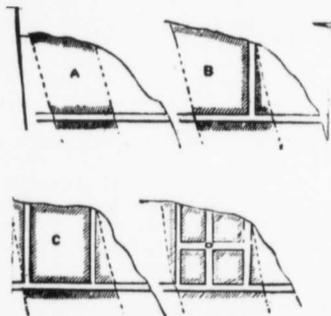


problem becomes easier still. Allowances to cover any possible error from nips, intrusions or inclusions, would have to be greater in the case of A than in that of B, and greater for B than for C. The allowances must, in fact, be inversely proportional to the amount of blocking out. They must also vary as the distances apart of the exposed sides vary. For example, in the case of No. 1, if the tunnel were 200 feet below the surface at block A, the estimation of the probable amount of ore in that block would be much more difficult than if the depth were only 50 feet, and therefore greater allow-



ances for possible variations must be made. The same remarks apply to the other figures. The extent of allowance, that is the factor of safety, depends largely upon the character of the deposit, and must be determined on the spot for each particular case.

Blocking out does not mean simply the exposure of ore by trenches, tunnels, drifts, winzes and raises, but includes also the exposures that sometimes result from denudation.

*Why blocking out is necessary.*—Owing to the very irregular manner in which ore deposits usually occur no one can, as a rule, form even an approximate idea of their extent until the boundaries have been determined by actual work. But even if the main or outside boundaries of a deposit be known there is still much to be learned with regard to the inside boundaries, for most, if not all, deposits contain more or fewer and larger or smaller inclusions of country rock, or other barren ground, about which we cannot know anything until the deposit has been more or less blocked out.

Variations also occur in the quality of ore in different parts of a deposit, so that the more we see of it and the more samples we can take, the more likely are we to arrive at the average quality of the workable portion of it.

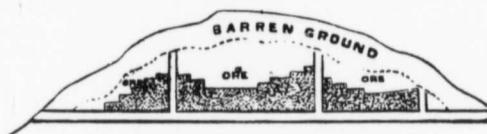
The man who has not, from experience, realised the truth of the above statements will be apt to permit his fancy to form his facts, and so reach conclusions which will most probably be altogether unreliable; for he will assume extensions which may not exist, continuity where they may (and probably will) be great interruption and uniformity where there is great variation.

A few of many instances that have come within the writer's experience will now be given of the unreliability of estimates of ore in sight which are made when the ground under consideration has been insufficiently blocked out.

*Illustrations of erroneous methods.*—The first illustration relates to a deposit of argentiferous galena, which occurred as a vein. The diagram below gives a section along the vein, and shows the amount of work done at the time the engineer of an intending purchaser made an estimate of the ore in sight.

Had the vein carried ore at the surface it would have

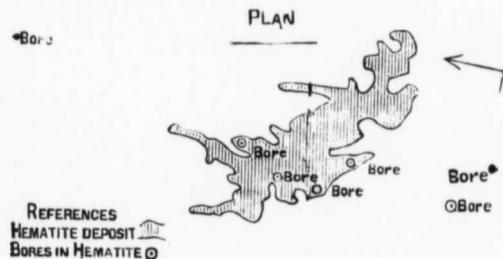
been fairly safe to infer that the ore in the back of the stopes would extend to the surface, but without satisfying himself of the existence of ore in the vein at the surface, the engineer referred to assumed that the body of ore he had seen in the stopes would extend out to



"day." Had he taken the trouble—as he ought to have done—to ascertain what really was on the surface, his estimate would have been very different from what it was, if indeed he had thought it possible to make one. The writer followed soon after with the same object, but failing to find any ore at the surface—that is lacking the third dimension—did not make an estimate, because the ore above the stopes could not be said to be in sight.

When the stopes were extended upwards, it was found that the ore actually nipped out along the dotted line in the diagram.

Another instance is in connection with a deposit of hematite. The deposit had been discovered by means of boring. Hematite had been found in five holes at the points shown in the following diagram:—



It was assumed that all the bores which passed through ore were in one and the same deposit, that the deposit extended literally much beyond the bores, and that therefore a body of ore containing at least 650,000 tons had been "thoroughly proved"—to adopt an expression made use of in the report prepared for the sale of the property—which expression may be considered as another way of writing "ore in sight." This estimate led to a very serious lawsuit, for when the deposit was practically exhausted only 41,879 tons of ore had been raised, the lateral extent of the deposit being shown in the above diagram. To assume that all the bores which cut hematite were in one deposit was to disregard entirely all experience of such deposits. But further, the founding of such conclusions so important, financially, on such insufficient data is most reprehensible. If the ore had been more thoroughly bored, or blocked out by workings, before any estimate had been attempted no such ruinous mistake could have been made.

Let us now consider an estimate of ore in sight relating to some gold-bearing veins. In its disregard of facts and its confident reliance upon assumption, this is, perhaps, the most reprehensible instance that has ever come under the writer's notice. One vein could only be seen for a length of about 50 feet in a trench about 4 feet deep. The width of the vein in the trench was