

## MINE MANAGEMENT.

---

*(A paper read before the Sydney University Engineering Society, on August 8th, 1906.)*

---

BY F. DANVERS POWER.

---

The qualifications necessary for a mine manager are as varied as the mines that have to be managed, but although no two mines are exactly alike any more than we find two individuals to be similar, yet their main features and characteristics may be such as to permit of classification into groups. There are, however, certain main principles that should govern all management, which may be modified and elaborated in certain cases. We may create an ideal and try to live up to it, but as we improve, so our ideal gets nearer perfection, from our point of view, and ever keeps ahead of us like a guiding star.

The selection of a mine manager is often placed in the hands of those who are really incapable of judging a man's ability, and consequently they too often rely on certificates and testimonials submitted by candidates. Too much reliance should not be placed on such documents, and it is often advisable to know something of the individual or institution that issues them. Even when diplomas have been fairly won, they may misguide those who wish to choose a manager. For a candidate, though possessed of technical knowledge, may lack tact, application and administrative ability. If a man stays but a short time in each position in order to gain varied experience, he may be looked upon as a man who cannot retain a post or who is always on the look out for something better, just as he has got well accustomed to his new surroundings. On the other hand if a man stays too long in one place, he is apt to be looked upon as non-progressive and out of date, unless his surroundings prove otherwise.

As no man can in himself have all the qualifications of an ideal manager in perfection, one should be selected who hold those most necessary for the work in hand. As to technical knowledge, if the chief difficulties lie in the underground workings, then a mining man should be selected as head of affairs, but if the difficulties are in the treatment of the ore, then a metallurgist should be chosen.

Every manager must make a beginning, and though there may be exceptions, it is usual and advisable for a man to work up from less responsible positions to that of a general manager. As head of some branch, a man has opportunities of observing how those above him administer affairs, and while his duties may oblige him to attend to the details of his department, yet he is able to consult with those above him in cases of difficulty, and is not weighed down with the worries of responsibility while endeavouring to conscientiously carry out his

duties, that often have a detrimental effect on one who starts managing early in life. A more seasoned man will do his best, and not waste his energies in useless worrying, and if he knows his weak points and tries to strengthen them is less likely to do harm than the over confident man. A want of confidence is often due to want of experience rather than to ignorance.

A mine manager should be a man of parts. He need not be a master of all professions, indeed no one lives long enough to become that, but besides a fair technical knowledge he must be a good organizer so as to arrange matters and make them dovetail into each other without waste of time and material. He must have tact, for he has to deal with all sorts of people from his directors to his men, and he should possess business ability so that he can work out commercial problems. Unfortunately mine managers seldom have a chance to obtain a business training, they have to pick up this knowledge as well as they can, and consequently they often stand at a disadvantage. There is a great difference between a scientific success and a commercial success. A machine or a process may carry out the work for which it was designed, but the mechanism may be so delicate and complicated, or the methods so costly, as to defeat its ends.

A manager is born not made, though he may be improved by training. A purely practical man who has worked his way up to the top of the tree is to be admired for his pluck and ability, but his advancement has generally been obtained at the cost of a great waste of time, money and often lives. Such a man with a sound technical training as a foundation could have done much more for himself and his employers. On the other hand, a man may have an immense fund of technical knowledge, and may be able to work out problems, and yet be unable to apply that knowledge outside a test tube. What a man knows is not of so much interest to his employers as the use he can make of it. A man frequently misapplies his energies because he is unable to properly appreciate his abilities. There are some men, both professionals and artizans, whose natures prevent them from doing rough work, or grasping a large idea, but who are first-rate at finishing off or details. For the benefit of the individual and the community, a man should be put at that work for which he is most fitted; to do otherwise brings discredit on the man, and keeps someone better out of his place.

As our knowledge increases, the tendency is to specialize and master some branch thoroughly; a specialist, however clever he may be in his own particular subject is, unfortunately, generally helpless outside of his speciality. Thinking and knowing most about his speciality he is apt to become warped in his ideas, and place too much importance on it.

Mining is an important industry intended to be carried out as a money making enterprise, and it is necessary that the man in charge of the operations should ever keep this in mind. He should think out his plans well before hand, as it is expensive to be constantly making changes; so much so, that it is often cheaper to keep on with an inferior method rather than make alterations when operations have gone past a certain stage. The laying out of a mine is a most important

matter, as if badly done, certain costs may be permanently greater than they would have been had the work been properly done; and yet, because at first but a handful of men may be necessary, until room is made for more, directors frequently employ an inferior man to open up a property, simply because he is cheap, and they think thereby to save the expense of a more capable man. The fallacy of this action is brought home to them later on when the mine has to be abandoned as unprofitable, or they have to provide the means for making necessary alterations.

