

Sampling and Valuation of Mines

By H. E. D. MERRY

The following lecture on sampling and valuation of mines and properties was delivered before the school of mines on Friday the 14th, by H. E. D. Merry, M. E. I have chosen as the subject for this evening one that is difficult to explain without practical illustration, and the time at my disposal will not permit me to treat it in full, but I will endeavor to make the main facts clear. When on the spot, one point follows another as circumstances arise, and an assayer, or one who is not an expert in this sort of apt to omit essential points that do not arise to the mind until too late. My reason for choosing this subject is the fact that I have frequently been asked: "What do you think of this? Do you think it carries gold?" and at the same time have been handed a small piece of ore, or a piece of specimen, and the specimen—I will not say sample—looks promising, or may carry a little mineral, such as iron pyrites, the eyes of the inquirer, (generally a prospector) look for it, and he thinks that it is worth something. He asks: "What do you think of this? Do you think it carries gold?" and at the same time have been handed a small piece of ore, or a piece of specimen, and the specimen—I will not say sample—looks promising, or may carry a little mineral, such as iron pyrites, the eyes of the inquirer, (generally a prospector) look for it, and he thinks that it is worth something. He asks: "What do you think of this? Do you think it carries gold?"

On an occasion I have seen some young prospectors standing around an "old timer" who, with a piece of ore in his hand, has the assurance to state, without any foundation other than his judgment: "This piece of ore will carry \$100 to the ton." Now, gentlemen, although it is simple for a mineralogist to distinguish most of the minerals containing metals of commercial value on sight, and to even make a very close estimate of the contents, it is equally as impossible for any man, however clever he may be, to state with certainty that a piece of ore does, or does not carry gold, unless it is visible. Such being the case, even when viewing ore from a well known mine, it follows that to positively state that a piece of ore from a prospect on which no assays have been made, does or does not carry gold, would be even more hazardous. I have taken a lump of ore on many different occasions from different parts of the world, and have broken them in two, and on assaying both halves separately, have time and again proved that one half may assay hundreds of dollars, while the other half may assay only a few cents. This being so, it is evident how useless it is for one seeking knowledge to have an assay made on one piece of rock or ore; it may have a trace of a thousand dollars, or it may have a trace of a few cents. The former, the assayer has robbed him, or thinks his claim valueless, and disposes of it for a mere song, or if the latter, he gets an exalted idea of his property, and frequently in consequence, loses a change of a good sale by holding out for a prohibitive price, for although by chance he may have knocked off a piece carrying \$1,000 per ton, his assay would just as probably reduce an average result to a few dollars, as judicious sampling in the other case might increase the result from a trace to many dollars.

The prospector says: "Well, what are we to do? We cannot bring tons of ore to the assay office." No, gentlemen, you cannot do that, although you can bring a small sample weighing from one-half to one pound that will represent, or nearly represent, tons of the ore, and several of these small samples will represent several tons. And if it were desired, you could bring one or two picked specimens of good and poor looking ore and some of the wall matter to show the nature of the ledge and vein.

In order to arrive at the value of a property it is absolutely necessary that such samples be taken. In valuing a prospect, there is no course in workman in valuing a developed property, and while no one expert can see a foot deeper into the ground than another, there are certain indications that make a prospect promising or not, sometimes irrespective of its surface assay results, and in valuing a property of this description these indications, or the lack of them, have to be taken into consideration, having a very important bearing on the case, in addition to correct sampling and assay results.

I will now endeavor to explain what I consider correct sampling, and if not too late when that is done, will state what I consider some of the indications necessary to make a mine, although it is hard to explain, there being many different circumstances connected with such, and experience is the only tutor that renders it safe for us to judge.

