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**Creators:** [Paul, R. S.](#)

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*MINING ENGINEERING PRACTICE.*

BY R. S. PAUL.

That it is in the province of this Institute to take cognizance of the methods of practice of the fraternity of mining engineers is evident, and any system of practice that will tend to the best results is what we should strive for; perhaps the very first thing that should be settled, as far as possible, is the proper terms to employ in a description of the operations of mining.

There is a more serious trouble here than appears at first sight. Terms are employed that are mere localisms and should be discarded; one set of terms being used in one vicinity and another in an adjoining place.

Let us now briefly recapitulate the several interests that are to be served by the employment of the mining engineer.

1st. The public at large, who have an interest in preserving maps and plans of workings for future reference in order to avoid disasters, prevent loss of life and waste of capital or labor, and who have a further right to know that the workings are judiciously laid out with a view to the health and safety of those engaged in the mines.

2d. The operators must have a definite knowledge of the

extent and character of their works and machinery in order to be able to economically and judiciously direct their efforts.

3d. The adjoining proprietors to any workings, who have a right to know whether their property is encroached upon or their rights interfered with.

4th. The lessors, if the operators are not the owners of the minerals, who have a right to keep themselves informed as to the way their property is being cared for; and in case of a mine being opened on the lands of several different owners, they individually have a right to be informed whether that which properly belongs to them is accorded them in a division of the proceeds.

Any of these classes may require the services of a mining engineer, and a few general propositions in regard to his rights and duties may be offered here.

1st. If he is employed by the public he should not work for private parties.

2d. The mining engineer when employed by a mine should be considered to be connected with the mine as much as any other official.

3d. If he works for a particular mine he should not work for adjoining ones; nor if he work for a lessor he should not work for a lessee, unless by the mutual agreement of the parties, for they may have conflicting interests.

4th. He should be at the mine as often as need be to make and keep up correct plans of the workings, and he alone can be the proper judge of the time he may require so to do.

When an intelligent mining engineer is employed under these circumstances (the proprietors understanding what is needed) then the plans will be up to date; the mining engineer will be conversant with the mine, and in case of difficulties arising, as they often must, there is at hand an actual representation of what has been done and which was made at the time the work of the mine was done. There is then no need of the difficult and dangerous survey of abandoned workings. No groping amidst the ruins of a mine in its poisonous and deadly gases, over and under its many obstructions in its wet and slimy passages along its unfamiliar and forgotten ways, where the best result to which we may arrive is but an approximation obtained with great risk and much hard

labor. The system which many of us were employed under was simply this:

In some mines in which the operators judged it to be their whole duty to everywhere save expense, and where mining engineers were only employed when deemed to be absolutely needed for the shortest possible time and at the least compensation for which one could be had.

It was desired, perhaps, to locate a point for a shaft, or some one point from which the operators could themselves judge how far to keep many rooms or entries from certain boundaries, and as generally the case where work is projected from insufficient data, troubles would arise. The dreaded boundary would be crossed or kept too far away from, and for their own carelessness some one would be blamed, often the engineer, even if the trouble arose a long way off from where he ever set an instrument, or if he had not been in the mine for months.

If a mining engineer is employed to locate a boundary he should not be considered to be responsible for errors unless he directs every working approaching it.

As litigation concerning our mines seems to be increasing each year, every mining engineer should prepare himself so that he can be of use to those that employ him; his notes and maps should be carefully kept so he can explain them to persons almost totally ignorant of his work; and he must be prepared for a trial of his patience, for judges and juries must be instructed and the misrepresentations of attorneys who do not understand him or his subject must be refuted.

I must say that I have heard many remarkable things from witnesses, and especially from men who knew better. For instance, lately a miner, who had been a mine Superintendent, swore that there was no waste whatever in mining coal in the Tuscarawas Valley; that every pound could be taken out with profit to the operator, and *that* in a mine where the undercutting was made 4 feet deep in the coal, cutting out, say eighteen inches of coal at the face and running back to a point and then broken down with powder out of the solid, and where from ten to twenty per cent. of the pillars were lost by falls. Such statements must be met by diagrams and calculations to show their absurdity.