There is a great difference between the man who controls and the man who manages a mine; but directors do not always recognize this difference, and consequently often hamper their managers, who, being on the spot, should, if he is any good, know better than those in town what ought to be done at the mine. Where policy requires a certain line of action, the manager should be taken into the confidence of his directors. A manager often gets a name for bad work, not because he is ignorant of what should be done, but because he allows himself to be led by his directors in matters which he alone should decide; or possibly he has no choice, as in cases where the finances are so badly arranged that he is forced to pick out the eyes of a mine in order to make ends meet, or else close down.

The false economy of starving the development of a mine while productive work is proceeding is seen later on, when most of the hands have to be discharged, while a few men are kept on to do dead-work; this dead-work has to stand all the general charges, *e.g.*, management, pumping, engine-driving, etc., although the engine-drivers and manager may be but partly occupied. The whole working of the mine is disorganised; men that the manager may have taken years to collect together get scattered, and when he wants to employ more men he may have to start again with inferior miners that have been weeded out of other mines.

If directors cannot trust their manager to carry out their work, then that manager is in a false position. A manager's life, like that of the proverbial policeman, is not always a happy one. He is a buffer between the directors and the men, and is frequently made a scape-goat.

Successful management often depends on a good choice of subordinates. An underground boss or foreman is best selected from the class he is to look after; he knows all their tricks and the best way to foil them, thereby getting as much work as possible out of the men under him. Such a foreman need not necessarily be the best manipulator of tools; a good miner is often spoiled by taking him from the work for which he is best fitted, to make him a shift boss for which he is unsuited. In the same way a good underground boss does not necessarily make a good general manager, for his experience and opportunities have been limited, and he is apt to disparage methods and appliances he does not understand. A scientifically trained man, on the other hand may not, for want of practice, be so skilled with his hands, but since he does not intend to gain his living that way, it does not matter; but on account of his training and wider knowledge, he is more likely to grasp and apply an idea, perhaps not previously

connected with mining ; he is not likely to erect a temporary structure where a permanent one would be cheaper in the long run, or *vice versa*, and he will look to the design and material of a machine rather than to its outward finished appearance, which has nothing to do with its working. Mining is very different now-a-day to what it was in the early sixties, and the man at the head of affairs should have a greater range of knowledge than was then considered necessary for a mine manager. A miner is a cosmopolitan, he is here to-day and somewhere else to-morrow, and to his other accomplishments often has to add a knowledge of foreign languages. A manager may be in charge of a mine in some isolated locality where he has to act on his own initiative for want of facilities to be found in more populated districts, in cases where otherwise he would obtain outside help ; but anyhow, whether he himself takes action personally or not, he should understand sufficient of many commercial matters to follow if not guide those who actually do the work. For instance take shipping ; he may indent goods from abroad, or he may wish to ship ore away. He must understand about freights which vary with seasons, also with the class of vessel. It may be a matter of calculation whether it be better to send ore by a sailing vessel at a cheaper rate and have money locked up so much longer, or to pay a higher freight by steamboat and get the ore delivered quicker. If the ore is shipped in bags, the bags should not hold more than a man can conveniently handle, or else the wharf lumpers will use their hooks and rip the bags open, spilling the ore which no one will take the trouble to save. If fine concentrates it may be advisable to use double bags. Should the ore be shipped in bulk, provision should be made for building trunkways to prevent the cargo from shifting. If the ore naturally carries much moisture one may have to calculate whether the freight on that moisture is greater than the proportional cost of a drying plant and working expenses ; if so, it may still be advisable to leave a little water in the ore to prevent loss of dust during transit. Then there is the matter of insurance ; fire insurance of plant and buildings ; insurance of goods in transit, when the question of averaging may crop up ; and insurance of workmen against accident so as to protect the employer against claims. As managers have to draw up agreements with their men, a fair knowledge of the law of contracts should be had. A manager should understand ordinary commercial banking transactions in connection with cheques, bills, overdrafts, interest, exchange, etc. Some knowledge of finance is advisable, also Stock Exchange practice. He must be able to understand the books kept at the mine, and with the help of properly designed cost sheets, ascertain where leakages occur, and when necessary to reduce hands, or take men from one place to put on at another, what places can best be abandoned for the time being.

A manager should know something about the market for his produce and work his mine according to whether there is a glut or a scarcity. It may pay him to rush the output when the value of his metal is high, and do more development work when the value is low. He must supply his product as the consumers want it, not as he thinks they should have it. It may pay to dress an ore to eliminate most of the gangue at the mine, thus reducing freight on worthless material ; or

to separate different minerals which are valuable apart, though hurtful when together. Should the ore be sold to custom works, the various tariffs ought to be compared by working out examples. Ore bearing material though worthless to-day may prove an asset in the future, with more favourable facilities, so should always be dumped by itself, and never put over the mullock tip.