With regard to sampling, the idea is to discover as near as possible, the quality of ore that can be mined, and shipped, either with or without crushing. The first thing, therefore, is to obtain average samples, not large, or such of it as is possible, and when there are streaks of ore that can be readily separated by sorting from the main body, it is necessary to take an average of such streaks, in addition to the general average, for although the latter may assay only a few dollars, the streak may be rich, and whereas it might not pay to ship all the ore, it may pay to work the mine for the benefit of such a streak. In valuing an undeveloped prospect to obtain these average samples, it is necessary to break up pieces across and along the ledge—which will presume the prospector has stripped for some considerable distance—in sections for every five or six feet, calling the first six feet sample No. 1, second six feet No. 2, and so on, or if not stripped, sample across and along the ledge where exposed. In fact, the ledge or vein must be sampled in every direction, wherever there is a prospect or developed property. The number of samples assayed must be governed by the pocket of the sampler. After obtaining such samples that may weigh anything up to 150 pounds, but do not often exceed that weight, place them in separate sacks, numbered, for identification. Then with a fat headed hammer, or sledge, and a mortar, which can be made out of the end of a three-inch gas pipe turned smooth, break each piece separately and place in a sheet of canvas and when the pieces of No. 1 sample have been broken (each, say to the size of a walnut) and reduced in size, they are thoroughly mixed on the canvas, divided into two equal quarters, the two opposite quarters of which are thrown to one side (or kept as duplicate of sample) and the other two quarters broken up, thoroughly mixed, and divided again; the operation of breaking (reducing in size to about one-quarter each time) mixing and dividing being continued until a sample convenient for assaying is obtained; and each sample having been treated separately in this manner, we have the samples marked No. 1, 2, 3, etc., and although mixed, each sample represents a pocketbook of what each sample represents and are thus able to pack to camp or town 20 or 30 samples weighing in themselves one-half pound to one pound, and reduced from samples weighing 150 pounds, and representing in their turn many tons of ore. And on receiving our results from the assayer, we know that for six feet our ledge will assay so much, the second six feet so much, and so on; and having sampled the streak we find it is rich or poor, as the case may be.

It is advisable to check the samples in duplicate, as in addition to checking the work of the assayer, it checks up the work

of the sampler, and I may say that unless samples have been taken with care, and treated with judgment all through, the assay is generally more correct than the samples, which, taken from the mine, are at the best, only approximate. Having made notes of the country surrounding the prospect, the nature of the country rock, character of ledge, width and length of ledge, kind of vein, we are able to judge the price asked for a property, and the value of the surrounding, such as accessibility, water, timber and other facilities render it practical and prudent to spend money in developing such a property.

It often occurs that the developments of claims adjoining serve as a guide, but not always. While some prospects are a long way from transportation in the country today, I do not consider such a feature sufficient to condemn a property that would otherwise be valuable. The developments that have taken place in the past few years have proven that wherever a mine is of value, railroad transportation surely follows, and by the time a prospect is sufficiently developed, transportation will be near at hand. We have instances of this in many parts of British Columbia, Rossland being one of them. At the present time we have had no railroad and now we have two. On the other hand, development could be recommended on a low grade property near transportation, but otherwise would be "turned down," not because the property may not some day become valuable, but from the fact that there are from an investor's point of view other properties that offer more advantages, being nearer transportation, other conditions being equal. Yet it may, in many instances, pay the owners of the isolated prospects to do development, or to have the properties already in their possession, and to await the coming of the much-desired railroad, by which time the work done will put the claim in a position to be developed, and in many cases add considerably to the value of the claim.

There are a thousand and one things to be taken into consideration by an engineer before recommending or condemning a claim, which are hard to enumerate. With regard to the question: "What values would be required to render a property worthy of recommendation?" I depend entirely on the surrounding conditions, nature of the ore, cost of treating such ore, on the spot or by shipping to a smelter, or other matters, and no general rule can be laid down, for we have in California gravel worked at a profit, carrying, I believe, only 10 cents per yard (about 1-1/2 tons), and the great gold well mines of Alaska, where about \$3 per ton, paying immense dividends, and yet there are many classes of mines with ore carrying \$30 to \$40 per ton that cannot be treated on the spot, and shipping at a profit, owing to their locality and character. It is necessary, therefore, that the expert is an experienced metallurgist, or that he send samples to the assay office for reduction works to obtain the desired information as to cost of treatment.

I think you will have gathered from the foregoing that whatever the nature of the ore, the essential point in determining the value of a property is systematic sampling. In the case of developed property, the sampling has to be done in a systematic manner, and instead of only chipping off pieces, a small groove or channel is cut, and all matter obtained by this procedure goes into samples, and in addition to correct sampling, it is necessary to know the quantity as well as the quality of the ore in sight, and such is done by measuring between the levels, and with an iron rod, distance between shaft and vein, or upraise, in fact, obtain the cubic contents in feet of the ore blocked out ready for stopping, and having taken the weight of cubic foot of ore, or a question of mining content deductions for probable and possible faults or narrowing of veins, and having our assay results from the samples taken, we can calculate that we have so many tons of ore assaying so much, and if indications are such as to warrant it, we may expect an equal number of tons more, at least, before the mine is developed. We can, therefore, base our calculations on such figures, deducting cost of mining, freight and treatment, interest on capital, undry and dead charges, and then recommending or condemning a property.

