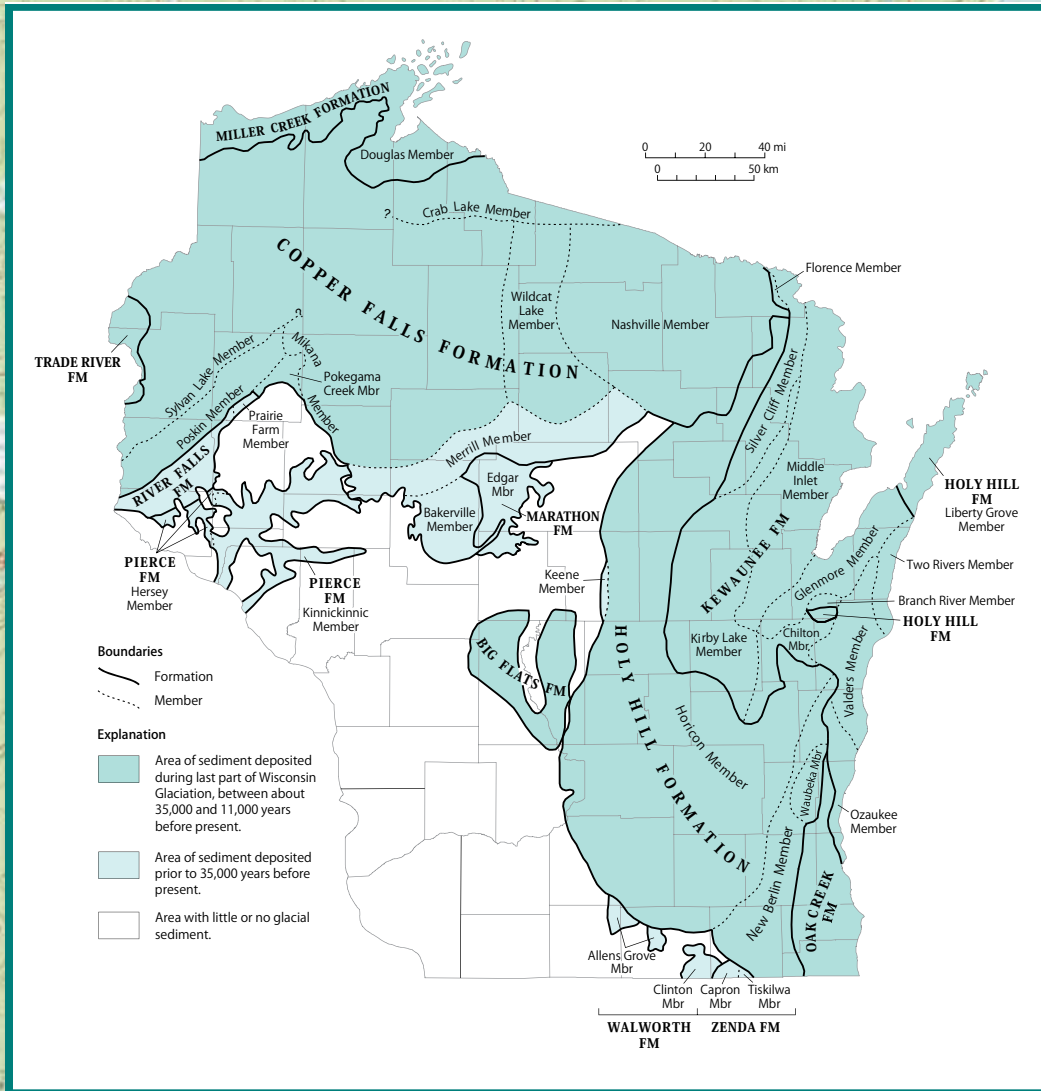


Lexicon of Pleistocene Stratigraphic Units of Wisconsin



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Rountree Formation

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Organization of the Lexicon

In this book, formations and their members are arranged by age, from oldest to youngest. For a quick lookup by formation name, refer to the following:

Formations by name

Big Flats Fm.	111
Copper Falls Fm.	58
Hayton Fm.	88
Holy Hill Fm.	96
Kewaunee Fm.	123
Kieler Fm.	157
Marathon Fm.	29
Miller Creek Fm.	145
Oak Creek Fm.	115
Pierce Fm.	18
River Falls Fm.	37
Rountree Fm.	152
Trade River Fm.	118
Walworth Fm.	43
Zenda Fm.	51

Rountree Formation

James C. Knox, David S. Leigh, and Tod A. Frolking

Source of name. The Rountree Formation is named after Rountree Branch, a tributary of the Little Platte River in Grant County, Wisconsin. This tributary flows adjacent to the upland dolomite quarry containing the type section of the Rountree Formation. Rountree Branch was named for John H. Rountree, pioneer lead miner and co-founder of the city of Platteville in 1827.

