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FUEL RESEARCH INSTITUTE OF SOUTH AFRICA.

TECHNICAL MEMORANDUM NO. 38 OF 1967.

INTERIM REPORT ON THE EFFECT OF ADSORBED  
METHANE ON THE EXPLOSIBILITY OF COAL DUST.

by

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RESEARCH CONTROLLING COUNCIL

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One of the research projects undertaken to establish the cause of the apparent inactivity of South African coal dusts when subjected to the explosibility tests designed by the U.S.B.M. was to study the influence of the methane content of the coal on the explosibility index.

Previous investigations have indicated that the methane content of South African coal is lower than that of European and American coals. This difference in the properties of the coals suggested a possible starting point for further investigation.

A series of tests were therefore designed to test the effect of the methane content of the coal on the explosibility index of the coal.

For this purpose the minimum electrical energy required to ignite a dust cloud was measured for a series of samples exposed to methane atmospheres under different sets of conditions.

In the first of these experiments coal dust samples contained in glass bulbs were evacuated for 12 hours at room temperature. The samples were then exposed to pure methane for 8 hours at various constant pressures. The samples were then placed in the Hartman apparatus and the test made as soon as possible to reduce the time of exposure to the atmosphere.

The results obtained in these tests are represented in Figure 1. They clearly indicate that a fivefold decrease in the minimum energy is effected by methane adsorbed at a pressure less than 250 Torr. Above this pressure the effect

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is less marked.

Since evacuation of the sample is a rather artificial test the experiments were repeated with unevacuated coal. Similar results were obtained.

To ascertain the time required for the methane to desorb from the coal during exposure to the atmosphere after methane adsorption, tests were made on samples exposed for different intervals of time. The results (see Figure 2) indicate that after 10 minutes of exposure the coal has lost so much methane that no difference in the minimum electrical required to ignite the dust cloud can be observed.

In another series of tests it was shown that during the first few minutes of exposure to methane sufficient amounts of this gas is adsorbed to effect a considerable change in the energy required to ignite the dust. These results are shown in Figure 3.

The amount of information obtained so far is not enough to allow definite conclusions to be drawn regarding the practical implications suggested by the results and the work is therefore proceeding.

PRETORIA.

6th September, 1967.

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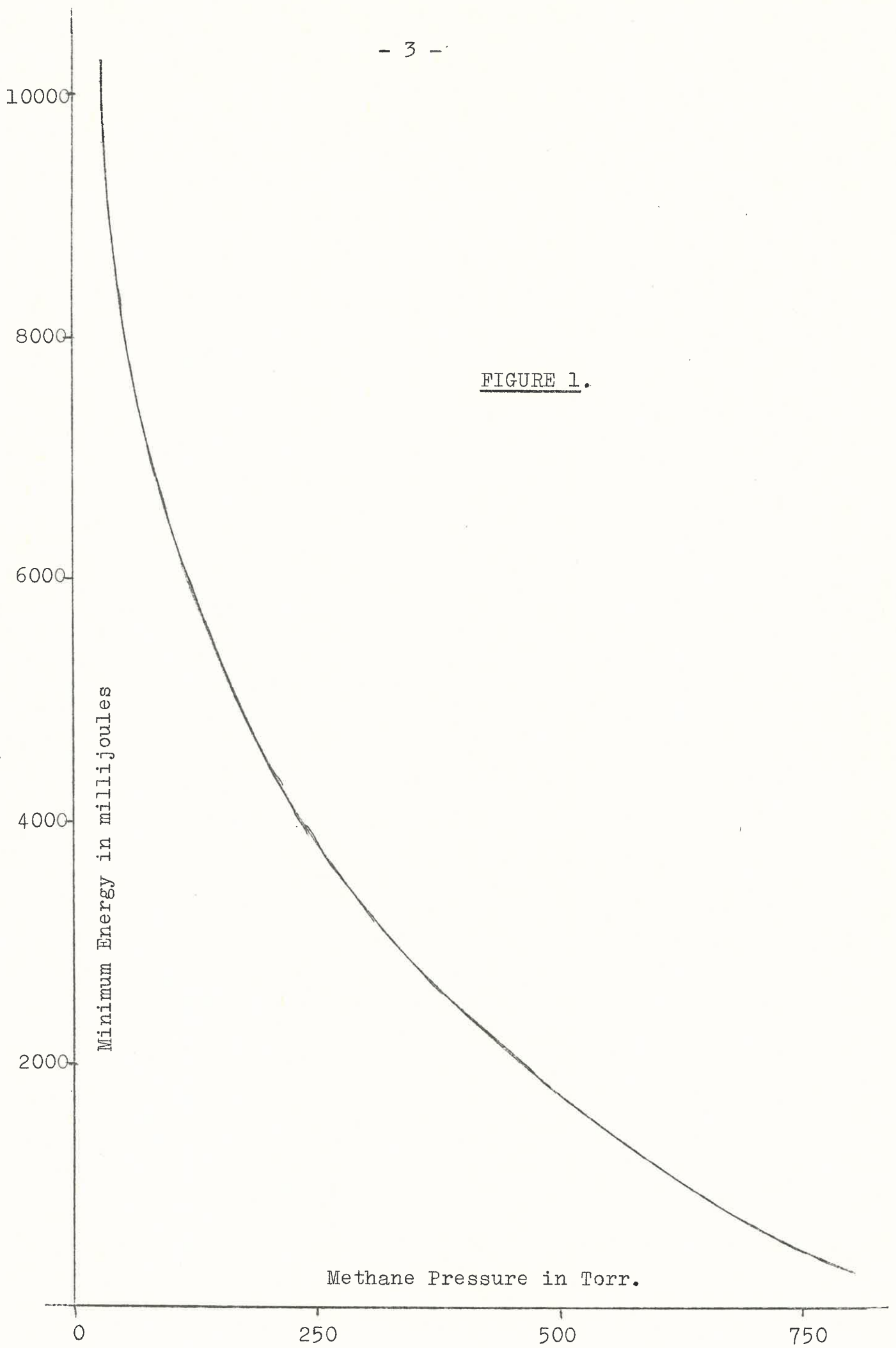


