section is approximately 270 feet thick in this section and is composed of a variety of carbonate lithologies, including wackestones, packstones, and mudstones. The Fort Payne Formation is characterized by a distinct transition from deep water to shallow water environments, as evidenced by the presence of storm deposits, wackestones, and packstones. The Fort Payne Formation is significant for its potential as a source of hydrocarbons and as a record of marine transgression and regression.

Figure 3. Topographic and geologic profile along Kentucky Highway 61, showing outcrops and geologic structure. Note possible fault at end of section in profile.

Figure 4. Wackestone mound at outcrop B with breccia. Complete outcrop is on west side of road at outcrop C.

Figure 5. Steeply dipping lenses of interbedded green shale and packstone. A steeply dipping lens is also on the west side of the road.

Figure 6. Gamma-ray-neutron log of Fort Payne Formation (lower Carboniferous), Cumberland Saddle region, Kentucky and Tennessee, USA, showing carbonate facies also along Lake Cumberland. The upward-increasing abundance of caysters suggests that higher levels of the Fort Payne were deposited near stable, ancient continental margins.

Figure 7. Chain of large marine crinoid in Wallow at outcrop L. Trough is 23 feet deep.

Figure 8. Detailed section of outcrop A showing cross-bedding of carbonate facies.

Figure 9. Dark blue-gray to olive-gray in color, this impure, fine siltstone is almost none to thin layers composed entirely of disarticulated crinoid spicules, but no entire specimens were found.

This compact series of exposures along Kentucky Highway 61 records a regressive transition from the deep, wackestone mound facies also along Lake Cumberland. The upward-increasing abundance of caysters suggests that higher levels of the Fort Payne were deposited near stable, ancient continental margins.

ACKNOWLEDGMENTS

This work was supported in part through National Science Foundation grants EAR-8905624 to Meyer and EAR-9018170 to Potter. We thank South Central Land Surveying (D.B. Barmore) for help with surveying, and Louisiana State University. Bence and Lisa Trump for drafting the figures. The Graduate Fellowships of the University of Cincinnati helped with publication costs.

REFERENCES CITED


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