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FUEL RESEARCH INSTITUTE

OF SOUTH AFRICA

TEGNIESE MEMORANDUM
TECHNICAL

NO. 42 OF 1969

EXPLOSION HAZARDS ADVISORY COMMITTEE RESEARCH PROGRAMME FOR 1970

OUTEUR:
AUTHOR: P.G. SEVENSTER

RESEARCH FOR THE COAL MINING
RESEARCH CONTROLLING COUNCIL

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1. EXPLOSIBILITY OF COAL DUSTS AND RELATED TOPICS

In planning research projects in connection with coal dust explosion hazards, it must be borne in mind that explosions take place in two stages, viz. ignition and propogation. The fundamentals involved in these stages are different and also require different facilities for their proper investigation.

The lack of large scale testing facilities, which are generally used for flame propogation and suppression studies orientates the research effort of the Fuel Research Institute more towards fundamental aspects of the ignition of coal dusts.

However, utilization of the available equipment and man-power to investigate some practical aspects of coal dust and methane hazards in our coal mines will be continued as in the past.

In broad outline the projects which are to be continued and also those that are to be initiated in the course of the new financial year are the following:

i) The work in connection with the characteristics of the dust occurring in the working areas of South African collieries will proceed. This work includes:

   a) Sieve analysis,
   b) dispersibility determinations, and
   c) explosibility tests.

ii) With the U.S.B.M. apparatus at present used by the Institute, it is in many cases impossible to obtain ignition of the coal dust with the result that an

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explosibility index cannot be obtained for a large proportion of the samples tested.

It is proposed to add to the present equipment, based on U.S.B.M. practice, the apparatus used in Germany (Berggewerkschaftliche Versuchsstreche) for studying the explosibility of coal dust.

In the German apparatus dust dispersion occurs in an efficient and reproducible manner and positive ignition thereof is ensured by the use of a powerful chemical flash igniter.

iii) The apparent insensitivity of South African coal dusts to explosion, which may be linked to their high mineral matter content and singular petrographic composition remains an interesting and worthwhile research project. The investigation will be continued along the following lines:

a) Differences in the explosibility of coals are probably associated with those coal properties that contribute to the initial ignition. This involves just about all aspects of the volatile matter and tar products.

b) The presence of inert gases in volatile matter appears to be of considerable significance in the explosibility of coal dusts and attempts to settle this issue are to be undertaken. Proper quantitative analysis of hydrocarbon gases in volatile matter is also necessary. These analyses can now be undertaken in one operation with new equipment acquired during the past year.

c) Preliminary work on the influence of petrographic composition on the explosibility of coal dust has demonstrated the significance of this property. Further work, including perhaps the analysis of gases produced by different macerals may be undertaken.

/d) .....

d) A prerequisite to further work on the effect of mineral matter of coals on their explosibility would be the identification of the minerals involved, and their dispersion in the coal matrix. It is hoped to initiate work in this connection.

e) There are two additional factors involved in colliery explosions that have no direct relation to coal chemistry which also call for attention.

The first of these is the dispersibility of South African coal dusts. The high mineral matter content of our coals may have an influence on the bulk density of the coals, thereby affecting their dispersibility. The factor of dispersibility involves also conditions in collieries such as fineness of the dusts in roadways and their state of weathering.

The other factor concerns the methane content of mine atmospheres and also of the coal itself.

2. METHANOMETRY

The surveys of the methane content of mine atmospheres are to be continued. Attempts will be made to assess the practical value of continuous methane monitoring in collieries.

For this purpose a full-time assistant stationed in the coal field and ten methanometers will be available during 1970.

(SIGNED) P.G. SEVENSTER
PRINCIPAL RESEARCH OFFICER

PRETORIA.
25th August, 1969.
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