The Upper Narrows and Van Hise Rock

Location. West side of the Upper Narrows of the Baraboo River, along Highway 136 between the Rock Springs and the bridge over the Baraboo River, E1/2, SE1/4, sec. 29, and the W1/2, SW1/4, sec. 28, T12N, R5E, Sauk County (Rock Springs, Wisconsin, Quadrangle, 7.5-minute series, topographic, U.S. Geological Survey, 1975) (fig. 1). *Caution*: This is a busy highway and a dangerous curve. Watch for traffic. Park at the parking area on the east side of the highway south of Van Hise Rock.

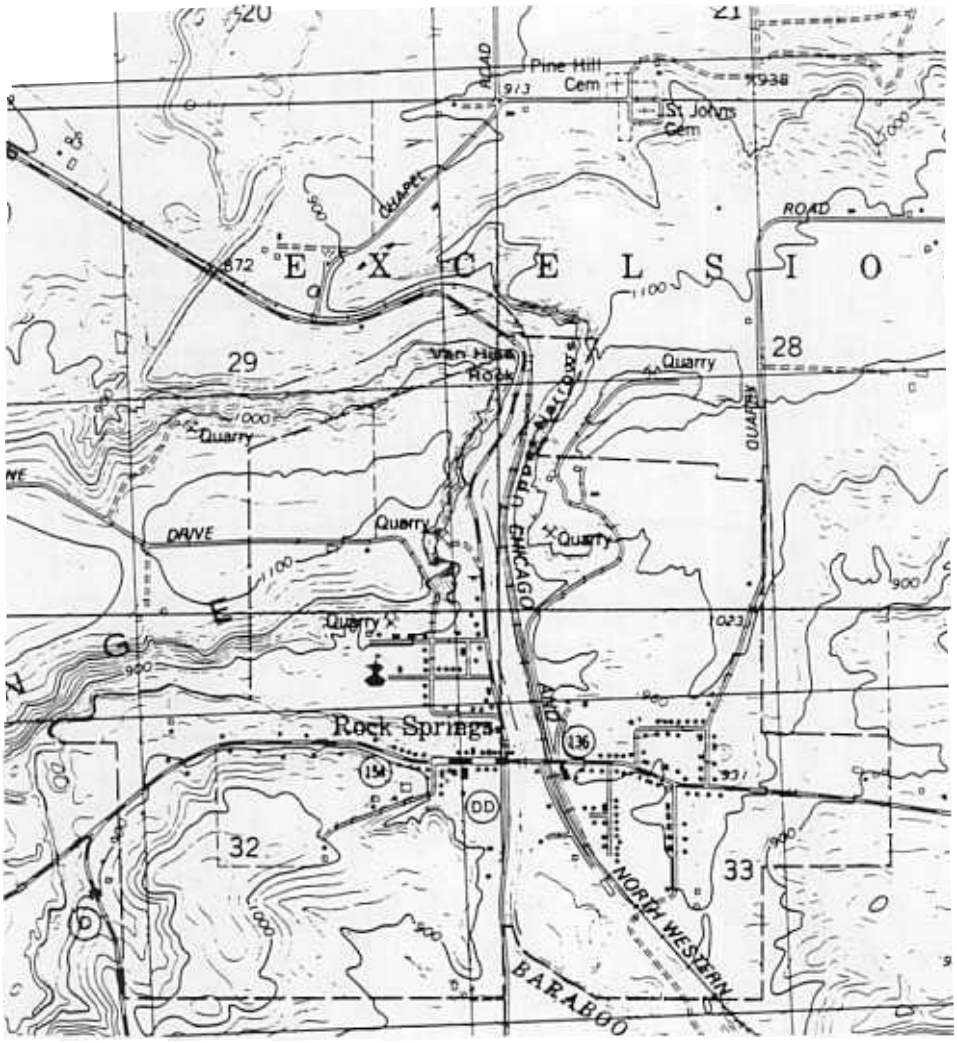

Figure 1. *Location of Van Hise Rock and the Upper Narrows area.*

Authors. B.A. Brown and M.E. Ostrom, 1990 (modified from Dalziel and Dott, 1970).

