University of Arizona
Bulletin

Sampling Mineralized Veins

BY

Geo. R. Fanett

Entered as second class matter November 23, 1915, at the postoffice at Tucson, Arizona, under the Act of August 24, 1912. Issued weekly, September to May.

PUBLISHED BY THE

University of Arizona
Bureau of Mines

Charles F. Willis, Director

TUCSON, ARIZONA

1917-18
TAKING SAMPLES AND MEASURING THE WIDTH OF A MINERALIZED VEIN

By George R. Fansett

Taking samples and measuring the width of an ore body are matters which everyone connected with the mining industry should be able to do properly. The purpose of this bulletin is to describe the methods generally used by many engineers, so that one may understand how to do this very important class of work correctly.

The width or thickness of a vein at any point is the distance between the walls of the vein, measured along a perpendicular or at right angles to the plane of the vein at that particular point. For this reason there is only one width or thickness of a vein for each point or location in it. The following sketches illustrate this:

Figures 1 and 2 illustrate veins the faces of which are at right angles to the plane of the vein. In cases of this kind it is a simple matter to make this measurement as "B". In a case like that shown in Fig. 3, where the exposed face of the vein is not perpendicular to the plane of the vein, it is often difficult to make this measurement correctly. In such instances there usually arises a great difference of
opinion as to the width of the vein, unless the measurement is properly made.

One of the best methods for making the measurement is to hold the Zero (⁰') end of the tape or rule at the contact of the wall of the vein as at "C", shown in Fig. 3. With the tape or rule held perpendicular to the plane of the vein, the reading on the tape where the other wall, if projected as at "E", would hit the tape, will give the true width, "B"—("C" to "E") for the vein at that particular point. "C" to "D" is not the width of the vein.

In mining terms a sample is usually considered to be a collection of fragments or pieces from a deposit which contains exactly the same minerals in the same proportion as they exist in the deposit from which they were taken. The act of collecting these pieces is called sampling. The material from a cross section or core, from a vein at any point in the vein represents a true sample of the vein at that particular point.

Fig. 4 illustrates this.

All of the material or core taken from the hole "A" represents a true sample from the vein at "A", but at no other point in the vein.

The above represents ideal sampling, and can sometimes be approached by the use of a diamond drill or other similar apparatus, but owing to the high cost and other considerations, it is seldom possible to sample a mine in this way. For these reasons, most engineers use methods which are quicker and cheaper, with the intention of approaching in accuracy the ideal case as closely as possible.

For this work many engineers sample veins by chiseling or hewing a channel shaped groove across the width of the vein, catching the ma-
terial which is hewn out and using this material for the sample for that particular point of the vein.

The following sketch illustrates how these grooves appear on the face of a vein after being cut.

Figure 5 represents a vein whose face is perpendicular to the plane of the vein. In either case the sample taken from the groove will be a fair sample, since the same proportion of minerals present is maintained. The only difference in the two cases is that the samples from No. 6 will be larger than from No. 5. The width of the vein should be measured, as explained before.

The groove which is chiseled out should have as nearly as possible the same width throughout its entire length. In most cases, a fair sample can be taken from a groove from three to six inches in width. The point must be decided for each particular sample, and will depend upon the hardness of the rock, the kind of ore deposit, the size of the sample wanted, and many other factors, each one of which will help to decide this important point.

The groove should have the same depth throughout its entire length if the face is fairly straight. In cases as illustrated in Fig 7, the groove should be chiseled to a greater depth nearing the center than at the sides. This is for the purpose of keeping the same proportion in the sample as they exist in the vein.

A fair sample can usually be obtained from a groove one-half an inch to three inches in depth. This, like the width of the groove can only be decided on the ground.
Engineers usually use moils or gads for hewing out these grooves. For striking the moil, a single jack (four pound miners' hammer) is very serviceable. If the vein matter is particularly hard, a double jack (eight to ten pounds, two handed, miners' hammer) is better.

The sample pick is seldom, if ever, used where great accuracy is wanted, and is not favorably looked upon by most engineers for doing this class of work. The reason for this is that it tends to pick out the softer spots in a vein. Since the soft material is usually the richer material of the vein, and the hard the leaner, it is easily seen that the sample take in this manner may be worthless as a true sample for that vein. The sample pick can sometimes be used to advantage by a thoroughly experienced sample man, when great accuracy is not desired.

The geologist's hammer is likewise not used for this work, as it tends to hit the projecting parts of the vein, and as these hard parts are usually made up of the leaner material, the sample may be worthless.

The practice of putting in a pop shot to break out the sample in no manner represents sampling. Even if the rock which is broken out by the shot is carefully quartered down, it cannot be considered a sample of the vein. The reason for this is that the shot usually tends to break out a conical shaped cavity whose axis is the drill hole and whose apex is the inside end of the drill hole. For this reason, a greater amount of the rock around the outer end of the drill hole will be broken than around the inside end. This, of course, would give a collection of fragments or pieces of rock that does not contain the same minerals in the same proportion as they exist in the vein, and for this reason, if for no other, it is valueless as a sample from the vein.

The practice of gouging out a specimen from the heart of a vein and giving the entire vein the values which have been derived from this specimen, of course needs no comment.

The grab sample for accurate sampling is likewise looked upon unfavorably by engineers, as one is almost bound to take the bright high valued pieces from a dump or deposit, if his eyes are open, and if he closes them he will usually get either too much of the fines or the lean rock. In any case, it is likely to be of no value for accurate sampling.

A powder box or other convenient receptical is useful in catching the pieces of the sample as they are hewn from the groove. It should be held as close as convenient below the cutting tool so as to catch all that is hewn out. Great care should be taken that none of the material making up the sample is lost.

For doing this work, at least two men are needed, one to do the
cutting and the other to hold the box, keep the records and superin-
tend the work generally. They should take the greatest care in every
detail of the work, for, if one part is poorly done it may make valueless
all of the work connected with that particular sample.

In some cases, especially when taking samples from an ore body
whose ore leaches readily, or when the exposed face is very rough, it
is desirable to break down and smooth off the exposed face. This
makes it not only easier to get a true section from the vein, but in the
case of minerals which leach easily, one gets back into the ore body
proper, and is not so likely to get a high grade or salted sample.

In cases where the vein only occupies a part of the face of the
drift, it is often better to take for the sample of the vein the material
hewn out from the vein. The material from the hanging wall can
be put in a different sack and that from the foot in another. It will
thus be possible to analyze each separately if desired. This matter
can be settled for each particular sample.

In cases where the vein is so wide that the sample will be alto-
gether too large, it is convenient to measure off certain distances on
the vein and take samples from them, records being kept so as to
identify each sample.

The samples taken in this way are usually much larger than is
needed for the assays or analysis which are to be run on them. In these
instances it is necessary to cut them down. Methods for cutting down
samples to the desired size, and for keeping the records of the work,
were described in Arizona State Bureau of Mines Bulletin No. 63,
Sampling Ore Dumps and Tailings Heaps.