

Report on Discussions

Mr Andrews presented his paper entitled 'Mine Ventilation Standards'.

Mr Knight asked whether Mr Andrews would give his opinion of dust sampling instrumentation in relation to their ventilation standards.

Mr Andrews said that he would hesitate to reply to this question as he had no direct connections with the Industrial Hygiene group which formed part of their organisation and which dealt with all matters relating to dust.

Mr Martinson then mentioned the Federal Coal Mine Health and Safety Act of 1969 and stated that he felt that the proclamation of this Act was a momentous event in the field of social legislation, and that many features of this Act could with advantage be repeated in other parts of the world. Two features on which he would like Mr Andrews to comment were, firstly, the historical split between the coal mining and the metal and non-metal mining industries and the possible continued existence of this division and, secondly, the author's experience of civil penalties which was one of the unique features introduced by the Act.

Mr Andrews replying in a personal capacity to the first question felt that based on the research done while preparing his paper and based on the different laws and Unions applicable to the various mining industries this division would probably continue.

In replying to Mr Martinson's second question the author said that he would rather not commit himself as several cases were at present tied up in court including one case involving a possible three quarter billion dollars, between the government and a respondent.

Finally, the Chairman, commenting on Mr Martinson's questions, mentioned that in the early days of mining the eastern part of the USA was involved in coal mining while the western part was concerned with metal mining. As a result of this geographical split two different programmes developed, one for coal and one for metal mines. Another answer to this was that safety problems were prevalent in the collieries. This was not to say that the metal mines were accident-free but that accidents in the coal mines were usually more dramatic, and because of this it was felt that separate organisations were needed.

The Chairman expressed his surprise that Mr Martinson had commented on civil penalties as these were an accepted part of most mining regulations in the United States. What did cause problems though, were criminal penalties which were associated with the Act, as there were often difficulties in getting acceptance of these.

Mr Burrows then presented his paper entitled 'Training of Mine Ventilation Personnel in South Africa'.

Dr McPherson made the following contribution to Mr Burrows' paper.

'I support the emphasis which Mr Burrows has given to the process of learning by the student rather than that of teaching by the lecturer or supervisor. Many centres of adult education now recognize this distinction in their training of prospective teachers. The good "teacher" is much more concerned with how much is being gained by his students than with the "excellence" of his own exposition, important though it is.

'The paper describes the training given at the Chamber of Mines to ventilation personnel. I wonder if Mr Burrows would indicate further the type of training given by the mining groups and on the mines themselves. What training

and to what standard is given to Black persons engaged in ventilation measurements?

'I have been involved in two of the "A" courses given at the Chamber of Mines. I have been impressed by the enthusiasm of the participants and their keenness to take new methods back to the mines for practical implementation. I have little doubt that it is this philosophy coupled with the environmental problems of deep mines which has produced the high standard of ventilation personnel and the rapidity of progress which exists within this field in South Africa.

'I would recommend to anyone involved in the establishment of ventilation training programmes to seek the advice of Mr Burrows.'

The author, replying to Dr McPherson's questions, mentioned firstly the training scheme for White ventilation officials. To complete the whole training cycle would take the average person a time of approximately three years. Of this period the actual 'off-the-job' training, that is, time spent on centralized courses, would amount to about six weeks. Therefore the bulk of the training was taking place in the work situation. With regard to the training of Blacks, Mr Burrows said that at the moment Blacks were concerned mainly with taking routine measurements in stopes and development ends and at this stage did not have much to do with the analysis of these readings. At present their training was the concern of the mine's ventilation and training officers and their training was done on the mine. However, he felt certain that their work potential would develop and at some later stage a training programme would have to be designed to meet these requirements.

Mr Burrows then went on to comment on the support the mines had given to the training programme and expressed doubt that the programme would work without the help received from the mines.

Mr Deglon, in a contribution to the paper, described the work done by the Rand Mines Training Centre in the field of ventilation training. Young matriculated men who show an aptitude for mining were given a thorough training in ventilation for 11 weeks of the initial year of the four-year course. In order to improve the learning situation a change was made from formal instruction to the learner-controlled system during 1975. In order to compare this new approach to that used previously, identical tests and examinations were written by the 1974 and 1975 ventilation groups. The results which were obtained are shown in the following tabulation:

	1974 Group	1975 Group
Average of interim tests	69%	76%
Final written examination	70%	82%

Mr Deglon mentioned that as a direct result of the success of this learning system it had now been applied to the other aspects of learner official training, namely, mining and survey, with similar results.

Mr Burrows, in his reply said that Mr Deglon had designed his course in conjunction with the Ventilation Training Section of the Chamber, and that the results obtained confirmed their findings regarding learner-controlled system.

Dr Hall commented on learning by objectives and said that candidates attending 'C' courses had the advanced ventilation certificate as an objective. Did Mr Burrows not feel that there was room for something of a higher standard than the advanced certificate? Perhaps not for the purpose of achieving a further certificate but to give those desiring it a personal objective to achieve.