Introduction. The Upper Narrows, formerly called Ablemans Gorge or Rock Springs Gorge, provides an opportunity to examine significant lithologic characteristics and structural relationships in the Proterozoic quartzite of the Baraboo Formation. The upper bluffs and the ends of the gorge also show the onlapping relationship of the Upper Cambrian formations. Exposures are on both sides of the Baraboo River for 0.8 km from the river bridge at the north end of the gorge to the old sandstone

quarry on the south end. The accompanying geologic map (fig. 2) and diagrammatic cross section (fig. 3) taken from Dalziel and Dott (1970) provide a guide to the important geologic features. Van Hise Rock, located south of the bridge and east of the highway, is an excellent example of cleavage refracted from a phyllitic bed into a massive quartzite layer on the north limb of the Baraboo Syncline. This rock has long been used as an example of cleavage refraction; it bears a plaque dedicated to pioneer structural geologist C.R. Van Hise, who first described this phenomenon in the Baraboo Hills.

Description. The Upper Narrows provides a cross section through the vertical north limb of the Baraboo Syncline. The features visible on the west side of the river along Highway 136 are summarized in figure 3.

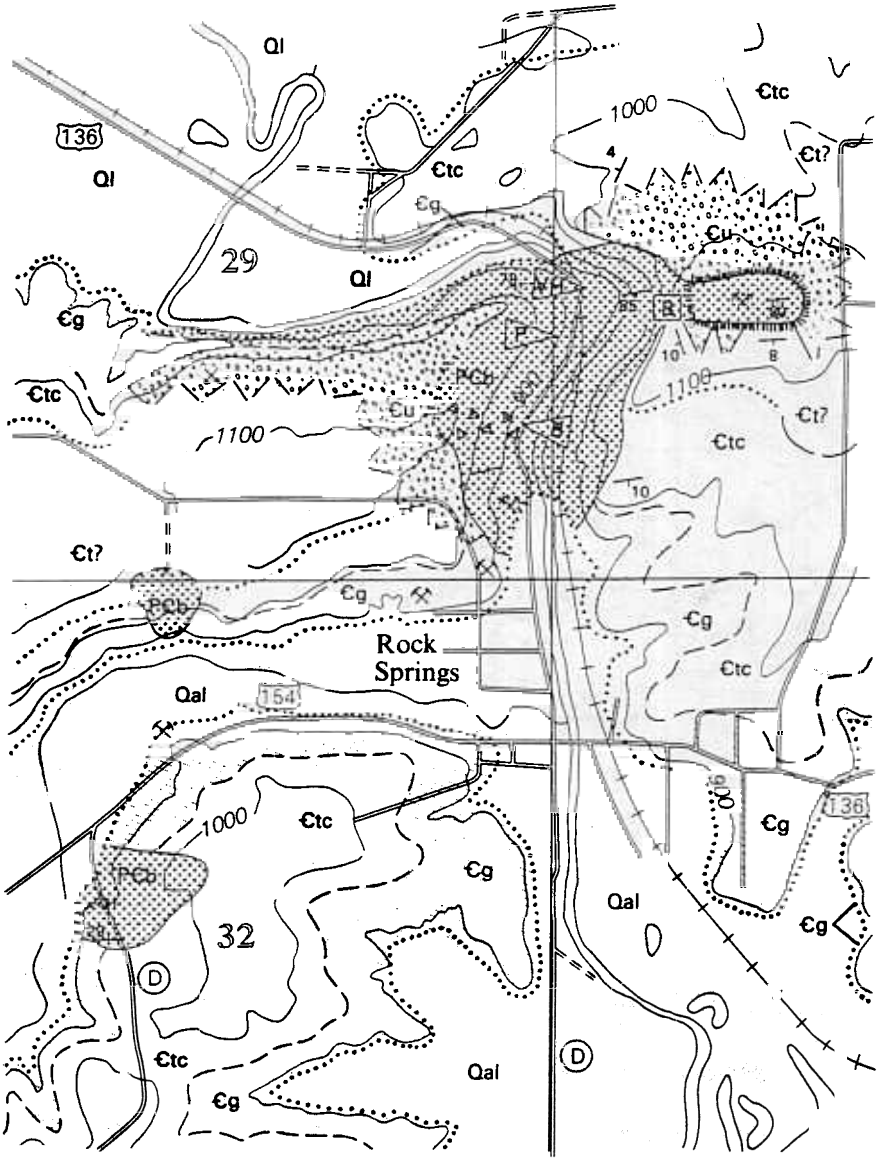

Figure 2. Geologic map of Upper Narrows (Rock Springs) area. On west side of gorge: VH = Van Hise Rock; P = polished quartzite surface; B = breccia zone. Note initial dips and distribution of conglomeratic facies in Cambrian rocks. PЄb = Baraboo Quartzite; Єg = Galesville Member; Єtc = Tunnel City Formation; Єt = Trempealeau Group; Єp = conglomeratic sandstone of the Parfreys Glen Formation; Qal = river alluvium; Ql = glacial lake beds (modified from Usbug, 1968; Dalziel and Dott, 1970, fig. 21).

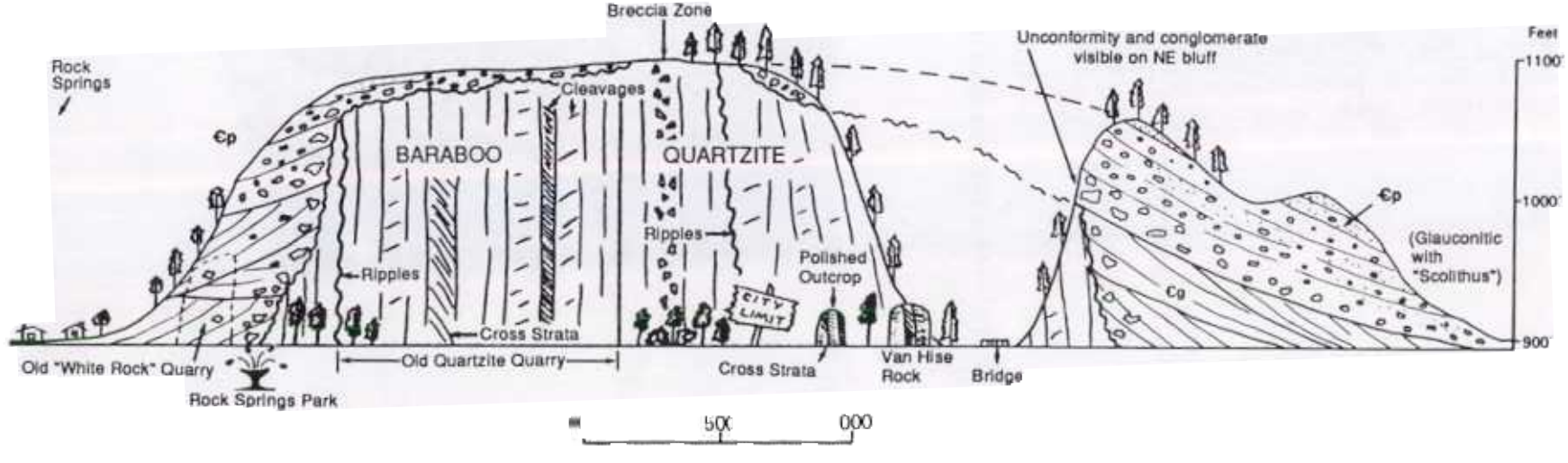

Figure 3. *Diagrammatic cross section of Upper Narrows of the Baraboo River looking west showing key geologic features €p Parfreys Glen Formation (Dalziel and Dott, 970, fig 22*

