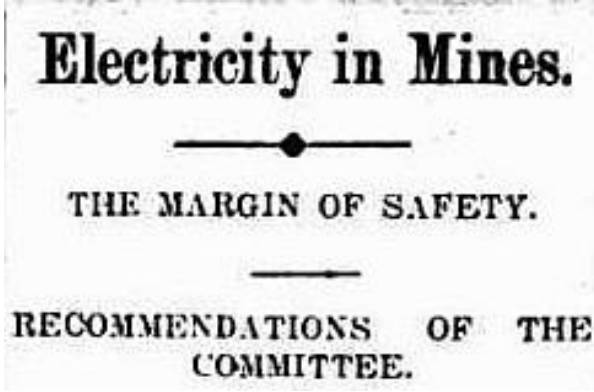


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Electricity in Mines.

THE MARGIN OF SAFETY.

**RECOMMENDATIONS OF THE
COMMITTEE.**

The report of the committee appointed to inquire respecting the use of electricity in coal mines for coal-cutting' and other purposes, received a few days ago by the Minister for Mines and Agriculture, goes extensively into the whole question from all points of view. Beyond the points of the report, the document contains a good deal that is interesting, but the general conclusions arrived at are that with proper precautions electricity may be safely and profitably employed in collieries.

From a list of some of the principal New South Wales collieries it appears that 33 are already equipped with electric generating plants, the total capacity in electric output amounting to 2176 kW, equivalent to 1917 horse-power. There are 1482 electric lamps on the surface of the mines, the number below ground being 777, and the motor-driven machinery is divided as follows: 16 collieries have 62 cutters, six have eight haulage equipments, 19 have 33 pumps, six have ID ventilating fans, and five have seven motors applied to other uses.

According to the classification of pressure used in Great Britain, which the committee recommends for adoption here, the plants of 25 New South Wales mines come under the category of low pressure, seven must be classed as medium pressure, and only one (South Bulli) ranks as high pressure. All are direct current, except the last, in which three-phase alternate current is used. The essential difference between the two systems is that it is practicable to generate alternate currents at very much higher pressure than direct currents, and the former present special facilities for subsequent transforming to any pressure.

The distances to which it is intended to extend the electrical equipment throughout the workings of the South Bulli colliery are such as to prohibit the use of direct current for the purpose.

Electric motors are now being advantageously applied to every class of work in a coalmine which requires the expenditure of power, and the practice is consequently

extending rapidly. The necessity for the recognition of and the making of provision against the dangers connected with the use of electricity are therefore self-evident. They may be divided into two classes, viz., shocks and fires. After a series of experiments carried out at the Ultimo Powerhouse, the committee was strongly of opinion that for portable motors, in connection with the operation of which shocks are most likely to be received, low pressure should be used wherever possible; and the members of the committee regarded it as most satisfactory that out of the 16 collieries using electric coal cutters 13 employ low pressure on the motors.

The most probable causes of shocks are: (1) Leakage, rendering machine bases, covers, or cable armouring alive, so that any persons touching them receive shocks; and (2) the leaving of "live" portions of the circuit exposed where they are accessible generally to persons who are not acquainted with the electrical risks. Both these matters received the special consideration of the committee which drafted the British rules, and numerous provisions were made guarding against either contingency. During the inspections and inquiries made by the committee many illustrations of the necessity for such precautions were met with. One of the most frequent causes of shocks from leakage was the lack of proper testing and repair of the trailing cables, in consequence of which the armouring of the moist outer covering would become "alive" and the men whose duty it is to handle these cables would receive shocks. In one mine (where safety lamps were not used) the proper maintenance of the cable insulation was so entirely disregarded that on a trailing cable which was actually in service during the committee's visit, there were a number of places where the insulation and covering were completely broken through, leaving the bare conductor easily visible. The committee considered it advisable to draft a number of new rules relative to the use and regular testing of trailing cables.

Shocks from "live" metal intentionally left exposed are most frequent in connection with low pressure systems, owing to an exaggerated idea of the harmlessness of the shock. Switches with their conducting parts entirely exposed were found in the main roadways; and in the travelling roads of one naked light mine the committee saw considerable lengths of cable from which the covering had entirely rotted off, leaving the bare "live" conductor in a position and at a height where the employees were quite likely to come into contact with it. One of the worst features of such practices is the disrespect for the electrical risks engendered in the minds of general employees who are uninformed in these matters. The committee gave the matter prominence, as it found a disinclination in some quarters to admit the necessity for guarding bare metal carrying low pressure, and the tendency to practical joking with that pressure has unfortunately been in evidence more than once.

The committee also referred at some length to the possible causes of fire by overheating of a conductor, leaking, and arcs or sparks. On the question of rules to be adopted to render the use of electricity in mines safe, the committee stated that it

gave very extended consideration to the question of the course that should be adopted with regard to regulating the use of high-pressure currents in the mines in which safety lamps are used. The draft departmental rules omit any special limitations. This the committee understood is in accord with the Continental and American practice. The correct construction of the clause in the British rules dealing with the matter is open to doubt; while the proposals of the British committee, who gave very special attention to the matter in the course of its inquiries, set certain limitations, which the New South Wales committee, by majority, decided to recommend.

The British committee's reasons for its determination on this point were:- "At the face we consider that a reasonable limit would be medium pressure, not in any case too exceed 650 volts. But in the rest of the mine, if proper precautions are taken, we have no reason to think there would be undue danger in much higher voltages. As for danger from shock, it is in a wet mine nearly as great with a medium voltage as a high one, and bad apparatus is capable, even at low voltages, of causing fires or exploding gas. When once, however, the apparatus is of excellent quality, well installed and completely protected, there seems no reason to apprehend -any danger either in mines or factories from the use of high voltages, and we do not see why in the United Kingdom any more stringent limits should be imposed than have been found necessary on the Continent."

Mr. Curley, however, recorded his dissent from this conclusion. He held that no higher pressure than a medium pressure should be taken to any place or part of a mine where safety lamps are used, and where, therefore, explosive gas may be expected to be occasionally present. Mr. Curley's fear was that the high tension current may, through inadvertence or accident, break down the insulation of the transformers, and thus find its way into the medium of low tension conductors, the consequent fusing of which would lead to a condition of danger.

The committee gave a great deal of consideration to the question of placing conductors in the return airways of safety lamp mines, the objection lying in the fact that if any gas is given off by the mine must necessarily pass through the returns. It appeared to the majority of the committee that it would be best to leave the decision of this question for special consideration in each case. Mr. Curley was unable to confer with the other members of the committee in this matter.

In the matter of providing against the presence of gas where portable motors be used at the face for coal-cutting and other purposes, the committee states it has taken the precautionary measures to even greater length than is required by any other of the codes of rules. The rules provide for the working faces where machines are used being frequently examined during the time that the electric power is used for undercutting, with an absolute requirement for the immediate stoppage of the machines and shutting off the current in the event of gas being discovered during such examination. This regulation ensures that even if the

apparatus is accidentally damaged, its use will be so well governed under the condition the committee has laid down that miners can work with coal-cutting machines at the different collieries where the committee saw them installed, with every reasonable sense of security and safety.

The committee quotes liberally from the British committee's report, issued in 1904, and adds that it agrees entirely with the salient features of that committee's conclusions; and though the rules the committee proposes include numerous departures from the British committee's draft, it is mainly in precision of detail, as the investigation furnished ample evidence that definiteness in rules is essential to the prevention of bad work.