Location and description of type section. The type section is in a dolomite quarry on a narrow interfluvium in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 14, T. 3 N., R. 1 W., Grant County, an area shown on the Platteville 7.5-minute quadrangle (fig. 121). The type section is a west-facing exposure at the east edge of the quarry and located at the crest of the interfluvium. This site has been previously identified as the Rosemeyer Farm Quarry (Knox and Maher, 1974). At this site, loess of the Peoria and Roxana Members of the Kieler Formation overlies the red clay of the Rountree

Formation, which in turn overlies cherty dolomite of the lower member of the Galena Formation (Middle Ordovician) at an elevation of about 295 m (970 ft) (figs. 122 and 123).

The overlying Peoria Member consists of about 2.2 m of dark yellowish-brown (10YR 4/4 to 10YR 5/4) to yellowish-brown (10YR 5/5) loess that averages less than 1 percent sand, 76 percent silt, and 23 percent clay below the depth of leaching (fig. 123). The Peoria Member was deposited during the last part of the Wisconsin Glaciation. The Roxana Member of the Kieler Formation underlies the Peoria Member at a depth of 2.23 to 2.35 m. The Roxana Member, correlated with the Roxana Formation in northwestern Illinois, is a dark brown (10YR 4/3) silt. The Roxana Member here tends to be slightly less silty and more clayey than the overlying unleached lower Peoria Member (fig. 123). The Roxana Member is leached and

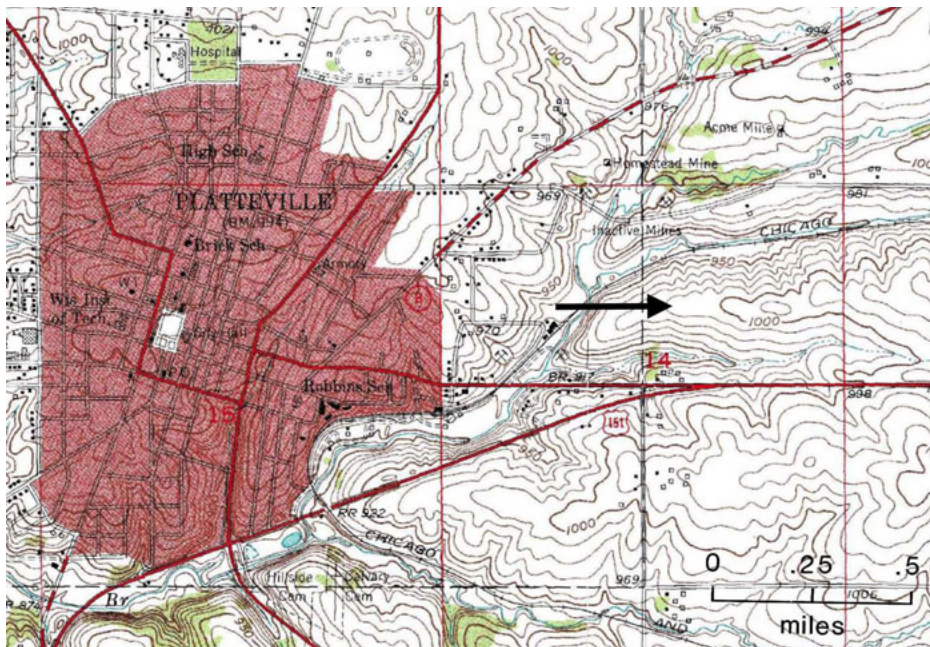


Figure 121. Part of the Platteville 7.5-minute quadrangle showing the location of the type section of the Rountree Formation.