I beg to offer a word or two of advice to prospectors, and that is, do not deceive yourselves by getting only picked specimens assayed, do not deceive others by making false representations, as by telling an expert exactly what you have, and showing some of the ore; he may see more of the ore, and if he is a man of feeling inclined to investigate the matter, and whereas he is always pleased to find a property better than represented, he is generally very wary when he is asked to assay a rough country under false representations. If the property is as good as represented, although it may not suit him in other respects, he will not condemn a property. He will, however, if taken on a "wild goose" chase and finding nothing but a "wildcat," he will probably venge himself on the head of the author of such a statement. He will, however, if taken on a "wild goose" chase and finding nothing but a "wildcat," he will probably venge himself on the head of the author of such a statement.

A NERVOUS BREAK DOWN.
Almost a Physical Collapse. But Completely Restored by South American Nerve.

Mrs. Geo. F. Quackenbush, of 340 Victoria street, Toronto, was gradually breaking down under an attack of extreme nervous prostration. Her appetite had left her; she suffered from insomnia. Here are her own words as she wrote them: "I took doctor's advice, but received no benefit. I commenced using South American Nerve, and three bottles worked a marvellous change in me. My appetite came back, I sleep soundly, and my general health is as perfect as ever it was. It is a pleasure to recommend so worthy a remedy. Sold by Goodeve Bros.

Mrs. Van Twiller, (who mistakes Dr. Jovial for a physician)—And where do you practice, doctor? Dr. Jovial—Ah, madam, I do not practice; I only preach.—Harlem Life.

THE MINING REVIEW

The dge on the Velvet Is 45 Feet in Width.

THE SHIPMENTS OF ORE

There Were 3,916 Tons Sent to the Smelters—There Has Been a Strike of Two Feet of Copper Ore on the Wallingford.

The Velvet on Sophie mountain has one of the largest ore showings in the camp. On the 160-foot level the ledge is 45 feet in width. The ore, too, is of a shipping grade from wall to wall; that is to say, it will average at least \$25 to the ton, and there are portions of it that will go much higher than this. It is as fine a showing of ore as can be found anywhere in the camp.

There was considerable excitement occasioned among owners of property in the Sophie-Record mountain section by the discovery during the week of a two-foot vein of high grade ore in the shaft of the Wallingford at a depth of 40 feet. The find is regarded as another evidence that this section will in time furnish several shipping mines and add considerably to the output from the Trail Creek division.

The shipments of ore during the week just closed set another high water mark. The week before last it was the largest on record up to that time and this week was 343 tons higher.

Development continues in the Columbia-Kootenay, and one of a high grade continues to be met with. It is claimed that this property could now ship 400 or 500 tons per week to the smelter were the railway extended to it. It is probable that it will not be long before the Red Mountain railway will extend a spur to this mine in order to give it the shipping facilities which it will soon need.

Table with 4 columns: Mine, Week, Tons, Year. Rows include Le Roi, War Eagle, Iron Mask, Evening Star, Deer Park, and Total tons.

War Eagle.—The shipments this week footed up a total of 1,360 tons, and would have been larger but for unforeseen incidents. The new hoist has not yet been taken over by the War Eagle company, but it is possible that the plant will be taken over by the contractors within the next fortnight. The sinking of the main drift during the week has not been reported. The policy of the management is being followed out in the deepening of this shaft—that is, of obtaining as much depth as possible, and in the case of the ore stopers as well. The shaft is now down 749 feet. The ore encountered is of a good grade and in large bodies. In fact, it is the best ore yet seen in the mine. Superintendent Hastings' time is so much occupied with the big lawsuit between the Iron Mask and the Centre Star that he was unable to attend to his duties during the week.

