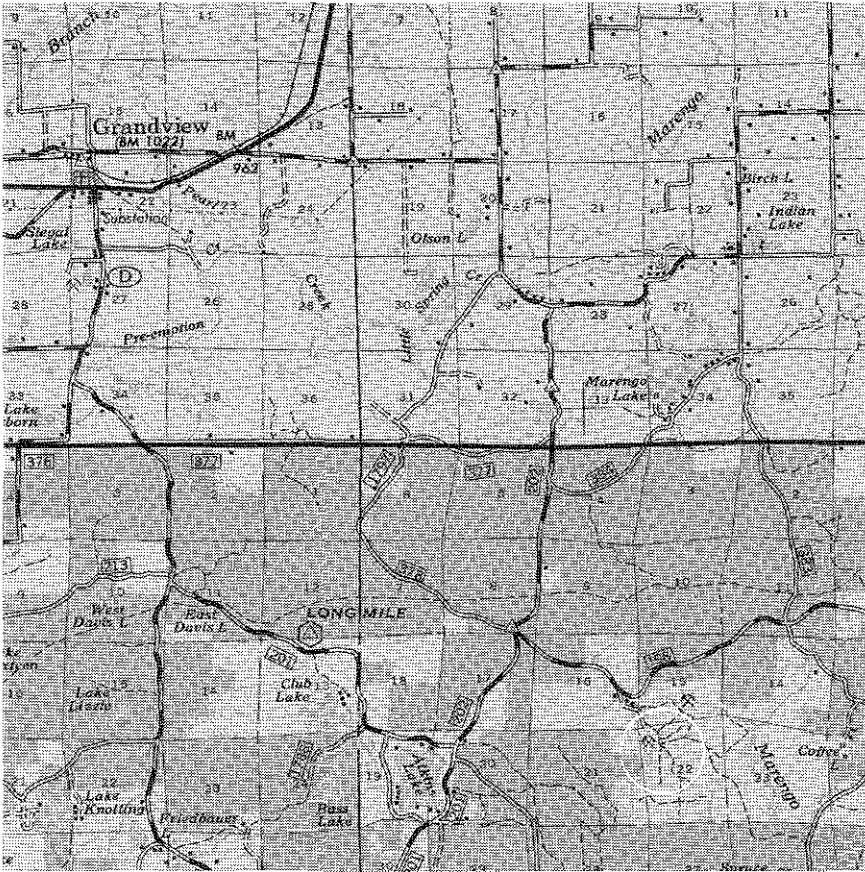


Title: Grand View Quarry -- Bad River Dolomite

Location: Johnson & Johnson Quarry, Grand View. NW $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 22, T.44N., R.5W., Bayfield County. (Chequamegon National Forest, $\frac{1}{2}$ inch = 1 mile, 1968)



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Author: Gene L. LaBerge (1978)

Description: This quarry provides one of the largest and most accessible exposures of the Bad River Dolomite in Wisconsin. The formation was named by Van Hise and Leith (1911) from exposures along the Bad River at Penokee Gap southwest of Mellen. According to Aldrich (1929), it unconformably overlies the Lower Precambrian greenstones and granites to the south. In the eastern part of the Gogebic Range the Sunday Lake Quartzite conformably underlies the dolomite, but both the dolomite and quartzite are missing in the central part of the district, presumably due to erosion prior to deposition of the overlying Palms Formation (Irving and Van Hise, 1892). Thus, there appears to have been gentle folding or arching along a north-south axis causing erosion of the Bad River Dolomite and Sunday Lake Quartzite prior to deposition of the Palms Formation, the basal unit of the Animikie Series (James, 1958) in this area.

The exposures in the quarry are fairly typical of the formation. The bedding dips 35°- 75° north, along with all other Middle Precambrian units on the Gogebic Range in Wisconsin. Komatar (1972) estimates a minimum thickness of 550 feet in this area, thinning to about 310 feet eight miles to the east. Aldrich (1929) reports that the lower part of the formation is mainly a dolomitic limestone with a much more siliceous upper part. The silica occurs as lenses of sandy dolomite or cross-bedded sandstone (now quartzite), and as beds, pods and irregular masses of chert (Komatar, 1972). The chert ranges in color from light gray to black, presumably due to included organic matter. Algal structures up to nearly 1 meter in diameter, some with black chert layers alternating with dolomite, are present in the formation (Figure 1).

