Preliminary Map Showing Quaternary Geology of the Mooresville East 7.5-Minute Quadrangle, Indiana

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INTRODUCTION

The Mooresville East 7.5-minute quadrangle is situated near the maximum limit of Wisconsin Episode glacial deposits in northeastern Morgan County. Till and outwash of Wisconsin Episode age and Holocene alluvium are the dominant surficial materials in the quadrangle. Wisconsin Episode eolian sand, loess, and colluvium are also present, with eolian sand and colluvium being adjacent to the West Fork White River valley and loess blanketing Wisconsin Episode till and outwash. Holocene (post-glacial) alluvium is found in the West Fork White River and White Lick Creek valleys and tributaries. Mississippian Borden Group bedrock controls many aspects of the surficial geology of the southeastern sector of the quadrangle. For much of this area, bedrock controls the topography and is less than 20 ft below the ground surface. It is mantled on the summits and shoulders of interfluvies mainly by Wisconsin till and minor amounts of sand and gravel (outwash) and eolian sand. The depth to bedrock (Borden Group) is greater along the trend of the modern West Fork White River valley, with depths greater than 100 ft. This bedrock paleovalley is filled with mainly Wisconsin Episode outwash (sand and gravel), and the paleovalley was a major path for meltwater in central Indiana during the Wisconsin Episode, from around 27,000 to 19,000 years ago. The Wisconsin Episode maximum limit lies just outside the quadrangle boundary to the south and east. The Laurentide Ice Sheet reached its maximum limit 24,000 years ago, based on radiocarbon dating of organics within till at the terminal moraine in the adjacent Cope quadrangle. Evidence for the readvance of the ice sheet is found in the Mooresville East quadrangle, which occurred 21,700 years ago; the southern limit of the readvance runs through the central part of the quadrangle, just south of State Highway 144.

This preliminary geologic map is an interim geologic map product that documents progress in mapping the Quaternary geology of Morgan County, Indiana. The lithologic classification of the Quaternary units of Indiana (Wayne, 1963) was used in assigning map units.

REFERENCES

Wayne, W. J., 1963, Pleistocene formations in Indiana: Indiana Geological Survey Bulletin 25, 85 p.

DESCRIPTION OF MAP UNITS

Martinsville Formation (Holocene)

- Qml Alluvium**
Silt/clay loam alluvium generally less than 20 ft thick. Alluvium of the West Fork White River and White Lick Creek reaches up to 20 ft thick, and is generally more sandy. First and second order tributaries generally have alluvium less than 5 ft thick. Unit overlies Mississippian Borden Group bedrock in the southeast corner of the quadrangle and sand and gravel (outwash) of the Atherton Formation (map unit Qao) and diamicton (till) of the Trafalgar Formation (map unit Qr) in the remainder of the quadrangle.

Atherton Formation (Wisconsin Episode)

- Qao Eolian sand**
Fine- to medium-grained sand greater than 5 ft in thickness, mainly as parabolic dunes and sand sheets. Located adjacent (eastward) to the major outwash plain in the West Fork White River valley.
- Qaf Outwash**
Sand and gravel, up to 110 ft thick. Generally covered by less than 5 ft of loess (Peoria Loess Member, Atherton Formation).
- Qcl Colluvium**
Clayey, sandy silt up to 15 ft thick found on footslope and toeslope positions on hillslopes in the West Fork White River valley. Grades laterally into Wisconsin Episode outwash (map unit Qao) and forms fans where second- and third-order tributaries enter the West Fork White River valley.

Trafalgar Formation (Wisconsin Episode)

- Qr Diamicton**
Silt loam till less than 30 ft thick. Generally covered by less than 5 ft of Wisconsin Episode loess (Peoria Loess Member, Atherton Formation). Center Grove Member of the Trafalgar Formation is the surface till of Wisconsin Episode age in the southern half of the quadrangle. The maximum age for the Center Grove Member is 24,000 years old, based on radiocarbon dating of wood fragments found within till near the terminal moraine. The Cartersburg Member is present at the surface north of a moraine, representing a readvance limit of the ice sheet, dated to 21,700 years old from other sites in Morgan County. The moraine crosses west-east in the center of the quadrangle, roughly 1 mile south of State Highway 144.

Quaternary (undifferentiated)

- Qr Residuum**
Weathered siliclastic Mississippian Borden Group bedrock generally less than 5 ft in thickness. Less than 5 ft of loess (Peoria Loess Member, Atherton Formation) can mantle or be incorporated into residuum, especially on hillslopes.

Disturbed or made land

- Includes quarries and excavation/fill associated with infrastructure.
- Contact concealed — Identity and existence certain, location concealed.
- Project-funded borehole with IGWS ID.
- Project-funded gamma-ray log with ID.
- Water-well data (Indiana Department of Natural Resources, Division of Water).
- Archived data (petroleum-well data, literature, test borings, and so on).

ACKNOWLEDGMENTS AND DISCLAIMER

This geologic map was funded in part by the Great Lakes Geologic Mapping Coalition program supported by the U.S. Geological Survey under Cooperative Agreement No. G18AC00240. The cooperative agreement requires the following statements: "this map and explanatory information is submitted for publication with the understanding that the United States Government is authorized to reproduce and distribute reprints for governmental use," and "the views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government."

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BASE MAP INFORMATION

- Digital cartography by Matthew R. Johnson.
- Topographic shading based on 2011–2013 Indiana lidar data.
- Transportation network from OpenStreetMap.org (© OpenStreetMap contributors).
- Hydrography from U.S. Geological Survey National Hydrography Dataset (local resolution).
- Projection: Universal Transverse Mercator (UTM), Zone 16N.
- Horizontal Datum: North American Datum of 1983 (NAD83).
- Loope, H.M. and Rupp, R.F., 2020, Quaternary geology of the Mooresville East 7.5-minute quadrangle: Indiana Geological and Water Survey, Indiana Journal of Earth Sciences, v. 2, scale 1:24,000.

CORRELATION OF MAP UNITS

4.2° W
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN
DECLINATION, 2019

SCALE 1:24,000