Iron Mask.—The winze is down 75 feet below the second level in the Iron Mask mine, which practically brings it down 350 feet to the surface. They will start to drift east and west either today or tomorrow and will open up new stoping grounds which are known to be filled with good ore, as rich as any yet found in the mine. The old workings stoping was started again yesterday, and there will soon be a large amount of ore on hand ready for shipment. The shipments for the last week were light, but active shipping will commence this week, and a good showing is expected before this day week. Meantime the management is pegging away at work, and finding that the balance of the mine is looking about as usual, and therefore prospering.

Velvet.—Superintendent Morrish of the Velvet was in the city yesterday and reports that the new shaft is down 160 feet to the 160-foot level is 45 feet in width. A crosscut is being driven from the shaft on the 160-foot level. The shaft is now down to a depth of 230 feet and crosscutting has been commenced on this level to cut the ore bodies on this level. A main adit is being driven so as to tap the ledge at a depth of 220 feet. This adit will be 400 feet in length and will be driven from the 160-foot level. The machinery recently installed is working in a satisfactory manner and the work is making excellent progress all over the property. There are 30 men employed on the Velvet.

Centre Star.—Quite a number of additional men have been put to work during the past week, and additional drills have been put in operation. The result is that the work is making good progress. A great deal of work being done in the mine during the past week has been for the purpose of demonstrating the theory that the apex of the disputed vein is in the ground of the Centre Star. The temporary hoisting plant is about ready, and so is the railway to the mine, so that the shipping can be commenced whenever the management so desires.

No. 1.—The shaft in the No. 1 is now down to a depth of 200 feet and is being cut out. The 200-foot level is being continued west on the ledge. There have been no new finds, but there is every indication of a promising one of the most valuable of the B. & C. properties. Josie and Annie.—The men on the Josie and Annie are still cutting out the station at the 300-foot level prior to sinking for the main drift. The work on the Josie and Annie, and new machinery has been ordered and is now on the way, both for these mines and for the No. 1.

Le.—Every day is going on in the same way at the Le Roi, and the shipments will continue to increase week by week from this time on until the mine ships 20,000 tons per month. No new strikes have, however, been made during the past week, but the ore continues of the same excellent value as has made the mine famous. The very conservative reports that have been sent forth have been sufficient to cause a rise in the stock on Friday of 1/2 per cent, or from \$7 1/2 to \$7 3/4. There is enough ore in sight already to ensure a year's shipment with no other work than loading.

good progress. The south drift is in 155 feet and the north drift 170 feet. In the south drift three or four feet of mixed ore has been encountered, which is clear and bright in appearance and looks as though it would return good values. In the north crosscut mineralized rock mixed with ore stringers has been encountered during the past week. The machinery is doing good work and everything is working in a satisfactory manner.

Mascot.—No. 2 tunnel is in 640 feet. There is no change of importance in the character of the ground, the winze at the new drift to a depth of 90 feet on the hanging wall. There is a good showing of ore in the winze. No. 3 tunnel is now in a distance of 485 feet. There is no change from the previous week in the character of the rock that is being passed through. It is expected that this tunnel will be driven at least 240 feet further before the ledge will be encountered. A full force is at work and excellent progress is being made with the work all over the property.

Columbia-Kootenay.—In the Columbia-Kootenay there are now seven drifts at work, and an intermediate drift is being run in the ore chut a recently opened up between Nos. 3 and 4 tunnels, where the high grade ore was recently met. The excellent value of this ore still continues, and shows signs of becoming better as the drilling goes on.

Nickel Plate.—The work is well started on the new vertical shaft on the Nickel Plate, which will be sunk from the surface and end at a depth of 200 feet level. When this is completed sinking to the 400-foot level will be hurried as rapidly as possible with as large a force of men as can be had.

Wallingford.—Work in the crosscut tunnel is still progressing by night and day shift. During the past few days some good copper ore has been encountered in the shaft. The showing in this part of the mine is very favorable. The ledge matter or pay streak is two feet between walls.

Iron Colt.—Drifting is in progress. There is some improvement in the character of the ore met with in the drifts, it is anticipated that the force will be augmented on the return early this week from the east of J. Ferguson McCrae, the manager.

The Leiter.—The water has come into the workings and has interfered so with operations that the property has been shut down. Superintendent White reports that work will be resumed on the 1st of May.

Homestake.—Drifting west from the 200-foot level is making good progress. The drift is in a distance of 210 feet. The management has been bothered some with the water.

