

ENGINEERING

Coal Mine Disasters

► WHEN WINTER COMES, coal miners beware. Coal mine disasters that kill five or more persons occur primarily in the winter months from November through April in the United States.

This peak for major disasters in the winter season has three causes, Dr. Raymond F. Boyer, director of plastics research for Dow Chemical Company, Midland, Mich., believes. His studies of coal mine accidents during the past 150 years confirmed evidence from other studies that the following are two causes:

1. A drop in the barometric pressure results in the expansion and spreading of methane gas, one of the two materials occurring in coal mines in sufficiently high concentrations to be the source of disastrous explosions. At time of low barometric pressure, the amount of methane in the air in coal mines frequently rises above the lower explosive limit.

2. Coal dust, the other main explosive material in coal mines, loses its moisture when a cold front passes through. Since the surface moisture evaporates first, the dried-out top layers are easily stirred up and dispersed, and the coal dust catches fire more easily.

Dr. Boyer also suggests a third effect that might cause coal mine disasters: a repeating up-and-down change in the amount of load carried by the earth's crust due to cyclic changes in barometric pressure. This could cause a difference in pressure of sev-

eral million metric tons per square mile.

Dr. Boyer, therefore, suggests that events some distance away from a given mine could cause shifts in the land on rock in the earth's crust, and that these would be transmitted to the mine, thus causing a disaster.

In Science 144:1447, 1964, Dr. Boyer reports that these actions could reduce coal mine disasters:

1. Increased safety precautions during winter months.

2. Use of water-attracting chemicals to reduce coal dust in the air.

3. Use by mine superintendents of methods for forecasting explosive conditions in coal mines.

4. Doing as much coal mining as possible during the summer months.

Dr. Boyer's interest in coal mine disasters is personal, triggered by his reading of Charles Darwin's "The Voyage of the Beagle," in which Darwin discusses a possible relationship between weather and earthquakes. Dr. Boyer noted in 1951 that the barometer in Midland, Mich., fell precipitously just at the time of the coal mine disaster at West Frankfort, Ill., on Dec. 21, 1951.

His statistical study also showed that minor coal mine accidents that kill less than four persons occur at a fairly uniform rate throughout the year.

• Science News Letter, 86:15 July 4, 1964



Plessey Group

ALARM BY SUN—The solar-powered VHF radio alarm system developed by the Plessey Group, London, broadcasts instant warning in emergency conditions.

TECHNOLOGY

Sun's Energy Warns When Power Line Fails

► THE SUN'S ENERGY is used to power a very high frequency (VHF) radio alarm system designed to transmit instant warnings of power network failures, high water levels or other specific danger conditions. Developed by the Plessey Group, London, the system is believed to be the first commercial application in this country.

Even on the dullest days, the sensitive solar cells provide enough electrical energy to keep a nickel-cadmium battery, the only supply needed, fully charged. The system can be used also with a conventional battery charger where power lines are available.

The compact VHF transistorized transmitter provides an output of about 200 microwatts in the 68-88 Mc/s band and, with a bank of solar converters, can be mounted on top of remote high voltage transmission line towers or other exposed sites. When a predetermined danger point is reached, the transmitter comes into operation and provides instant warning signals at a central control point.

In addition to its use for public utilities, the warning system could be used for police, ambulance and fire service by means of street-corner pushbutton installations without cable laying.

The transmitter uses the normal mobile-to-base channel of radio control networks so that alarm facilities can be added without extra radio channels. The self-contained weatherproof equipment operates over a wide temperature range, virtually eliminating maintenance visits to remote unattended sites. The equipment was developed in collaboration with the British Government's Central Electricity Research Laboratories.

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Automated Commuting

► A WAY FOR COMMUTERS to have separate automobiles yet leave the driving to computers has been developed at the Massachusetts Institute of Technology.

Undergraduate mechanical engineers worked out many details of a new kind of car and new kind of road as an exercise in solving real problems. They call the car a Commucar. It could be driven and parked anywhere on any road, but would also be suitable for use under automatic control on special, 60-mile-an-hour main arteries.

The Commucar and the arteries it would use are described in Technology Review, 66:8, 1964.

The Commucar would be a light, compact, electric auto that would have arms on each side. It could draw power through either arm from an electric siderail while it was on a Commucar throughway. It would also be steered and switched at junctions through these arm-siderail connections.

"These throughways might be in median strips in some areas, and elevated above existing roads and streets in other areas," the magazine says. "Since the Commucars would be small, light vehicles, the structures

required for Commucar lanes would not have to be as heavy, expensive and unsightly as those needed for elevated trains.

"Before being admitted to a fast Commucar traffic lane, each vehicle would undergo a 15-second automatic safety check. Its driver would indicate his destination by inserting a punched card into a box, and from then until he arrived there his car's speed and route would be determined automatically.

"At some terminals along Commucar roads, control of the vehicles would be returned to the drivers so that they could then proceed as they wished on other roads. At other terminals, if the drivers wished, their cars might be run directly into automatic parking garages."

If privately owned, the throughway operators could charge tolls. If rented out by the operators of the roads, a customer might go to work in one car and return home in a different one summoned for him.

Prof. Robert W. Mann reports the students were convinced their solution to the daily problem of commuting would be better than monorails or other proposals.

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