Mr Burrows in his reply said that he did not see the advanced certificate as an aim of their training programme. The aim of the training programme was to improve work performance and the advanced certificate was recognised as a minimum qualification. In his opinion there was no need for a higher certificate but a need to update periodically the syllabus for the advanced certificate.

Mr Martinson commented on early ventilation training and mentioned that it was in 1923 that it was made compulsory for a group of ventilation officers to attend a course held at the University of the Witwatersrand. He then spoke of the various courses which he had organized some ten years earlier. These A, B, C and D courses were still being held today, but, in his opinion, on a more rational basis.

Mr Martinson saw two problems with the present training situation. One was the question of overtraining and the possibility of arousing expectations which could have no possibility of fulfilment and the other was that of in-house training where one had to exercise certain discretions when dealing with risk topics.

As there was little time available, the Chairman was not able to ask Mr Burrows to reply and closed this part of the session.

Mr Fermor then presented his paper entitled 'Study of the Factors Present in Planning the Ventilation Needs of Diesel Vehicle Operation Mines in Quebec Province, Canada'.

Mr A. R. Bell said that the author's comments concerning the total pollution caused by particulate matter resulting from diesel operations was of considerable interest to him. He mentioned a series of tests carried out in Zambia during 1972 by the Government Mines Safety Department to define the levels of particulate contamination resulting from the use of diesels. The average results obtained were as follows:

Loading with a diesel vehicle	4,4 mg/m ³
	78% soots
	15% oils
	8% silica
Drilling operations	2,13 mg/m ³
	19% soots
	64% oils
	18% silica

These results were obtained by means of time-averaging Hexlet gravimetric samplers for the size range 0,5 to 5 micrometres. Mr Bell said that it was interesting to note the near-equal reversal of the proportion of soots and oil in the case of drilling and diesel operations. Although the figures showed a large increase in particulate concentrations when a diesel was operating they were still within recommended threshold limit values for soots and mineral oils which are 3,5 and 5 mg/m³, respectively. Mr Bell said that he would like to know if similar work had been carried out in Canada. Finally he commented on the effect which diesels have on temperature in Zambian copper mines. The heat added by diesels is an important parameter when planning the ventilation needs for these mines.

Mr Fermor replied to Mr Bell's last remarks and said that as the average temperature underground in their mines was in the region of 10°C a little heating was not unacceptable.

In reply to Mr Bell's question on particulate matter the author mentioned that the Department of Energy, Mines and Resources were about to do experimental work in this direction. They had already assessed the performance of an exhaust gas cooler-diluter in regard to particulate matter and information that had been obtained would be published possibly in the coming year.

Mr Eschenburg asked Mr Fermor of the extent to which they turbocharged diesel engines. He commented on the practice at Harmony gold mine where the diesels were normally adjusted on surface where the barometric pressure was about 85 kPa and were then used underground where the barometric pressure could be 110 kPa, this being equivalent to a turbocharging effect of 35 kPa.

Mr Fermor, in his reply said that the extent to which one turbocharged depended on the type of engine. Some engines achieved improved combustion while others showed an increase in NO and NO_x emission. It was therefore very important to go into the characteristics of engines when deciding on the degree of turbocharge.

The Chairman then thanked the participants and the Rapporteur and closed the session.

WRITTEN CONTRIBUTION

'Training of mine ventilation personnel in South Africa': J. H. Burrows.

Mr L. Vieira: The Mines and Works Act and Regulations require that certificated, competent persons be appointed as Manager, Mine Overseer and Surveyor when the number of persons employed underground exceeds a certain number.

The South African College of Mining is responsible for training approximately 90 per cent of the successes in the Mine Manager's examination by full technical examination, and for approximately 85 per cent of the successful Mine Overseer's candidates.

Two-hourly evening tutorials are held at Johannesburg, Springs and Carletonville for the Mine Overseer's and Mine Manager's candidates and four-hourly sessions at fortnightly intervals at Welkom, Orkney, Rustenburg and Western Areas. These centres cater for the major gold and platinum mining fields.

All students attending the evening tutorial sessions do so in their own time, while the fortnightly sessions are held during company time. Candidates attending the full-time classes normally do this during their annual leave and thus forfeit their holiday. Because students are doing most of the work during their leisure time they are normally well motivated, keen and conscientious.

On enrolling, a student is given a comprehensive set of lecture notes covering the syllabus as laid down by the Commissions of Examiners.

The weekly tutorials prepare a student for the examination over a two-year period. Full-time tuition of up to one month's duration is held twice a year primarily for students who have reached an advanced level in their studies and are ready to attempt the examination. The majority of successes are from students who have attended the full-time course. During this period the student is relieved of the burden of the day-to-day worries he encounters at work and is free to concentrate on his studies only.

Practical skills are learnt 'on-the-job', a function over which we have no control. Because of the numerous and various mining methods each mine will train employees to meet their requirements.

A candidate passing the Government Certificate of Competency does not necessarily qualify for a senior position. Having passed the examination, however, is proof of having attained a certain minimum level of proficiency but further development for senior supervisory positions must be the responsibility of the company employing the man.