FIGURE 1.

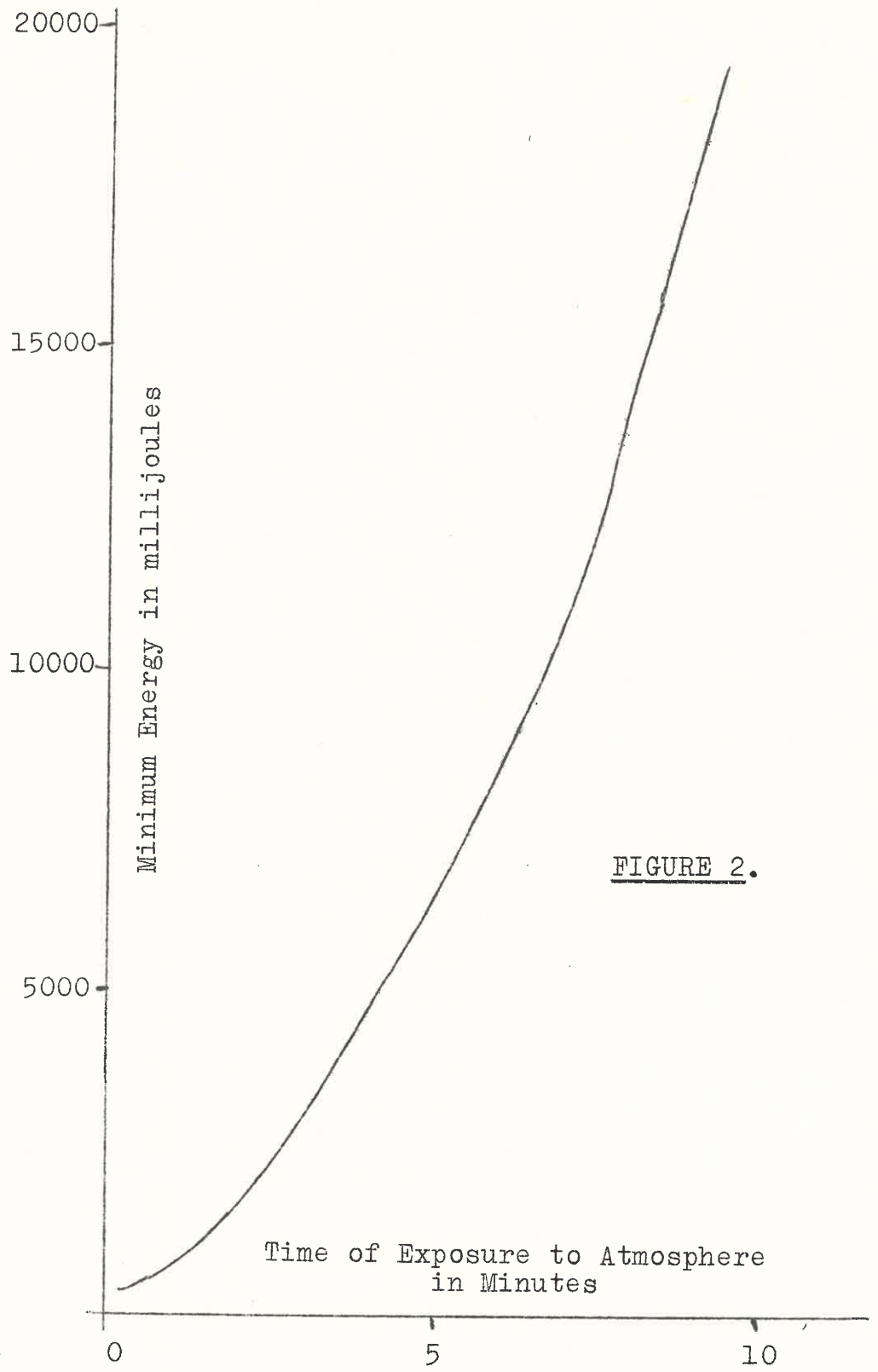


