

Dry crude calcium chloride, as sold by dealers, contains 60 per cent. or more of calcium chloride; the other 40 per cent. or less is chiefly common salt (sodium chloride). The latter, if pure, does not absorb moisture from the air and is of no value for laying dust. Pure calcium chloride can absorb three or four times its weight of water.

In the larger cities of the eastern part of the United States calcium chloride costs, in carload lots, from \$14 to \$18 per ton. It may be bought in three forms: Dissolved, solid, or granulated. The solid form, which comes in large drums, contains a high percentage of water and has to be broken for use. This form is not as convenient for mine purposes as the others. The granulated form is easy to scatter along an entry, and if it is packed in air-tight cases, so that it can not absorb moisture during shipment and storage, it is the best form to buy.

There are two ways of using calcium chloride. One way is to dissolve 5 or 6 pounds of it in 100 pounds of water and sprinkle the solution along the roadways by water cars or by hand pumps. The salt must be used in this way in order to moisten the ribs, roof, and timbers.

The other way to use calcium chloride is to sow the granulated form broadcast. This method is especially suited for dampening gobs or the floors of entries; on roads where coal dust is thick it gives much more lasting results than does sprinkling. The little granules of the salt lie on the surface, and by the moisture they absorb from the air they make the dust particles stick together. After the surface of the dust in a road is thus moistened any new dust that falls upon it will stick and get moist in turn.

Any person who intends to try the calcium chloride treatment for coal dust should remember that the crude calcium chloride is not pure, and some that has been sold contains so much common salt that it has little value for laying dust. In one instance brought to the attention of the Bureau of Mines the substance sold as calcium chloride contained no calcium chloride at all, but was chiefly common salt.

Conclusions.

The mining engineers of the Bureau of Mines, from the experiments they have made and from the facts they have gathered in examining hundreds of coal mines, believe that explosions of coal dust can be prevented by proper care. Furthermore, they believe that although the use of any one of the methods described in this circular may be difficult and expensive under some conditions, there will be little danger of a widespread dust explosion at a mine where any one of the methods is properly carried out.

The engineers of this bureau believe that, although many mine operators have taken great pains to protect miners from most of the dangers of mining, the precautions regarding dry coal dust are not always complete. Some operators who keep the main roads free from dry coal dust do not make sure that in all parts of the mines the dust is in a harmless condition. Hence it sometimes happens that a blow-out shot or a small explosion of gas sets fire to the dust in a dry room or a dry heading, and the resulting explosion crosses an area that was kept so damp that a dust explosion could not have originated within it.

It must be remembered that after a dust explosion has developed the shock and the flame are so strong that slightly dampened coal dust may be caught up and ignited to spread the explosion. It must also be remembered that a dry area usually contains more

dust than can be completely burned by the oxygen that is at hand. So if an explosion gets a good start in such an area, it may have strength enough to carry burning and unburned dust into and perhaps across a dampened area. The latter, though it may furnish no coal dust, can supply the oxygen needed to burn the dust carried over from the dry area.

In a recent mine disaster in this country the explosion travelled 1,500 feet along a slope that had been washed down with hose just before the explosion and even had a wet floor after the explosion. The explosion burst forth from the slope mouth in a great flame and deposited much coked dust on the timbers of the trestle. The flame and the thick crusts of coked dust showed how great was the quantity of unburned dust and gases that had been carried for 1,500 feet along a slope that was so damp it might have been considered

Precautions.

In a mine working a coal that makes inflammable dust, the risk of a dust explosion can be greatly lessened by following these precautions:

Use permissible explosives where the coal can not be wedged down, and use them in the ways suggested by the Bureau of Mines in Miners' Circular 2.

Don't use black powder, dynamite, or any long-flame explosive.

Don't blast the coal "off the solid." Undercut it or shear it, and wedge it down if possible.

Don't drill the holes beyond the undercutting or shearing.

Don't fire two shots at once, except by electricity from outside the mine. Allow enough time between shots for the dust to settle.

When shots throughout a mine are fired after the shift by shot-firers, they should be fired on the last of the air first, then successively toward the intake, so that the dust and gases from the earlier shots will not be carried towards and possibly ignited by the later shots.

Don't tamp shots with coal dust, bug dust, or small coal, whether wet or dry. Use clay or other material that will not flame.

Lead out all coal dust or bug dust from the working places and do not let it collect along the roads. It is dangerous in the mine; it has value as fuel outside.

Use tight cars and keep the coal below the sides of the cars.

Flush the tops of the loads with sprays.

Remember that a dry mine is a dangerous mine.

Wash the coal dust from the roof, ribs, and timbers; or, if this is not done, keep the dust damp by making the mine "sweat" all winter as it does in summer; or else keep the coal dust covered with rock dust, clay, or similar material.

Don't be satisfied with having some parts of the mine wet.

Keep all the mine wet, so wet that the roof and sides are beaded with moisture and the dust packs down on the floor and looks wet.

Although in the year only 150 tons of tungsten ore were marketed, the present annual consumption is well over 4,000 tons of concentrated ore carrying from 60 per cent. to 70 per cent. tungstic oxide.

The Tilt Cove Copper Company, Limited, operating at Tilt Cove, Newfoundland, earned a gross profit during the calendar year 1911, of £12,152 8s. 2d. The company is a subsidiary of the Cape Copper Company, Ltd., a London concern that was organized in 1863. The Tilt Cove mine is held under a 99-year lease, expiring 1989.