It is well in preparing plans to use before a jury to make them on as large a scale as possible, and to make the lines heavy and to

place the plan where it can be seen; a framework like a painter's easel is a convenient way to exhibit.

In short, it is for us to make plain to others what we know ourselves; and we may rest assured that the professsion of mining engineering will not be overcrowded for the present, and the study of its duties will amply repay those who attempt it.

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### DISCUSSION.

A. B. CORNELL.—It is very desirable that the etics of the profession should find expression. On one point, however, I do not agree with Mr. Paul. There has not been enough of mining engineers in this valley to do the work. The business of mining also would not justify the employment of an engineer for every mine, as the paper would seem to recommend. More than that, is it necessary or desirable for such a division of the work to be established? When I employ an advocate or attorney it is, of course, improper for him to receive pay from my antagonist, at the same time. But an engineer is not an advocate; he is employed to find the facts, and the facts are equally necessary for both parties. An engineer need not conceal anything from either. Lessee and lessor are not necessarily antagonists. The engineer is not seeking to injure either party.

THE PRESIDENT.—In reference to the amount of coal taken out of mines no unvarying rule can be laid down; there are better systems practical in some districts than in others. The conditions of the coal bed usually determine the system or plan practiced in the different mines. There is mord coal taken out to the acre in this valley than anywhere else in Ohio; not because of better mining systems in use, but because of the favorable texture of the coal and roof, as well also owing to the narrow channels or troughs in which the coal is found. There are, I should say, 90 per cent. of the coal bed worked away in this valley, while in some other fields not more than 50 per cent. is recovered. Better systems are, however, being adopted everywhere, and we have now few, if any of those crushes or creeps which were so common a few years ago. A good system of mining is practiced at Pomeroy, which was described by Mr. Middleton in a paper read before the Institute at the Columbus meeting in Jaauary last; 85 per cent. of the coal is got

in the Pomeroy mines. The pillars are attached and withdrawn as soon as the rooms are finished up.

Regarding the amount of minable coal in an acre, the rule obtaining among engineers is to calculate 1,000 tons for every foot of thickness of the coal bed. Where operators trespass on the domain of adjoining owners, this rule is generally adopted in settlement.

MR. HAZLETON.—The rule referred to I regard as a geological one rather than a guide for engineers. In my practice I make the calculations from the actual amount of coal taken out and then deduct a certain per cent. for nut and slack coal, and I find it exceeds considerably 1,000 tons to the foot of thickness.

MR. CHAMBERLAIN.—The question, What is minable coal? may, with propriety, now be called up. Lawsuits are common here, arising out of this question. It is very desirable to have a standard. How thin may a bed become before it ceases to be mineable? How thin coal can you oblige the lessee to take out? Some go down as low as eighteen inches.

THE PRESIDENT.—In our part of the State (Jackson county) we regard all coal two feet and over in height as minable; below that thickness it is left optional with the lessee whether he takes it or not. In the mines of the Mahoning Valley I believe coal as low as eighteen inches is frequently mined; but only under favorable conditions. Coal is minable, no matter how thin the vein may be, which can be wrought with profit to the owner of the mine.

MR. CORNELL.—The words minable coal should not be used in their strict and narrow sense. It means coal that the mine owner can take out with profit. Nothing else will stand examination. Courts will not oblige a man to go beyond this. It is sometimes urged that the thick coal is taken out and the thin left; and that as money was made on this thick coal, some of this money should be spent in taking out the thin coal. This is not valid reasoning. A man engages in coal mining to make money. Where profit ceases mineable coal ceases. By reducing the royalty on thin coal, some of what is left could be recovered.

MR. McCURDY.—The courts have passed upon this question; according to a recent decision coal must be mined down to a thick-

ness which a prudent owner would mine for himself, less the royalty.

MR. HAZELTINE.—Many mines are opened and worked in such a way that no money can be made out of them. There is often injudicious outlay, or extravagant management. No money is made under such circumstances. It would be unfair to ask an owner, under such circumstances, to reduce royalty. I have seen eighteen inches of coal mined under favorable conditions, with profit.

MR. PAUL.—More care is made in drawing leases than formerly, and that will solve the problem in many cases. Experienced operators are cautious and bind the lesser with careful phrases. In many existing leases the question is a troublesome one, and is often brought into court.

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