The speculative element will never be entirely eliminated from mining. It is the chance of making money easily with little personal discomfort, that encourages many people to put money into mining ventures, and thus enables deposits to be tested. There is always a certain risk in mining, but it can be greatly reduced when capable men are engaged in connection with it.

Most papers that have been written about mine management deal with large mines where there is a correspondingly large staff of officers, but there are more small than large mines in existence, and at the commencement of one's career it is generally a small mine one is called upon to manage. On large mines minute details are more important than on small ones, as it is not so easy for the manager to have personal control of every department, and the loss of a few minutes *per diem* may mean the loss of several tons in the output, which might perhaps be saved by more efficient organization.

Some conditions of a mine are uncontrollable, such as its natural environments; the lode may pinch or make, become poorer or richer; other conditions are controllable and depend on the judgment of the management, selection of the most suitable methods, machinery and men, and making the best use of them with the least expenditure of time and money.

Every one requires experience in his particular line in order to become efficient. A manager cannot be expected to work with tools as well as those who give up their whole time to manual labor, and if he put in his time doing an inferior class of work, while receiving a higher rate of pay than men who could do that work as well or better, he is not making the best use of his abilities. A manager requires to look after himself as well as after his men, he should apportion his time so that too much is not spent underground, or an undue proportion in the office.

Since no man is perfect, every one makes mistakes. The greater experience a man has had the more mistakes he has to account for. If a man claims he has not made any mistakes, it is because he has never had the chance, and consequently no practical experience; his mistakes have to come, and you naturally do not want them at your expense. It is after all not the number of mistakes a man makes in a life-time that counts, so much as the nature of the mistakes. We may greatly benefit by the mistakes of others, for there are certain things that our reason will permit us to accept when they are pointed out, without our personally experiencing them. If a manager recognizes his weak points he can select capable and reliable men to attend to them.

Some people have a way of presenting their best side to the public, and no doubt this habit assists them materially for a time, until those who have had an opportunity of seeing their innermost nature begin to talk. Such people take credit to themselves for the ideas and work

of their subordinates, they make a great show on the surface while starving the underground operations; when they see a mine getting into difficulties they leave, to talk in the future of the dividends the mine paid when they managed it, while the task of overcoming former bad management with a limited working capital falls to the lot of another who, though often a better man, gets little or no credit for his efforts. One often finds better management in a mine working from hand to mouth than in one that has ample funds. Anyone can spend money, and when cash is plentiful one is apt to be extravagant.

Storekeepers and others periodically take stock so as to ascertain how they stand. Stock should be taken at mines in the same way, not only of any stores and plant, but of developed ore. The amount of so-called "ore in sight" is often stated in half-yearly reports, but it is frequently guessed at instead of obtained by careful measurements, assays and calculations, consequently to place any reliance on such guesswork is to live in a fool's paradise, as the estimate is generally overstated. A mine manager should know, approximately at least, the value of the ore in his mine, so that he can blend the ore from different faces to secure a fairly uniform yield, and even if his mine will not stand the expenses of an assayer, he can at least pan off the samples and in that way obtain a rough idea.

When taking command in a new district, one has to find out a great deal for himself, since he cannot accept the statements of old hands as gospel, however honestly they may be made. One is told of unlimited water supply; wells that have never been known to dry up in the worst droughts. You put a pump on and the well is empty in an hour to the astonishment of the old hands, who stand gaping about repeating "my word!" Their ideas of an unlimited supply consists of an occasional bucketful for domestic purposes, which naturally does not go far in a forty head stamper battery.

If you replace a former manager, there are bound to be some friends of your predecessor who look upon your presence as a personal insult, and who throw all manner of obstacles in your way. Some of these it may be in your power to get rid of, as their obstructions are not conducive to the success of operations; the prejudice of others you have to live down.

Theft is a matter that causes managers great anxiety. It may be reduced by taking ordinary precautions, instead of placing temptation in the way of men, for most men are fairly honest when there is danger of discovery. Tools should be properly branded and not left lying about when finished with; clean-up rooms should be under lock and key, but are better separated from the rest of the building by an open work partition rather than by a solid one, for then if any unauthorized person gains admittance he can be readily observed; at night when valuables are in the place a light should be kept burning, should the lights be extinguished, you may look for trouble. It may even be necessary to lay little traps in case people interfere with things they are told not to touch. For instance by sprinkling a little dust on a retort and noting its position, figure and quantity, anyone interfering with the retort is bound to disturb the dust and will be unable to replace it as you left it, even if he noticed you had put it there.