Great Western.—On the Great Western nothing is being done at present, except cleaning up, and will not be until the best of the machinery, which are on the way, have been put in place.

Jumbo.—The work of extending the No. 3 tunnel is still in progress. It will not be long now before the main ledge will be tapped by this shaft.

Abie Lincoln.—The crosscut on the 200-foot level has been driven for a distance of nearly 100 feet. Water retards the operations somewhat.

Coxey.—Work is making excellent progress on the lower tunnel and in the drift on the level.

Gertrude.—The shaft is being deepened and has now reached a depth of 180 feet.



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Before it is too late, stop that succession of colds that means nothing more nor less than catarrh. Stop the suffering. Stop the disagreeable catarrhal discharges that are so humiliating to you and offensive to your friends. Don't let it run on until your condition causes you to be ostracized as if you were a leper. Don't neglect yourself until consumption makes its fatal appearance. You can be cured—not merely relieved, but absolutely and perfectly cured.

Dr. Agnew's Catarrhal Powder

will restore you to complete, perfect health. It gives relief at once. It cures in an incredibly short time. Hundreds of cases of from 5 to 20 years' standing have been cured—cases that physicians had pronounced incurable. The catarrhal powder acts like magic, not only in catarrh, but in colds, sore throat, tonsillitis, hay fever, loss of smell, deafness and all similar diseases.

Mr. C. C. Archer, of Brewer, Maine, writes as follows:—"I have had catarrh for several years. Water would run from my eyes and nose for days at a time. About four months ago I was induced to try Dr. Agnew's Catarrhal Powder. I had not used it long when I was cured. I would not be without it." At druggists.

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"My deafness came on about six years ago with bad ringing noises in the head, which troubled me greatly in conversation. I had to ask people to raise their voices when speaking to me, and around the table I could only hear the sound of my own voice. I can now see well and hear hearing rapidly improved under Dr. Reeves' treatment. I now hear well, and the ringing noises have entirely stopped."

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"My eyes were so bad I had to stop reading entirely. The dizziness, the blurring and pain around the eyes made me fear total blindness. Dr. Reeves' mastery over diseases of the eyes is certainly wonderful. I can now see well and best of all, can read with comfort. I was cured in a short time, while other doctors tampered with my eyes for the past six years."

"He Cured My Stomach"

Before I consulted Doctor Reeves my stomach was very bad. Severe pains, belching, bloating and sour risings was awful. I lost 40 pounds in less than a year. I thank God it was my fortune to go to this great doctor, who cured me."

"He Cured Me of Catarrh"

"I had catarrh for a long time. It affected my head and throat and there were growths in my nose. Doctor Reeves' New Treatment is just splendid. I never tried anything that did me so much good. I am recommending it to all my friends."

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People afflicted with any disease whatsoever should write to Doctor Reeves.

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"Doctor Reeves cured me of consumption. Two other doctors had given me up, but his Discovery is certainly an absolute cure for consumption if taken in time. If you have consumption go to Dr. Reeves for he is the only doctor I have ever heard of that could really cure consumption."

"He Cured My Heart Disease"

"I had heart trouble for 16 years, and would often drop senseless on the streets and for two years was so bad I could not be left home alone. And would faint often as two or three times a day. My circulation was poor and sluggish and had palpitation of the heart. After taking Doctor Reeves' treatment for one month I had but one spell. And now I heartily endorse his Wonderful New System of treatment."

The Character of Dr. Reeves'

practice, the range of cures he has performed in the various diseases of the HEAD, THROAT, EARS, THE LIVER, THE STOMACH, THE LUNGS, THE KIDNEYS, THE EYES, THE LUNGS, THE STOMACH, have more than words can tell proved that he possesses the quality of medical proficiency that is essential to diagnose and properly treat all those diseases which attack the human frame.

Nor is it wonderful that Doctor Reeves possesses these qualities when his education and medical learning are taken into consideration. A graduate of the best medical college. Has had 20 years practice on the coast. His cures are many and wonderful.

Remember, Dr. Powell Reeves is the oldest specialist on this coast, and has thousands of testimonials showing his success in Spokane. Ask your banker, ask the express company, ask your neighbor. Everybody knows Dr. Powell Reeves, the old RELIABLE doctor. You can depend on him when all others fail.

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