

they were not sufficient, at first, to alarm the men seriously, several of whom had been present when previous outbursts had occurred, and who were always on the outlook for signs of unusual pressure on the coal. This outburst also differed from previous ones in the total absence of violence along the roads. A safety lamp would fill with flame, twenty-four hours after the outburst, when held on the top of the fan-chimney, and a week afterwards there was a distinct cap on the lamp-flame in the return-airway.

The volume of air passing along the main level, as measured a few days before the outburst, was 57,000 cubic feet per minute, and the self-recording water-gauge, on the fan, showed absolutely no change during, before or after the outburst.

The mine had been shut-down for several months, and only a few places in the level-faces were being worked; and, for a month prior to the outburst, not a single report of gas had been made by the fireman.

The management estimate that this outburst displaced 3,500 tons of coal, 800 tons being removed to recover No. 14 body, which was found with fully three feet of dust under it, and it is supposed, therefore, that the man was wading through this depth of dust when he fell. One man, who was overtaken, was found in the attitude of running, upright on his feet, head leaning forward and hat on, and this fact, of itself, shows that there was no violence.

It is pretty clear from the foregoing particulars, that the men working at and near the face of the top level, received some warning before any check to the air-current could demonstrate to those on the road that an outburst was in progress, because they had run from 600 to 700 feet; whereas No. 5 had only run 500 feet, and No. 13, the same distance. Neither No. 1 nor the man who escaped appeared to have taken warning from the check to the air-current, as had No. 1 done so, he ought to have escaped alive.

The check to the ventilation must, however, have been very severe, and its extent may be realized by noting that both of the intake air-currents were pushed towards the entrances of the mine, without the self-registering water-gauge in the engine-house of the fan showing any signs of increased pressure; and, therefore, it is fair to assume that the volume of gas given off must have exceeded 57,000 cubic feet per minute. Again, it may be noted that the volume of gas given off did not exhibit any signs of great violence, such as might have been expected if it had been suddenly released from a huge cavity. Nevertheless, it was enormous in volume, and continued at high pressure for thirty-five minutes, and at a diminishing pressure for a considerable time afterwards. It may, therefore, be reasonably supposed that from 2,000,000 to 3,000,000 cubic feet of gas, at atmospheric pressure, were set free by the outburst in thirty-five minutes. Mr. James McEvoy, who does not accept the cavity-theory, estimated the volume of gas at 5,000,000 cubic feet.

Remarks.—It does not seem reasonable to the writer to imagine that this tremendous volume of gas could be pent-up in a cavity in the coal-seam, and, taking into account the great quantities of dust, which have been a feature of all the outbursts in this mine, he has considered several probable solutions of the problem. In doing so, he has noticed that petroleum and natural gas are found in these Cretaceous measures; and also that on the south-eastern side of this coal field seepages of petroleum have been found, and petroleum has already been and is still being sought in the Flathead district of south-eastern Kootenay.

The presence of petroleum in this district opens up the interesting geological problem of its source. Geologists state

that there are no rocks in the district likely to contain stores of petroleum, but prospectors allege that there is visible evidence of its presence in several places. The late directors of the Geological Survey of Canada, Dr. G. M. Dawson and Dr. A. R. C. Selwyn, personally examined the district and identified the rocks as belonging to the Cambrian age, in which oil has never been found, as they are too close-grained and compact to be capable of absorbing oil. Dr. Dawson calls it "a somewhat anomalous occurrence of petroleum;" and if, as he suggests, these older rocks have been, by a gigantic overthrust, slipped eastwards over the Cretaceous formation, then the overthrust fault must extend from ten to twelve miles eastwards. Mr. W. F. Robertson, the Provincial Mineralogist for British Columbia, states that seepages of oil occur in three or more places; that there might be a body of oil underground, but that this is problematical; and that, although some oil was found in a bore-hole at a depth of 1,120 feet there was no flow, and he is not sanguine that even at a depth of 3,000 feet a profitable flow of oil will be obtained.

The writer has referred to the oil controversy, because he thinks that the outbursts of gas referred to as having occurred at Morrissey may, and probably have, some connection with petroleum. The samples of oil obtained by Mr. W. F. Robertson, and reported on by the Provincial Assayer, proved that the oils were of exceptionally low specific gravity: one sample consisted almost entirely of the lighter constituents of petroleum. It appears possible, and also probable, to the writer, that these frequent outbursts of gas may be attributable to the volatilization of light oil or spirit, which has been absorbed in patches of the soft coal, and, on being released by the removal or thinning of the surrounding coal, becomes volatilized with accompanying violence. As layer after layer of saturated coal is blown off, the dust is carried away by the gas, and the outburst continues until the oil-saturated mass is blown off and the oil or spirit volatilized. Under these conditions, the outburst would exert its greatest effect at the outset, and then gradually die away, as in the instances at Morrissey. If gas only were confined in a pocket, the writer does not see how so large a body of coal could be displaced; whereas, if a volume of oil were disseminated throughout a very soft portion of a coal-seam, which would, therefore, have the same absorbent qualities as a sponge, when the first burst occurred, the spongy coal would be carried away by the volatilization of the oil, and, as this proceeded, dust and gas would be continuously blown off, until the oil-saturated mass was exhausted. This supposition would allow of a very large volume of gas at high pressure being given off through a long period of time, and thus account for, what is at present, the mystery of the Morrissey outbursts. So problematical does the possibility of working the mine with any reasonable sense of security appear to the owners, that the writer understands that they have closed the mine.

In conclusion, the writer hopes that the subject may provoke discussion and suggestions from members, who may think that the mode of working, and the precautions taken to guard against such outbursts, can be so effectively improved, that the further working of the mine may be rendered reasonably safe.

THE BRITISH COLUMBIA LEAD SITUATION.

To the Editor:

Sir:—In your April number, under the caption of "The Lead Situation in British Columbia," you say:—