Rountree Formation

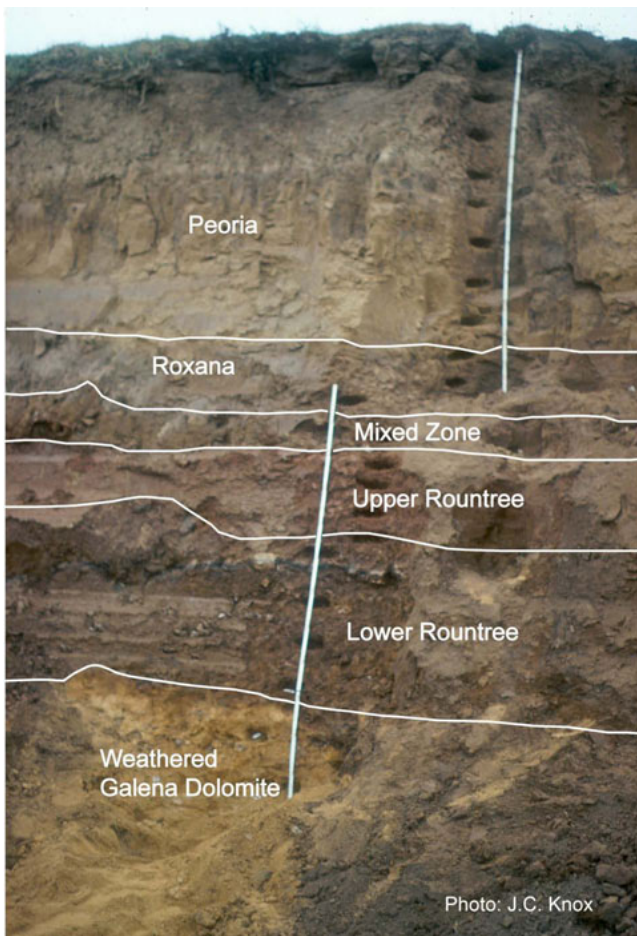


Figure 122. Photograph of the type section of the Rountree Formation at the Rosemeyer Quarry (date of photo, 1975). The vertical rods are each 2 m long. The Rountree Formation is overlain by the Roxana and Peoria Members of the Kieler Formation.

characterized by a moderately coarse, platy structure. Small charcoal bits are common. The basal yellowish-brown silt of the Peoria Member between depths of about 1.90 and 2.23 m is interstratified with dark brown silt eroded from the Roxana Formation. In turn, the main unit of the Roxana Member is separated from the Rountree Formation by a leached, dark brown (7.5YR 4/4) mixed zone occurring between depths of 2.35 and 2.59 m (fig. 123). Unlike the basal Peoria Member, where thin bedding identifies the interstratification within the Roxana Member, no bedding is apparent in the mixed zone at the interface between the Roxana Member and the Rountree Formation. The mixed zone is distinguished from the Roxana Member by its redder hue and the inclusion of occasional chert fragments.

The dark brown (7.5YR 4/3) to reddish-brown (5YR 4/3) Rountree Formation directly underlies the mixed zone at a depth of 2.59 m on the crest of the divide at the type section (fig. 123). The Rountree Formation consists of two prominent subdivisions: an upper reddish-brown (5YR 4/3) clay unit and a lower dark brown to strong brown (7.5YR 4/4 to 4/6) clay unit. The clay content in the less-than-2 mm fraction ranges from 50 to 60 percent in the upper unit, and in the lower unit, from 60 to 80 percent. A lens of yellow (2.5Y 8/8) carbonate-leached silt occurs within the lower Rountree Formation between 4.16 and 4.27 m and contains chert fragments; it is unclear