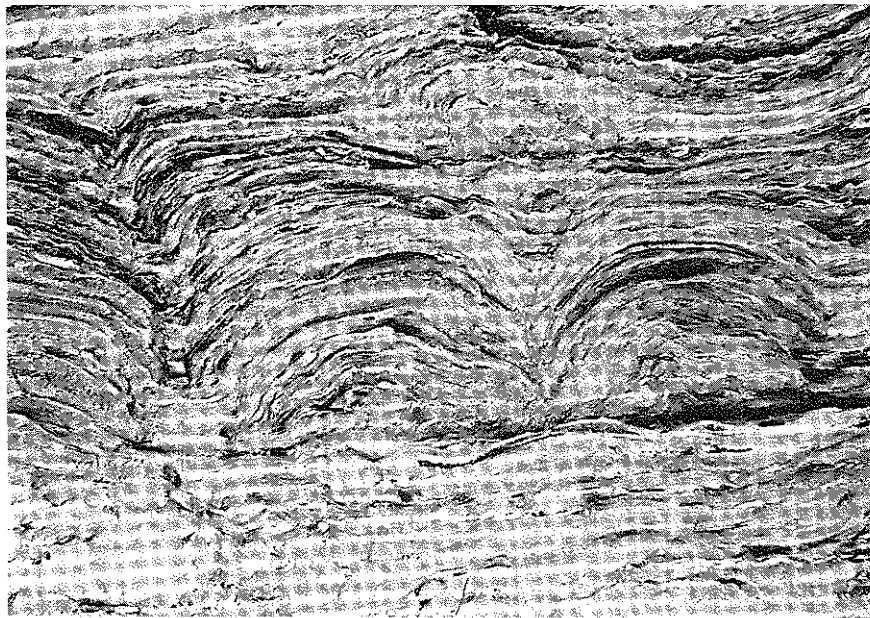


Figure 1. Algal structures in the Bad River Dolomite. Photo is of a large glacial erratic near Clam Lake, about 10 miles southeast of Grandview.

Several mafic dikes striking N.80°E. and dipping 84°S. are exposed in the quarry (Komatar, 1972). These are presumably Keweenaw diabase dikes.

Mineralogically, the formation consists of medium-grained granular carbonate with lenses, pods and patches of quartz. A reaction rim of pale green tremolite typically occurs between the quartz and carbonate. The tremolite is also present in layers of massive, randomly oriented crystals and as radial aggregates several inches in diameter.

The mineral assemblage in the Bad River Dolomite and associated Palms and Tyler Formation indicate that the area was metamorphosed to greenschist facies during the Penokean orogeny about 1700 m.y. ago (Komatar, 1972). He reports that the metamorphic grade increases from quartz-albite-muscovite-chlorite subfacies on the east to quartz-albite-epidote-almandine subfacies in the Grandview area. This metamorphism was associated with only slight deformation.

Intrusion of the Mellen gabbro produced widespread contact metamorphism superimposed on the earlier regional metamorphism. K/Ar ages (Komatar, 1972) date this event at 1050 ± 40 m.y.

Discussion: The Bad River Dolomite was deposited on an erosion surface of Lower Precambrian greenstones and granites. The presence of algal structures, sandy dolomite and interbedded layers of sand indicate deposition in a shallow marine environment. The increase in sand content upward in the formation suggests either a shallowing of the basin or a change in source area providing more coarse clastics to the basin. The unit is similar in all respects to the Kona and Randville dolomites in the Marquette and Menominee districts of Michigan respectively, with which it is generally correlated.

The absence of the Bad River Dolomite in the central part of the Gogebic suggests a gentle upwarp in that area resulting in erosion of the formation prior to deposition of the overlying Palms Formation. Gentle folding and greenschist facies metamorphism occurred during the Penokean orogeny.

The major northward tilting of the units and contact metamorphism associated with emplacement of the Mellen gabbro occurred during Late Precambrian time.

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