and the general speeding-up of production; and while the industry adopts every possible preventive measure to stop the toll of life it seems at times that its efforts are futile. In all probability the greatest cause of mine explosions is man failure, and although strict laws have been enacted, machinery constructed as fool-proof as possible, and an educational campaign of safety carried on continuously, yet it is apparent that the human element must be given more serious consideration in order to reduce to a minimum these calamities.

One phase in this connection that stands out as making remarkable progress in recent years is in respect to the rescue and recovery operations that naturally follow an explosion. Hundreds of men throughout the region have received specialized training in this work and manufacturers have been encouraged to develop equipment and devices to fully protect these workers while engaged on their hazardous mission. Most of the larger companies carry a mine rescue and safety organization headed by an acknowledged expert and supplied with all necessary equipment to cope with any disaster. They respond immediately on call, and too much credit cannot be given to these heroic, unselfish volunteer workers, for the manner in which they willingly risk their lives in this precarious task. The procedure of organization generally followed is outlined on the chart appended.

During 1927 two coal dust explosions occurred, causing a loss of ten lives, and in 1928 there were five explosions of gas and coal dust, costing two hundred and twenty-six lives. Five of these explosions are classed as catastrophes. It is to be hoped that from a careful analysis of these lamentable mishaps something may come forth that will preclude the probability of a recurrence. Following is given in detail a report of the catastrophes occurring during the years 1927 and 1928.

ELLSWORTH NO. 53 MINE EXPLOSION

An explosion occurred in Mine No. 53 of the Ellsworth Collieries Company, located in the Borough of Cokeburg, Washington County, Pennsylvania, on April 2, 1927, at eight o'clock a. m., resulting in the loss of six lives. The mine is in the First District, Alexander McCanch, Inspector.

From the report of the Commission of Inspectors appointed to determine the cause of the explosion, it is clearly shown that the explosibility of coal dust without the addition of methane is possible and that rock dust is an efficient agency to localize such occurrences.

The report of the Commission and the verdict of the Coroner's Jury of Washington County follow:

REPORT OF COMMISSION OF INSPECTORS

Monongahela, Pa., April 6, 1927.

Mr. Frank Hall,
Deputy Secretary of Mines,
Department of Mines,
Harrisburg, Pennsylvania.

Dear Sir:

It is with deep regret that we are compelled to report the occurrence of a local mine explosion in Mine No. 53 of the Ellsworth Collieries Company, situated in the Borough of Cokeburg, Washington County,

Pennsylvania, on April 2, 1927, at 8 o'clock a. m., in which eleven persons were involved, resulting in the death of six and the injury of five.

Being more express as to location, the explosion occurred in No. 11 butt east on "D" face south, being initiated at the face of No. 11 room on said butt entry by an overcharged capped shot of 40 per cent gelatine dynamite, placed on a large piece of sand rock, the flame of the shot having ignited coal dust.

It appears that a large piece of sand rock had fallen at the face of the room referred to above, and that the use of explosive was made necessary to break it up for disposal. In consequence of this, a shot firer prepared a shot by removing the cover from four sticks of 40 per cent gelatine dynamite, compounding them into two mounds and placing them on top of the rock, inserting a blasting cap in each. Each mound was then surmounted with a cap of clay and the two mounds connected in series through the cap leads and the shot-firing cable. The shot firer then retreated to a point of safety and connected the shot-firing-cable to the shot-firing-battery and fired, initiating the explosion. Prudence should have suggested to the shot firer that one stick of explosive would suffice for the work to be done.

The explosion, as stated earlier in this report, was of a local character, being confined to the workings in Nos. 11 and 12 butts east on "D" face south, and showed so little force that none of the victims died from violence, each having succumbed from the inhalation of afterdamp, the collective products of a mine explosion. No doubt the afterdamp was very poisonous, because fire-damp, or methane, was not involved.

The mine as well as the entries in which the explosion occurred were heavily rock-dusted, and this in all probability was responsible for localizing the destructive influence of the occurrence.

The prompt and intelligent action of the official personnel of this company in restoring ventilation, in exploring the affected area, and in administering first-aid treatment to the victims who had been exposed to the deadly afterdamp, resulted in saving the lives of five of the eleven men who were involved.

While this is a regrettable affair, yet we are fortunate in having been able to save the lives of five of the victims, and among them the shot firer, who prepared the blast that initiated the explosion, and who reveals without hesitation just how the affair took place.

Permissible powder is used exclusively in this mine for blasting coal and slate, and all shots are prepared and fired by men who receive their position because of their special fitness for this class of work, but for many years large pieces of hard rock in roadways have occasionally been broken with light charges of other than permissible explosives, with the charge prepared and arranged much in the same manner as described in this report, without a single serious injury, and this accident would doubtlessly have been avoided if a reasonable amount of explosive had been used.

However, with all this favorable history behind us, it will not be denied that the safest form of explosive, although possibly not the most convenient or effective in certain classes of mine work, to be used

in coal mines wherein coal dust is an element of hazard, is a permissible explosive and its use should be extended to the breaking of fallen rock, and this is recommended. It is also recommended that the practice of placing a mud cap, or clay cap, over a charge of explosive give way to the conventional practice of loading the charge in a properly prepared drill hole in all cases where the thickness of the fallen material to be broken makes this practice feasible.

For convenience and to illuminate this report, a small print of the area wherein the explosion occurred is herewith attached.

Respectfully submitted,

ALEXANDER McCANCH,
Inspector First Bituminous District.
C. P. BYRNE,
Inspector Twenty-first Bituminous District.

VERDICT RETURNED MAY 25, 1927, BY CORONER'S JURY IN EXPLOSION AT ELLSWORTH NO. 53 MINE, WM. GREENLEE, CORONER

"We, the Jury, find that Tony Sabatta and five other men came to their deaths following the explosion April 2, 1927, at No. 53 mine of the Ellsworth Collieries Company, located at Cokeburg, Pa., from the effects of afterdamp caused by the explosion. In our opinion the direct cause of the explosion was the firing of an overcharged sand rock shot; prepared and shot by one Clute Douglas in Room No. 11, No. 11 Butt East Entry off "D" Face. The result of this heavy shot was the firing of the coal dust blown into the air by the force of this overcharged shot, causing the explosion.

We wish to commend the prompt action of the officials of this mine which resulted in the saving of five lives.

We find that the deaths of the above-named men were due to accidental sources.

We recommend that careful instructions be given at all times to all shot firers in regard to their duties."

EHRENFELD NO. 3 MINE EXPLOSION

On March 30, 1927, at 12:15 p. m., an explosion occurred at the Ehrenfeld No. 3 Mine, operated by the Pennsylvania Coal and Coke Corporation. This mine is situated at Ehrenfeld near South Fork, Cambria County, and is in the Thirteenth District, John Ira Thomas, Inspector.

Four lives were lost, and although the accident is not in the catastrophe class the conditions in respect to this explosion are so marked that it is thought best to give a brief description of the occurrence.

The seam being mined at this operation is the Lower Kittanning and is of a very friable nature with a volatile content not over seventeen per cent. As the initial point of the explosion was on the main intake airway about one mile from the drift mouth, and at least one and one-half miles distant from active workings, it proved conclusively the explosibility of coal dust of a low volatile content without the addition of methane.

The report of the Commission and the verdict of the Coroner's Jury of Cambria County follow: