

# **MINE MONITORING FOR SAFETY AND HEALTH**

## **PREFACE**

In 1994, as a prelude to privatisation, the British Coal Corporation closed its Technical Services and Research Executive (TSRE). This brought to an end a forty-seven year period during which Britain's state owned coal industry had carried out its own research into mining related problems.

The amounts of money spent had been huge. For example, in one arbitrarily chosen year, 1988/9, it was £16m (1). Whilst some went on projects that had a direct impact on the productivity of mines, for example the development of improved coal getting machines, some was also spent on more philanthropic activities. Examples included investigations of the underground environment and its impact on the safety and health of miners. As part of these studies many new and improved instruments were produced for the assessment of atmospheric 'pollutants'. For the purposes of this monograph all such devices will be called 'environmental instruments', or 'environmental monitors'.

In 1974 I joined an expanding team of physicists at the NCB's Mining Research and Development Establishment (later to become TSRE) to work on environmental monitor development. Some twenty years later, when redundancy occurred, I felt the need to look back at what I had done and to ask why and so what? Only when these ghosts had been exorcised would I be able to move forward with confidence to a new and exciting career.

This monograph is the result of my research. In it an attempt is made to answer a number of questions:

- \* What underground environmental factors have an adverse impact on the safety and health of coal miners?
- \* How were these hazards discovered, investigated and controlled?
- \* What influence did the availability of appropriate monitoring instrumentation have on this process?
- \* Were there any underground environmental hazards that required (in 1994) continued research into their control and monitoring?
- \* Were there (in 1994) any environmental monitoring or control procedures that could be relaxed?

Before considering the history of environmental hazards in coal mines, this monograph begins with chapters containing general background information for the discussions that follow; Chapter 1 looks at the attitudes of colliery management and governments towards underground safety and health and how they affected the introduction of hazard control measures; Chapter 2 outlines the development of mining technology, showing how it led to the appearance of new pollutants and sources of danger. Environmental hazard control has frequently been achieved by ventilating the workings. Chapter 3 contains a brief review of technology applied.

Following these general reviews are chapters that consider the identified hazards. These include: Blackdamp - Chapter 4, Firedamp - Chapter 5, Gaseous products of explosions and fires - Chapter 6, Shot firing - Chapter 7, Diesel engines - Chapter 8, Respirable dust - Chapter 9, Ionising radiation - Chapter 10, Heat and humidity - Chapter 11, Lighting - Chapter 12, Noise - Chapter 13. Answers to the questions identified above are given as a set of general conclusions in Chapter 14.

Although falls of ground have been a major danger underground, they are usually considered a 'geological' hazard rather than environmental. Consequently the subject has not been reviewed in this monograph.

### Reference

1. British Coal Corporation. Report and Accounts 1988/89.

# **The Measurement of Air Flow in British Coal Mines: A Historical Review**

## **PREFACE**

Many papers, for example Hinsley (1), Mining Association of Great Britain (2) and Saxton (3), have been written on the subject of mine ventilation history. Middleton (4) has produced a comprehensive study of the history of meteorological instruments and Medlock (5) has written a historical review of flow metering. A literature survey did not, however, locate any studies of the air flow measurement practices and apparatus applied within the coal mining industry. In view of the extensive use of anemometers underground and the advances in air flow measurement technology this has fuelled, it was decided to rectify this omission.

The results to the study of the history of coal mine air flow measurement practices and instruments were first presented to Nottingham University in 1988 in a thesis for the award of the degree of Master of Philosophy. However, in producing the following redraft the aim has been to try and make the monograph of interest to readers outside the coal mining industry, as well as those within it.

Part 1 of this study reviews the development of air flow measurement practices in coal mines, whilst Part 2 describes the historical development of the apparatus used. Throughout the monograph the subjects are treated from a practical point of view, with discussion of the theory behind an instrument's operation kept to a minimum. Included as Appendices are brief outlines of the research and development organisation within the nationalised British coal industry, and the use of electrical equipment underground.

Thanks are also due a large number of now ex-British Coal staff who gave their help and support. During the research covered by this study many individuals and organisations outside the mining industry were contacted. Many provided valuable information and their help is gratefully acknowledged. The author would also like to thank his family for providing the motivation to complete this work.

In many places results obtained by employees of the National Coal Board, the British Coal Corporation and its contractors are discussed. The views expressed on these and any other subjects within the monograph are those of the author.

### References

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