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STRUCTURAL GEOLOGY AND MINING METHODS  
ON THE GOGEBIC RANGE

by

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## STRUCTURAL GEOLOGY AND MINING METHODS ON THE GOGEBIC RANGE.

W. C. Hetchkiss, February 1934.

The Gogebic iron formation is about 500 to 1000 feet in thickness and has a fairly uniform dip of about 50° to the north. There are numerous basic dikes varying up to about 100 feet in thickness which cut about perpendicular to the dip of the iron formation and make the gently pitching troughs, with the quartzite footwall (and impervious parts of the iron formation), in which the ore lies. Most of the ore has been mined from the footwall side of the formation, but many ore bodies extend well toward the hanging. The ore bodies are mostly linear bodies in these troughs, and are roughly of triangular cross-section bounded by the footwall, the dike and the lean iron formation or "cap rock." Many of the smaller ore deposits are relatively thin tabular bodies lying on the quartzite foot.

The wider ore bodies which extend far from the footwall have a "capping" that varies with the original richness of the formation. The alteration to ore has proceeded farther up, away from the dike, in the richer beds of the formation than it has in the leaner beds. Consequently in the wider ore bodies the "capping" bellies down in irregular fashion and gives an uneven weight to be cared for in mining.

The thin tabular ore bodies are usually of ~~much~~ harder texture and have better walls than the wide ore bodies. Their capping is also narrow and more readily supported. In these bodies

stepping methods are quite commonly used, either sub level stepping or shrinkage stepping.

The great bulk of the production comes from the wider ore bodies. In these slumping and crushing has weakened the ore and this, combined with the greater width and irregular shape of the weak cap rock, makes some form of caving system of mining a necessity.

These wider ore bodies will in rare cases extend the full width of the formation, so that the ore body may be 500 feet wide. More often the width is 80 to 200 feet. In these large bodies the length of the deposit may be a mile or two. The quartzite footwall is likely to be disintegrated to sand in spots, near large bodies, and is always more or less weakened. The hanging wall is sometimes a partly leached iron formation known as "mixed rock and ore" which makes a difficult wall to mine against. At other times it may be a mushy ferruginous slate; but most often it is a lean, somewhat leached, porous ferruginous chert that breaks into fairly good sized chunks and makes a good wall to mine against. The capping is usually of the porous ferruginous chert just described. With the chunks is some loose sandy disintegrated chert that causes trouble by contaminating the ore.

The great depth - 2000 feet and more - combined with the wide irregular capping, causes the capping to come down with the ore and necessitates some form of caving as the method of mining. One of the most common methods is slicing combined with some ore

caving. A newer method developed on this range has replaced this to some extent - caving into branch raises - and diminishes the amount of hand shovelling materially. A third method of mining is in use in two of the large producers - caving into chutes.