It is a mistake to make too many changes at once in an old established mine, for local practice has been established by experience. True, local practice may be capable of improvements, but it is as well to make changes gradually.

A manager should be able to utilize the materials at his command and show his resourcefulness when the usual appliances are not at hand. He should keep a sufficient supply of stores in stock, and this requires a little looking ahead, especially when dry or wet seasons interfere with transport. Still one does not want to look too far ahead, for if you get in too large a supply of stores, some will go bad, and the capital expended in their purchase is lying idle. Some material is wasted for want of proper housing, and some because it is not used up in time; for instance, timber should be used in rotation, otherwise if fresh lots are piled on the old, the latter will in time become useless. Another source of waste is the giving out of new material to men when old material at hand will do equally as well. There is a good deal more in buying stores than at first sight meets the eye. If you only want small quantities, it may be cheaper for you to get them through the local storekeepers, who by getting his goods by the truck-load, get the benefit of minimum rates; but if you are working on a larger scale, you will find it better to employ a broker in town to buy for you, his remuneration being a trade discount which your Company would not get anyhow. Of course you have to be careful in the selection of your broker. Large mines often make out a list of stores likely to be required, and call for tenders, the tenderer giving the rates at which he is prepared to provide the goods.

A manager has his own good name and reputation to look after as well as the interests of present and future shareholders, he should therefore hesitate before taking any action that may damage the prospects of his mine, even when urged to do so by his directors.

In all large communities we find good, bad and indifferent individuals; miners are no exception. When labor must be had, and there is no choice, the manager has to make the best of the material under his command, but as fresh comers arrive on a field, the inferior men are weeded out. It is false economy to employ inferior men, even at a lower rate of wages, as when you engage a man for any particular class of work he is supposed to know it, and you don't want him to be learning it at your expense. The more inefficient a man, the more bossing he requires, his work often has to be done over again, he spoils tools, wastes materials, and in general is an individual you would rather see your neighbour engage than employ yourself. If you give him a chance at a contract he cannot make a living at it, so throws it up, and should the work be driving or sinking to open up more ore, and time is an object, the capital spent on the work is locked up for a longer time, and is not earning any interest; the value of the ore to be won is lying dormant and the interest on any profits is lost during the extended time, so that under such circumstances it may pay, not only to employ good men and pay them good wages, but encourage them to extra exertions by bonuses paid for work over and above a certain amount performed during a given period.

Men take a greater interest in their work if they are allowed to use their intelligence, instead of being employed simply as machines. Being concerned in the actual details of the work they must observe many points that are overlooked by those above them. In some places suggestion boxes are used into which any man can make a suggestion to the management for the better carrying out of the work. Of course many of the suggestions are unsuitable, but some are worth adopting, and the man who submits an accepted suggestion is rewarded according to its value.

It takes a considerable time to get a good set of men about one. At first one has to take anybody who comes along, especially in out of the way places, but as a locality gets settled and known the better class of miner comes along when forced to leave former work and takes the place of the inferior man. Monday is the great sacking day when men turn up to work before the effects of Saturday night and Sunday debauchery has worn off, or perhaps they don't turn up at all. A manager who treats his men fairly is soon followed to a new place by those of his old hands who are out of work. The manager who is unduly familiar with his men soon loses their respect, and when necessary to discharge one for any reason, it is often made a personal matter. On this account it is well to avoid employing relatives or having favourites. There are other honest people in the world besides one's relatives, and honest people may be just as incompetent as dishonest people, though they do not mind accepting pay for work they are unable to carry out properly. As to favourites, when there is any gold stealing done they are generally the worst culprits, they have the opportunities and are not suspected.

The health of the men should be attended to by providing proper sanitary arrangements, and seeing that the ventilation is good, for if not well, men cannot be expected to do a fair day's work.

There are times when skilled labor is not available and miners have to be made out of raw material. In such cases it may be necessary to make the man behind the drill solely responsible for getting the holes down in the spots and at the angles pointed out by the shift bosses.

The labor question is largely influenced by the climate and the class of labor available; one may even have to import the necessary labor, and in order to get the best work out of them, may have to adopt to a large extent the systems to which they are accustomed. With semi-civilized people one not only has to study their characteristics, but their superstitions, the neglect of this has often caused trouble.

Although both mine owner and miner are more or less dependent on a mine, yet their interests are not identical. The general run of workman cannot afford to wait for payment until the product of his work is disposed of, neither is he prepared to take the risk of the markets. Therefore his employer has to advance a certain proportion of the value to enable the workman to live, and of course has to leave what he considers a safe margin for market variations and other contingencies between the time he pays the men and disposes of the ore, for he takes all the risk.