

EXPLOSIONS AND FIRES IN COAL WORKINGS

Situation and Outlook

Although progress has been made over the years in reducing the occurrence of coal-mine explosions and fires, they remain significant causes of death and injury to miners. During the most recent five-year period for which statistics are available (1962-66), explosions caused 132 mine fatalities and 165 injuries. Fires, during the same period, resulted in 19 deaths and 30 injuries. Clearly, both records indicate a need for improvement.

Moreover, while fires in active mines are an immediate threat to the safety of men working underground, those in abandoned coal workings and inactive coal deposits, pose an insidious danger to lives, health, and property of people living in or near coal-mining areas. In the Appalachian region alone, more than 200 such fires are known to be burning uncontrolled, some of them dangerously close to urban centers. And nearly 500 coal-mine refuse banks are afire in 15 states. Approximately 40% of these banks are within a mile of a town.

National significance

While the high accidental death and injury rates in mining have long been on the public conscience, a concern with the depreciation of human and environmental values is of more recent origin. The "after cost" of a mine disaster is easily documented in terms of the manpower loss and the human tragedy. It is not so easy to estimate the demoralizing effect on communities of fires in coal formations or in culm banks. Objectionable fumes pollute the general atmosphere and, if they accumulate in poorly ventilated spaces, can even kill. The economic losses extend far beyond value of the coal consumed, for the development of adjacent properties may be prevented and surface structures may be damaged by subsidence. Fires within 30 feet of the surface destroy vegetation, and outcropping fires have ignited homes and forests causing widespread destruction.

Needs

The occurrence of any fire or explosion requires the coincidence of at least two factors: a source of ignition and a local accumulation of combustible material.

Much fruitful work has been done on reducing and controlling these factors, of which the development of "permissible explosives" and continuous monitoring of working areas for methane are but two examples.

Local accumulations of combustibles are probably inevitable by the nature of mining operations, and there may be an irreducible minimum of ignitions. However, the transition from a small flame into a mine disaster can occur only when substantial concentrations of combustible material have been allowed to accumulate. Here proper ventilation of underground workings can limit the danger. In this field there is much still to be learned and much of our basic knowledge has yet to be fully applied.

Fires in inactive mines and culm banks demand better criteria for assessing their cost to the community. The urgency of applying costly existent methods to control such fires and the advisability of looking instead for new concepts of control can only be judged in terms of a known need.

Government involvement

The Bureau of Mines was established in 1910 to improve health conditions, increase safety, and conserve resources in the mining industry. The Federal Mine Safety Code of 1953 provides guidance for Federal inspectors in bituminous coal and lignite mines. Public Law 738, 83rd Congress, authorized the appropriation of up to \$500,000 annually for control of outcrop and underground fires, and these operations were greatly expanded by the Appalachian Regional Development Act of 1965.

Application of science and technology

Three classes of fire and explosion hazards are being fought by applying science and technology. These hazards are: (1) accumulation of methane in cavities and in the strata overlying mine workings; (2) accumulation underground of float coal dust layers which may yield combustible dispersions even when they are diluted with rock dust in accord with existing legal codes; and (3) the formation of mixtures of coal dust and methane that are combustible although each fuel by itself is too much diluted to support combustion.

The tendency of methane to concentrate in layers can be dangerous even when the rate of ventilation is based on the rate of methane emission. The methane