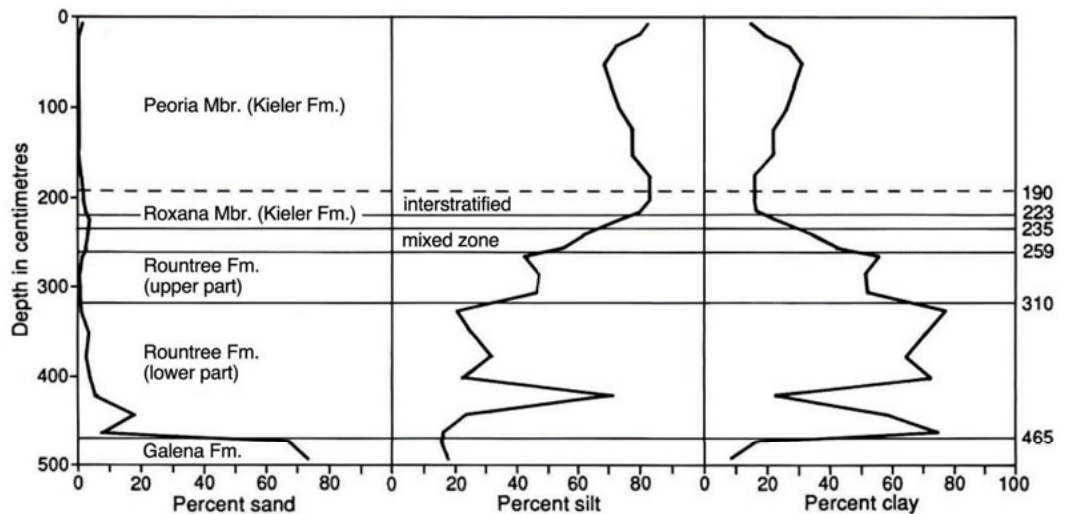


Figure 123. Grain-size analysis of the Rountree Formation at its type section. From Knox and others (1990).

Rountree Formation

whether this silt is residuum or material illuviated from above. Although angular chert fragments are common in both units, the quantity of chert is considerably greater in the lower unit than in the upper unit. The redder hues of the Rountree Formation in comparison to the overlying loess deposits are due to more abundant extractable

iron, which commonly ranges from 3 to 6 percent (citrate-bicarbonate-dithionite extraction). The reddish-brown to strong brown cherty clay of the Rountree Formation abuts brownish-yellow (10YR 6/6) dolomitic sand on the weathered surface of the lower Galena Formation at a depth of 4.65 m.

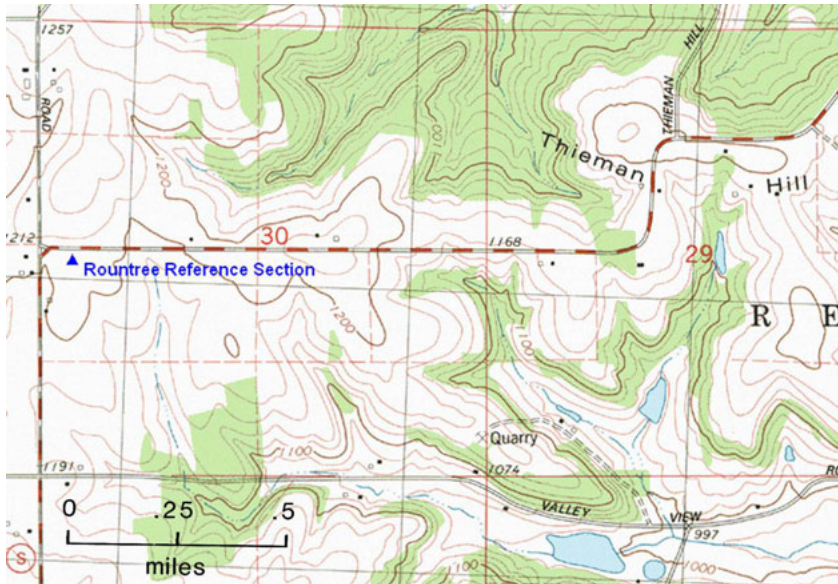


Figure 124. Part of the Loganville 7.5-minute quadrangle showing the location of the reference section of the Rountree Formation (a drill hole).

Location and description of reference section.

A drill hole (WGNHS Geologic Log SK-286-F) 8 km (5 miles) east of Lime Ridge, located in the NW corner of SW1/4 sec. 30, T. 12 N., R. 4 E, Sauk County, as shown on the Loganville 7.5-minute quadrangle (fig. 124). Lithologic properties for the Rountree Formation at the reference section are plotted in figure 125.

Description of unit.

At the type section on the crest of the divide, the Rountree Formation is 2.06 m thick. The upper reddish-brown (5YR 4/3) clay has a strong, fine, angular, blocky structure and is 0.51 m thick. The

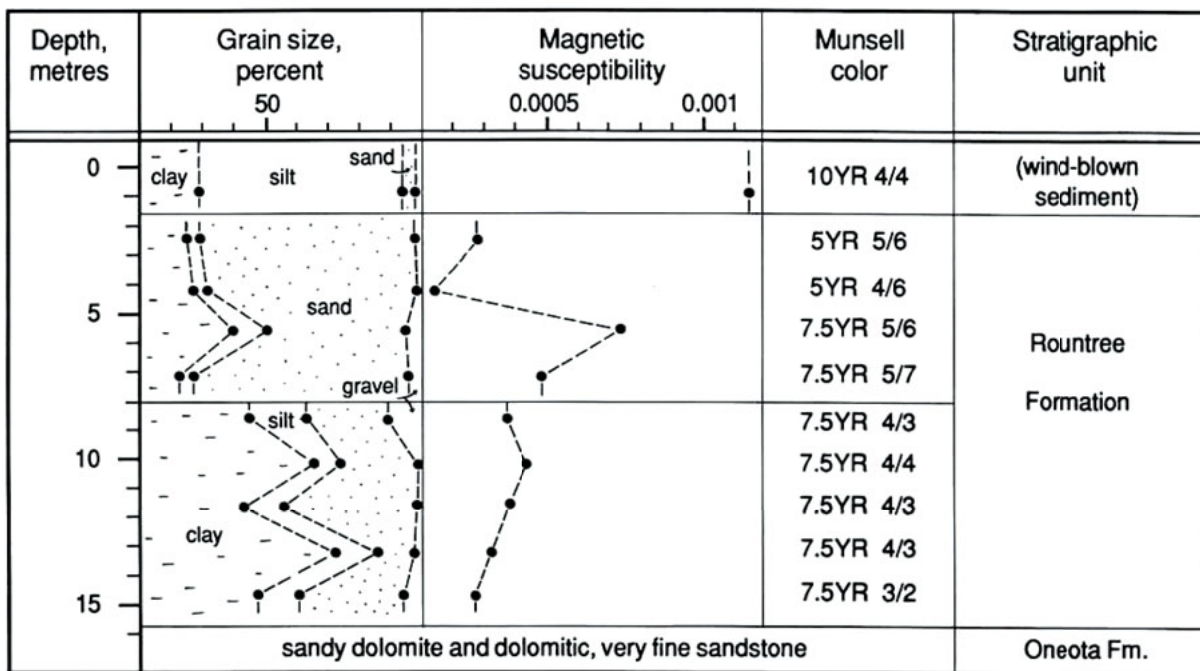


Figure 125. Lithologic properties for the Rountree Formation at its reference section (WGNHS Geologic Log SK-286-F). From Clayton and Attig (1990, p. 34).

Rountree Formation

lower dark brown to strong brown (7.5YR 4/4 to 4/6) clay is 1.55 m thick and contains many metallic black manganese coatings on ped faces; its strong, coarse, platy structure becomes more pronounced with depth (fig. 123). Both units are leached of carbonates throughout. The less abundant clay in the upper Rountree Formation is mainly associated with more abundant silt. Grain-size differences between the two units reflect an influx of silt from overlying loess units as well as the downward illuviation of clay within the Rountree Formation. The clay mineralogy and a modest increase of organic carbon in relation to depth support the notion that illuviation is an active process.

At the type section, Frolking (1978) found that montmorillonite (>50 percent) and mixed-layer intergrades dominate the clay fractions, kaolinite (5 to 15 percent) and quartz (<5 percent) tend to occur in moderate amounts, and mica (5 to 15 percent in upper red clays; <5 percent in lower red clays) and vermiculite (5 to 15 percent) are present in small amounts. Except for greater amounts of vermiculite in the overlying loess (16 to 30 percent), clay mineralogy of the overlying loess is broadly similar to that of the Rountree Formation. On the other hand, the underlying dolomite insoluble residue is dominantly mica and quartz. However, the mineralogy of the clay within dolomitic sand weathered from the Galena dolomite is similar to that of the overlying Rountree Formation clay, indicating that mica is slowly being altered to montmorillonite and kaolinite. These observations support the idea that clay in the Rountree Formation includes contributions both from overlying loess and underlying bedrock. Further evidence of downward migration of clay from overlying units into the Rountree Formation is indicated by horizontal chert beds that can be traced laterally from unweathered dolomite into clayey Rountree Formation. This shows that the red clay is moving downward and replacing the dolomite on a volume-per-volume basis because the amount of clay produced by the volume of weathered dolomite is incapable of providing the quantity of clay underlying these chert beds.