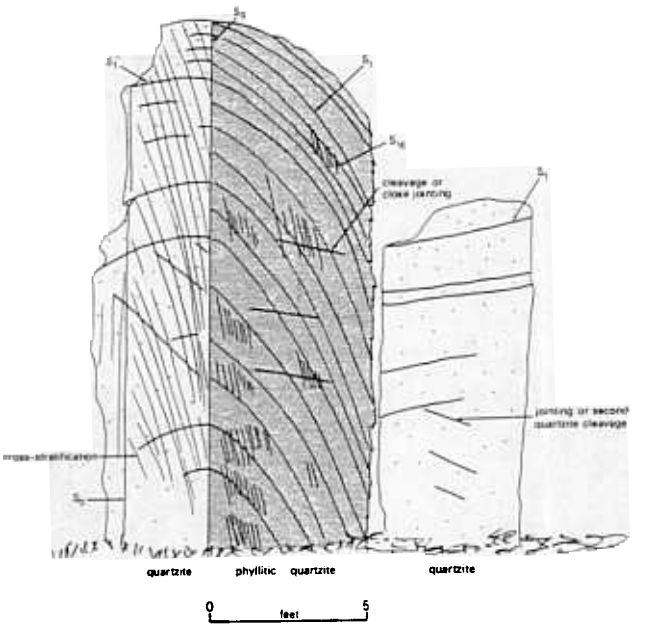

Figure 4. Sketch of structures in Van Hise Rock as seen from the east (Dalziel and Dott, 1970, fig. 23).

Figure 5. Photograph of Van Hise Rock looking northeast from Highway 136. Phyllite bed is dark bed on left. Cliff in background is Baraboo quartzite capped by Cambrian sandstone and conglomerate.

Van Hise Rock consists of two massive beds of Baraboo quartzite separated by a finer-grained bed of phyllite (fig. 4). The phyllite layer, which was originally an argillaceous fine sandstone, is not traceable into the cliff west of the highway. This bed appears to be a lens that pinches out to the west, although similar phyllite beds typical of the middle to upper part of the Baraboo quartzite are visible in the face of the roadcut. Consistent orientation of structures in Van Hise Rock and throughout the gorge area suggests that the rock is in place.

The most striking feature of Van Hise Rock is the refraction of cleavage between the quartzite and phyllite layers. Gently south-dipping cleavage in the quartzite is refracted into phyllite cleavage dipping about 40° to the north (fig. 5). The bedding or cleavage intersection is nearly horizontal and oriented east-west, roughly parallel to the axis of the Baraboo Syncline. A prominent set of joints, often quartz-filled, is developed at high angles to the bedding/cleavage intersection and was interpreted by Dalziel and Dott (1970) to be extensional fractures at right angles to the regional least-compressive stress. Well developed tension gash bands are visible on the north side of Van Hise Rock. Dalziel and Dott (1970) provide a more complete discussion of the structural geology of the Baraboo Syncline.

The roadcut on the west side of Highway 136 opposite Van Hise Rock contains some excellent examples of bedding and cross stratification in the Baraboo quartzite. To the south, at the Rock Springs village limit, a trail leads to the west into an old quartzite quarry. Ripple marks are visible on some bedding surfaces; at the south end, the quartzite becomes a breccia cemented by white vein quartz. These breccias are common in other exposures of the Baraboo interval quartzites. The fragments are angular and appear as if they could be fitted back perfectly. These zones show no evidence of a tectonic origin, no rounding of clasts or cataclasis as would be expected if they originated as fault zones. Greenberg (1986) described similar breccias at Hamilton Mounds and at Waterloo, attributing them to hydrothermal activity.

Farther south, a large quartzite quarry behind Rock Springs Park provides another opportunity to see sedimentary structures such as ripple marks and cross-bedding. At this location the unconformity between the quartzite and the overlying conglomerate of the Parfreys Glen Formation is visible as it was at the north end of the gorge. Rounded clasts of quartzite up to 1 m in diameter are contained in a sandstone matrix.

At the south end of the Upper Narrows, an old quarry produced building stone from sandstone of the Parfreys Glen Formation that is relatively free of the typical coarse quartzite clasts. This sandstone was deposited in the interior of the basin formed by the Baraboo Syncline. Scarce angular blocks of quartzite in the sandstone suggest that this material was deposited in a relatively wave-free area in the lee of the quartzite knob to the north.

References

Dalziel, I.W.D. and Dott, R.H., Jr., 1970, Geology of the Baraboo District, Wisconsin: Wisconsin Geological and Natural History Survey Information Circular 14, 164 p., VII plates.

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