

guide the air, and at some of the ends it is very bad. The air also in the rise workings of the old mine where the rest of the men are employed, is also very impure; and at this part of the mine the slack, all of which is left in the mine, appears to be heating, and I fear that a fire is imminent. I have cautioned the manager, who was away when I visited the mine, by letter, to keep a careful watch upon these slack-heaps, and requested him to take steps to improve the ventilation by guiding it to the faces; and, in event of it being found necessary, have advised him to draw the slack from these workings, so as to avoid the difficulties attendant upon an underground fire. I was unable to find that the mine was examined in the mornings before the men go to their work, and I have written Mr. Black to the effect that, as it is the manager's duty to see that the workings are safe, and fit to work in, I consider it necessary that this daily inspection should be made, either by himself or a deputy before the men are allowed to go to their work. The diamond drill had sunk 108 feet through a vesicular basalt on the 15th June, the day that I visited the mine.

Bridgewater Colliery, Miranda.—This mine is now closed and offered for sale, so I did not visit it.

I have, &c.,

S. HERBERT COX,

Inspector of Mines.

The Under-Secretary for Mines, Wellington.

No. 5.

SPECIAL REPORTS UPON THE SHAG POINT COAL MINE.

Mr. Inspector COX to the UNDER-SECRETARY for MINES.

SIR,—

Dunedin, 26th April, 1881.

I have the honor to inform you that I have found it necessary to call the special attention of the manager of the Shag Point Mine to the danger of an explosion which would exist in the mine, should the gases now being evolved force their way into the workings. I cannot find fault with the arrangement which is pursued for ventilating at present, as various things render it a difficult matter to improve until the whole area on fire has been walled off; but I have enjoined the strictest caution, and the necessity of constant watchfulness, as, in the event of the gas coming into the workings, it could readily be contended with if the dip workings were closed down for the time. I have written Mr. Binns to the effect that I have given Mr. Williams the above instructions, and requested his attention to the matter at his next visit.

I have, &c.,

S. HERBERT COX,

Inspector of Mines.

The Under-Secretary for Mines, Wellington.

The UNDER-SECRETARY for MINES to Mr. Inspector BINNS.

(Telegram.)

Government Buildings, 6th May, 1881.

I AM directed to request that you will arrange to visit Shag Point Mine, and see that proper precautions are taken in accordance with Mr. Cox's recent suggestions to the manager, of which Mr. Cox has informed you.

OLIVER WAKEFIELD,

Under-Secretary for Mines.

Mr. Inspector Binns, Dunedin.

Mr. Inspector BINNS to the UNDER-SECRETARY for MINES.

SIR,—

Dunedin, 15th May, 1881.

In answer to your telegram of the 6th instant, I have the honor to inform you that I had already visited the Shag Point Coal Mine on the 6th instant, prior to the receipt of your telegram, and that I made another inspection on the 13th. On both occasions I failed to find inflammable gas.

The inflammable gas referred to in Mr. Cox's letter appears to have been known in the Shag Point Coal Mine for some years, and has never been known to cause an explosion. It also appears, from a letter written by Mr. Jas. Bishop, of Shag Point Colliery (a copy of which is enclosed), to be exactly similar in appearance to an inflammable gas well known in the coal mines of Continental Europe. It is described at Shag Point as burning with a lambent blue flame, similar to the well-known flame of carbonic oxide, which is ordinarily stated by English authorities on mining to be of the rarest occurrence in mines; and in Greenwell's work on coal-mining—a somewhat obsolete but standard work—the following passage occurs: "When mixed with common air it (*i.e.*, CO), does not explode like firedamp, but burns brilliantly" (p. 216).

In Roscoe's Elementary Chemistry (p. 93) we find, "When heated in contact with oxygen, carbon monoxide takes fire, burning with a characteristic lambent blue flame, and forming carbon dioxide."

The following experiments were made by Messrs. Richardson, Browell, and Marreco (under the last of whom I studied) to ascertain the effect of different mixtures of atmospheric air and carbonic oxide on the flame of a candle:—

Percentage of CO in Mixture.	Observation.
2·5	No visible effect.
5·0	Ditto.
10 0	Ditto.
12·5	Flame apparently elongated, but very slightly
15·0	A large top on the flame, with the characteristic appearance of carbonic oxide.
20·0	The top much increased, but the candle burnt tolerably well.
23·0	Appearance same as last, and candle still burnt.
25·0	The candle extinguished, the mixture inflamed, and a disc of flame passed slowly to the bottom of the vessel.
28·5	The candle extinguished, and the gas burnt with a flash. This is the theoretical mixture for perfect combustion.
50·0 } 70·0 }	These mixtures inflamed and burnt more or less rapidly (See Trans. N of E. Inst. Vol. 12, p. 202)