Summary of Field Work in the Kingman Quadrangle, 1991-1992

by Craig H. Moore

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General

Field work in the Kingman quadrangle began in earnest in December of 1991. As is typical in Indiana, the timing of field work was dictated by the weather, an unusually late fall of leaves delaying the beginning of the season in 1991. The terrain in the Kingman quadrangle consists of steep, incised valleys cutting into relatively flat, high plains. All of the quadrangle has been glaciated. The valleys are heavily wooded and dense undergrowth limits the reasonable field season to approximately November through April; the flatter areas are mostly farmland. All of the property in the Kingman quadrangle is privately owned - there were no out-of-the-ordinary problems with access. As usual in these terrains, mapping was limited (as are outcrops) to the stream valleys and road cuts - all significant stream valleys were walked and mapped. Many of them contain no outcrops, float was not mapped.

Geology of the Kingman Quadrangle

The Kingman quadrangle contains 4 major lithofacies and 1 minor lithofacies. These are described in detail below.

The Russell Bend Lithofacies

The minor lithofacies, herein called the Russell Bend Facies, can be found in outcrop just north of Russell Bend on Sugar Creek in the first eastern tributary to Pot Rock Hollow (SW1/4 Sec. 19, T17N R7W). This facies has only one rock, type - a medium to coarse grained, carbonate-cemented conglomerate. The clasts in the conglomerate are clasts from the till in which the conglomerates formed. Apparently the till is carbonate rich and local mobilization of the carbonate has resulted in cementation of the till. Pieces of this conglomerate were found elsewhere along tributaries draining into Sugar Creek, but it was not clear that any of them were in place.

The Devil's Den Lithofacies

A major lithofacies in the quadrangle is herein call the Devil's Den facies. The Devil's Den facies crops out in the valleys that drain into Sugar Creek in the SE quarter of the quadrangle. It is best seen in the valley east of the south-east end of the Rockport Bridge and in the valley just west of the north-west end of the bridge. The dominant rock type in the facies is a medium grained, medium brown sandstone that forms thick, steep cliffs. Sets of mostly tabular planar crossbeds occur throughout the sandstone and are usually 1/2 to 1 meter thick. In places (e. g. the valley just east of the south-east end of the Rockport Bridge) these crossbed sets are separated by thin (~ .5 cm) drapes of sandstone/siltstone containing no cross beds. The ichnofossil *Lockeia*

was rarely seen in float, none was found in place. The cliffs formed by the sandstone were up to ~ 20 meters in height.

Directly underlaying the sandstone in many places is an interbedded, laminated sandstone/siltstone with carbonaceous material that may be a rhythmite. This is best seen at the location mentioned above where it is about 2 m thick. At various localities this unit may contain coal stringer and bands. It also may contain a more massive sandstone bed up to a few meters thick. Occasionally the laminations in this lower unit are disrupted, most likely from dewatering or slumping. This type of feature is common in the Catlin and Mansfield quadrangles as well.

The Jim Branch Lithofacies

Another major facies, herein called the Jim Branch facies, crops out in section 20, T17N R8W along Jim Branch creek and in the valleys to the south that drain westward into the Wabash River. This facies is dominated by shale and silty shale. A lower unit, up to about 15 meters thick is dark gray to black and contains abundant organic detritus. This unit is overlain by about 25 meters of medium gray shale. In the valleys in the southwest corner of the quadrangle, couplets of carbonaceous siltstone/shale that is resistant to weathering and non-resistant, less carbonaceous layers form a distinctive outcrop in the sides of the valleys. Each bed is about 20 cm thick and the total thickness is about 1.5 meters. Sandstone and limestone lenses and pods are fairly common in the lower unit as are cabonate concretions, some having a 'septarian' form. The concretions typically have iron carbonate or iron oxide rims. Some thin beds are sufficiently carbonaceous to be considered coal. In the upper half of the section, concretions are also common and occur in more friable layers. In these layers the laminations and bedding 'wrap around' the concretions.

Lying above the shales/siltstones is a friable, clayey, light brown, medium grained sandstone. This sandstone weathers readily as do the shale units. Consequently many of the outcrops are covered with crumbled rock, nonetheless, the exposures are reasonably good.

