

## Drifting Cuyuna Tourmaline

Every once in a while tourmaline-bearing rocks are found in the glacial drift in this part of the St. Croix Valley. The source of these rocks has been a mystery. Some are clearly in granite pegmatite. Such rocks are not common in either Wisconsin or Minnesota. The nearest large area of tourmaline-rich pegmatite is east of Winnipeg. Here, the large Tanco deposit is worked for lithium, niobium and other rare metals. It's possible that chunks of these pegmatites have been moved here by glaciers, but it would be a long haul.

Recent work by geologists at the Minnesota Geological Survey (Cleland, et. al., 1996) have uncovered a closer source - the Cuyuna Iron Range, east of Brainerd. (Oh - yah?) The tourmaline here, however, isn't in granite pegmatite. It forms in layers of quartz within the iron formations and associated schists. Its presence there, along with other unusual minerals such as hyalophane (a barium-rich feldspar), aegirine ( a sodium-rich pyroxene), rhodonite (a manganese silicate) and barite, has spurred a reinterpretation of the history of the rocks of the iron range.

The tourmaline was first noted in 1963. It has since been found in specimens and drill core from a number of spots in the North Cuyuna Range - particularly at such mines as the Sagamore, Hillcrest, Feigh and Portsmouth.

The tourmaline is found concentrated in certain parts in the lower levels of the Trommald formation, which is the major iron-bearing unit. It also occurs in the underlying Mahanomen Formation. The tourmaline may make up locally 30% of the rock and is associated with quartz, muscovite and chlorite. The crystals are small, perhaps 7 mm (1/3 of an inch) long and have a black to dark green color. The grains are scattered through the rock in a manner suggestive of scattered thistle seed.

The occurrence of such concentrations of boron-rich mineral, combined with high levels of barium, strontium, and manganese lead the Minnesota Survey geologists to suggest that a submarine hot spring system was active during the formation of the iron ore. Those fluids would be the source of the chemicals that eventually became the tourmaline, as well as the barite, manganese and other rare minerals. They further suggest that other hot spring ore deposits, such as those bearing gold, copper, zinc and silver may also be present, and should be targets for exploration.

Thus rocks with fine-grained tourmaline in quartz could be from these deposits, and should be recognizable if they turn up in local gravel pits. Certainly if rocks from near Winnipeg can be brought down here, rocks from the Cuyuna should be here too. Further, understanding these rocks may lead

to the discovery of important new ore deposits in Minnesota. I imagine most rockhounds would be pleased to see active mining resume on the Cuyuna, with the production of even more interesting minerals from the range.

- Dr. Bill Cordua, University of Wisconsin-River Falls

Reference:

Cleland, Jane, G.B. Morey and Peter McSwiggen, 1996, "Significance of Tourmaline-Rich rocks in the North Range Group of the Cuyuna Iron Range, East-central Minnesota", *Economic Geology*, vol. 91, p. 1282-1291.