Regional extent and thickness. The thickness and distribution of the Rountree Formation varies with the type of underlying bedrock, slope steepness, and interfluvial width. Rountree Formation at the Rosemeyer Quarry can be absent or greater than 2 m thick across the interfluvial. Some of the variation in thickness found here is due to the highly irregular surface of the weathering front on the Galena Formation dolomite, but much is due to slope steepness. At the type section, much mass wasting and fluvial erosion occurred on side slopes prior to deposition of the loess of the Peoria Member. As a result, the Rountree Formation clay thins near the valley sides, and chert is concentrated in lag deposits up to 50 cm thick (Knox and Maher, 1974). The Rountree Formation is mainly concentrated in areas underlain by carbonate formations; the greatest thicknesses are associated with Paleozoic units that are rich in chert, such as the lower parts of the Prairie du Chien and Galena Formations. The chert lag deposits have provided a protective armor and reduced the erosional susceptibility of the Rountree Formation. The Rountree Formation usually is absent or in thin layers on slopes steeper than 3 to 5 percent.

The thickness of the Rountree Formation tends to be greater on wide flat upland interfluvial than on narrow interfluvial, but the relationship is not strong due to the previously mentioned factors. Because of the wide range of thicknesses of the Rountree Formation, it is meaningless to assign an average thickness for the entire region. The greatest thickness occurs north of the lower Wisconsin River; this appears to be related to karst depressions on upland interfluvial underlain by the chert-rich Prairie du Chien Formation where depths exceeding 15 m are not uncommon.

South of the Wisconsin River the Galena Formation dolomite is the main source of chert on uplands, but chert is considerably less abundant than in the lower part of the Prairie du Chien Formation. Consequently, south of the Wisconsin River, the maximum thickness of the Rountree Formation generally does not exceed 3 m on uplands underlain by the Galena dolomite, and the average thickness may be closer to 1.5 m. The Rountree Formation

Rountree Formation

thickness commonly may be only a few centimeters on other upland landscapes not underlain by cherty dolomite bedrock south of the Wisconsin River.

Origin. The Rountree Formation had a complex origin that involved illuviation from overlying loess deposits and slow accretion of residual sediment from underlying dolomite. Frolking (1978) concluded that the large amount of fine and medium clay, the textural and mineralogical homogeneity throughout the profile, the concentrations of organic matter and amorphous iron, and oriented clays at the base of the Rountree Formation are strong evidence for clay illuviation. Frolking also suggested that the montmorillonite dominance in the fine and medium red clay is similar to that of the overlying loess and distinctly different from the dolomite insoluble residues dominated by mica and quartz. Frolking (1978) used neutron activation analysis on the 0.001-to-0.01 mm medium clay through fine silt fractions. Frolking found that an undisturbed Rountree Formation sediment sample directly overlying dolomite was similar to that of the underlying dolomite, but that a Rountree Formation sediment sample higher in the profile had trace-element concentrations intermediate between those of the dolomite and loess, suggesting mixing. In contrast, the mineralogy of the silt and sand fractions within the Rountree Formation are generally quite similar to the dolomite insoluble residues, indicating that most of this sediment is residual and does not involve significant downward mixing from higher in the profile (Frolking, 1978).

Age and correlation. The Rountree Formation is older than the Peoria and Roxana Members of the Kieler Formation that bury it on upland sites, but its complex origin makes it impossible to assign a specific age. On some upland sites in western Wisconsin, it is associated with the Windrow Formation, which might indicate that it has been forming since the Cretaceous Period (Andrews, 1958). It is unlikely to be of great antiquity at most places in the Driftless Area because severe mass wasting during Pleistocene periglacial climates in the region resulted in much erosional stripping of the upland landscapes (Knox, 1982). For example, a study of a small southwestern Wisconsin watershed showed that the loss of sediment from upland hillslopes between 12,000 and 20,000 ¹⁴C yr B.P. (approximately 14,000 to 24,000 cal. yr B.P.) was about 200 Mg km⁻²yr⁻¹ (Knox, 1989). This rate is approximately double the modern agriculturally accelerated rate of 112 Mg km⁻²yr⁻¹. The number of such erosional episodes during the Pleistocene is unknown, but such events probably have occurred several times and they explain why the Rountree Formation is either relatively thin or absent at many locations throughout the southwestern Wisconsin region.

Previous usage. Formalized in Clayton and Attig (1990).