The County Line Lithofacies

A spatially very restricted, yet thick facies, herein called the County Line facies, occurs if the SE1/4 NW1/4 Sec. 5 T17N R8W just south of the Parke-Fountain county line and where the power line crosses the stream valley. This facies is dominated by a medium brown, medium grained, micaceous sandstone forming cliffs up to about 12 meters thick. It contains sets of mostly tabular planar crossbeds that are about .25 meters thick. The sandstone lies above a coal about .75 meters thick which, in turn, overlies an underclay/shale that contains zones rich in carbonaceous material. This underclay/shale may also contain or lie just above amoeboid-looking pods of siderite(?). At the stream junction just north of the power lines, a small 'graben' structure with a displacement of about .25 meters occurs in the lower part of the section. Some nice fossilized limb segments were also noted.

The Mill Creek Lithofacies

The units herein referred to as the Mill Creek lithofacies occur in Mill Creek in the northwest quarter of the quadrangle and in the small creeks that drain westward in the extreme northwest corner of the quadrangle. The Mill Creek facies contains sandstones, siltstones, shales, limestones, and coals - usually in units no more than a few meters thick. The sandstones are the typical medium brown, medium grained sandstones of the area and, like the other lithologies, are often rich in carbonaceous detritus. The siltstones and shales are usually medium gray in color. The limestone is fine grained, in places micritic, and contains fossil fragments, mostly of crinoids but also of some bryozoans and molluscs. Crinoid fragments may also occur in calcareous siltstones that often underlie the limestones. Some carbonaceous siltstones and sandstone contain *Zoophycus.* In general, it seems that the limestones are more abundant in the upper part of the section, but because of the small size of the outcrops and their discontinuous nature, reliable correlations were not found in this investigation. More detailed work might, however, reveal them. Valleys outside of the quadrangle which are continuations of the valleys in the extreme northwest corner contain excellent outcrops of the lower part of this facies.

Relation to Commonly Accepted Regional Stratigraphy

Because of the apparent lack of good, mappable, units on the surface which can serve as marker beds, it is difficult to assign formation names to the Pennsylvanian rocks cropping out in Parke county. The rocks of the Kingman quadrangle are no exception to this. If one were forced to place these rocks into the existing framework, assignment of the Devil's Den, Jim Branch and County Line facies to the Brazil formation and the Mill Creek facies to the Staunton formation would seem plausible. It is possible they are all simply lateral facies of each other. I recommend including them all in an undifferentiated Raccoon Creek Group.

General Thoughts on Environments of Deposition in the Kingman Quadrangle

My general feeling is that the rocks in the Kingman quadrangle were deposited in a near-shore environment showing both marine and non-marine influences. It is clear that the few limestones present (e. g. in the Mill Creek facies) are marine. In this same facies, the presence of *Zoophycus* in some siltstones and sandstones suggest at least a marginal marine influence. The rare presence of *Lockeia* in the sandstones of the Devil's Den facies also suggests marine influence.

The large sandstone bodies have channel-like geometries as do those in adjacent quadrangles, but it is not clear to me that these are terrestrial fluvial channels. As with other sand bodies in the area, there seems to be no unequivocal evidence from the primary sedimentary structures or facies relations that they are non-marine. In fact many of the internal bedforms, most notably the possible rhythmic bedding suggests that there was some tidal influence. The sand bodies could have been formed in an estuarine setting.

Much of the carbonaceous detritus seems to be derived from woody plant material. This along with the presence of well-preserved limb and branch fossils in some of the sandstones suggests that land, whether in the form of islands or a larger land mass, was nearby.

There does seem to be a bit more lateral continuity between the units in this quadrangle than there was in the units of the Catlin and Mansfield quadrangles which I mapped last field season. This may be a result of the fact that the Pennsylvanian-Mississippian unconformity, upon which there is a great deal of relief, played a more important role in causing local variations in topography in the rocks of the Catlin and Mansfield area because they were deposited nearer to it (in a vertical sense). The rocks of the Kingman quadrangle are further above the unconformity and so may have been deposited in an environment with less local topographic control.