FIGURE 2.

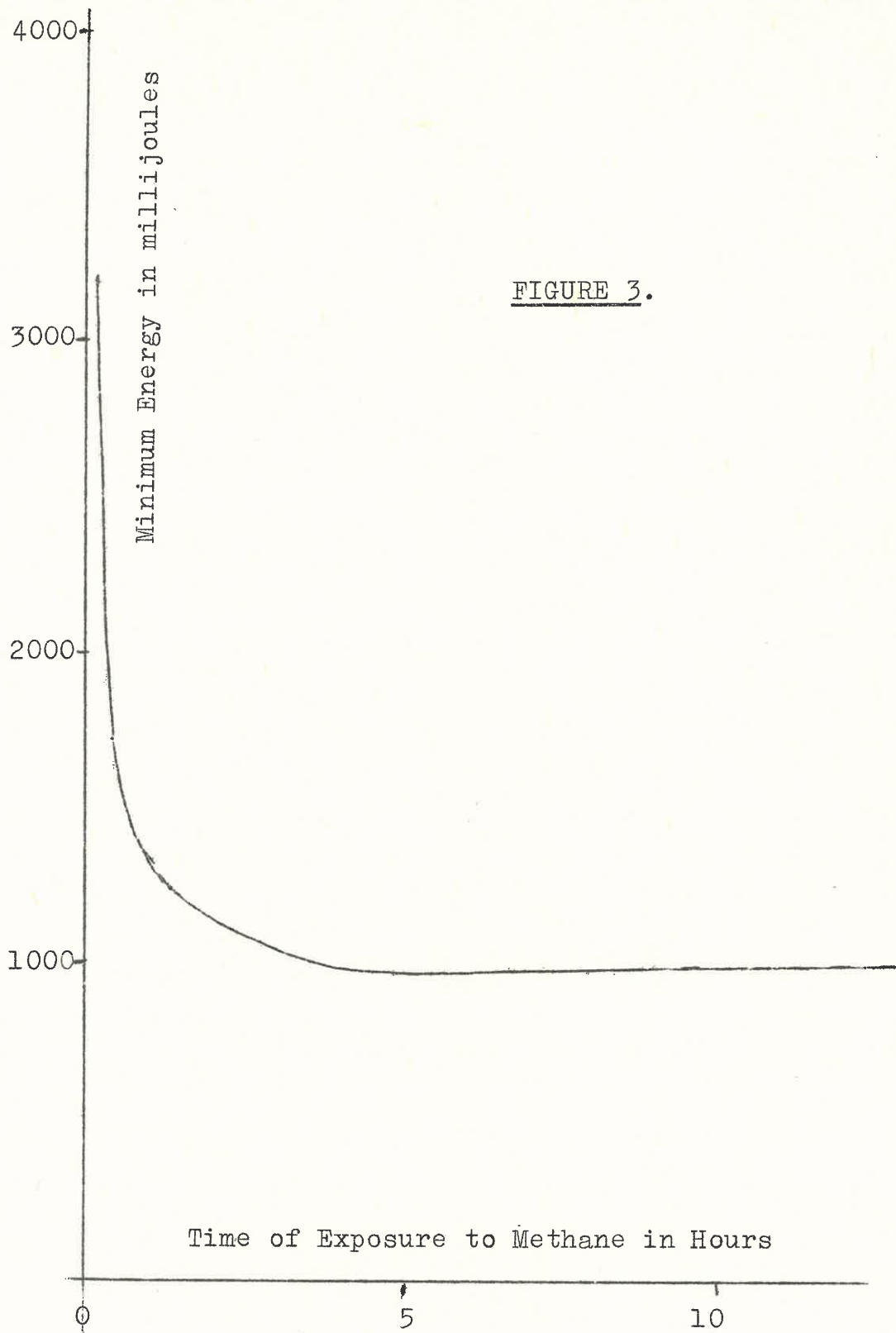


FIGURE 3.