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CENTRO BRASILEIRO DE PESQUISAS EDUCACIONAIS

TV

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UK

T V IN INDUSTRIAL TRAINING AND EDUCATION

APPLICATION OF CC TV IN SAFETY TRAINING BY THE COAL MINING BOARD IN U;K;

	DISTRIBUIÇÃO
<u>SPECIAL MOBILE STUDIO CCTV SYSTEM</u>	Prof
A new media, <u>first of its kind.</u>	<u>M J McCarthy</u>
reports and correspondence	C B P E
general information re system for publicity	
on safety measures in mines.	
<u>National Coal Board London S W I. Inglaterra</u>	
<u>Technical information from Makers</u>	
Photos etc publicity materials	

UNIPER

C. B. P. E.

Prof M J McCarthy

12 Feb 1968

John K Bepres  
Managing Director,  
Systems Control Electronics Ltd,  
Ashly Crescent, Southampton SO2 9NA  
England.

Dear Mr Barras,

I thank you for your letter of the  
10th January received today and the enclosed  
booklet on Mobile & permanent Systems for TV  
Education.

The document was prepared for sending  
by AIR MAIL at your office, but in fact was  
dispatched by "Maritime" mail by SS A Argentina.  
Unfortunately the stamps if any were robbed off the  
envelope, before handing over to me here at this centre,  
with part of the envelope where the stamps would have been  
cut out, so I cannot say what postage was really paid.  
Receiving parcels by ship is very difficult, and involves  
loss of time and energy. I hope if you are sending us any  
further material about T.V. equipments you will ensure  
that they are not sent by ship please.

I take it that the MOBILE TV supplied to the National Coal  
Board is not one of those included in this booklet?

Thanking you for your attention,  
Yours sincerely,  
attention,

C B P E

Prof Michael J McCarthy

## THE APPLICATION OF T V CLOSED CIRCUIT IN INDUSTRIAL EDUCATION & TRAINING

A special new MOBILE T V STUDIO , the first of its kind, has been developed by System Control ( Picador Coachworks Ltd).

Mobile Closed circuit T V is the latest and most up to date publicity media.

Five of these units are now in regular use touring mines operated by the National Coal Board ( this industry was nationalised in 1947) with favorable results.

It is used for training and education in safety and accident prevention in the industry .

The unit consists of a complete T V studio, and equipment and control room housed in a special large motor vehicle. There are fixed and roving cameras, telecine equipment, video tape recorder and five monitor screens which can be installed quickly at convenient points up to 200 yds away from the studio. Using inside and outside cameras extensive T V programmes can be broadcast through the closed circuit network.

The units visit collieries normally spending one week at each . The monitor Screens are erected in the Canteens, lamp room , shaft head and other convenient points where workmen can be expected to congregate at the change of shift times. Short programmes on safety matters - each about 10 to 15 minutes duration- are broadcast during the shift changes.

Colliery and Trades Union officials take part in these programmes. The subject chosen is one which is of particular importance to each colliery concerned, and the manner of presentation is agreed between the Colliery Manager, N U M branch chairman or secretary.

The permanent operating team on each studio consists of a T.V. Electronics expert and a lady Interviewer. Spare teams are available to cover holiday period or sickness etc.

The programmes have been extremely well received and although audiences vary from Pit to Pit, the average number and the interest shown by workers makes the activity worthwhile.

The type of programme varies considerably according to the ideas of the colliery officials concerned. The particularly successful programmes were based on photographs taken underground at the colliery, showing unsatisfactory and unsafe environments. These photographs were greatly enlarged and then discussed by the joint Colliery Safety Committee in the conference room. With the aid of the inside and outside cameras, shots were taken alternately of the conference and of the photographs under discussion. The whole of the discussion was broadcast in sound.

This media lends itself to very varied and "Up to the minute" presentations and it is important that those who take part in the programmes behave completely naturally and rehearsing is reduced to the minimum. Programmes are sometimes "live" but mostly video tape recordings so that a mixture of "outside" and studio work is shown built into each programme.

Each T V studio costs \$20,000 to purchase and £7,000 p a to operate, excluding depreciation.

Smaller industries have appeared somewhat envious of the facilities available to the Safety Branch in the Coal Mining Industry. When it is borne in mind that the number of workers employed in mining and its auxiliaries, is nearly half a million and there are about 500 mines and factories works etc with an annual turnover of £1,000 million it will be appreciated that these major safety operations are well within the capacity of this industry.

Even with five units operating costing £100,000 it will be possible to visit each mine only once in two years, and this cannot be considered as even slightly extravagant! The expenditure of money and effort at each mine will not be more than could reasonably be expected at any factory or works employing the same number of workers. It is the overall size of the industry that makes these spectacular efforts possible.

Other industries could get together under a sponsoring body to plan similar or more extensive coverages. Each participating firm or factory would contribute a proportion of the cost either directly or as a per capita charge on the number of employees. There are many organizations of a national character and Councils set up by the state

or non-government industrial and commercial associations, who could act as the sponsors and organisers for services to groups of industries of such T V training programmes, not only in the important field of "safety at work", but in other aspects of educational training for employees, is the considered view of the Director of Safety of the National Coal Board of the United Kingdom.

C B P E

Prof M J McCarthy

N.B. 21 Jan 1968

Technical details about the Mobile studio are being sent to me by the makers.

THE APPLICATION TO INDUSTRY OF RECENT ADVANCES  
IN ACCIDENT PREVENTION IN THE MINING INDUSTRY.

by

W. A. Wood, Director of Safety, National Coal Board

Whilst this paper has been prepared primarily to describe some of the National Coal Board's more recent activities in the field of safety publicity and propaganda, it will, no doubt, be useful to members of the Institution of Industrial Safety Officers to first of all say a little about the general organisation.

INTRODUCTION

The Coal Mines of the United Kingdom came into public ownership on the 1st January 1947, and the management of these mines was vested in the National Coal Board. A partial exception was that "small mines", i.e. those employing less than 30 men, continued to operate privately by virtue of licences issued by the National Coal Board.

The privately owned undertakings varied from the ownership of a single relatively small mine to public companies owning groups of very large mines.

At the beginning of 1947 there were 1073 separate mines each employing 30 men or more which were vested in the Board and there were 469 small mines. The coal output for 1946 from the vested mines was 180 million tons from a manpower of 706,800.

The pattern has changed completely under national ownership and because of the closing of unproductive mines and of amalgamation of small groups there were at the end of the fiscal year, March 1967, only 438 mines at which was employed a labour force of 410,000 men. The output for the year ended March 1967 was 165 million tons.

The newly created National Board had a very great responsibility for providing the best possible measures to protect the health and safety of miners and an early decision towards the implementation of this duty was to create a Safety Branch. Some of the more progressive mine owners had established a safety organisation but at the majority of mines in the country nothing had been done in this direction. It was necessary to make an entirely new start, but by the end of 1947 the organisation of a Safety Branch covering all the mines in the United Kingdom was virtually complete.

THE PLACE OF THE SAFETY BRANCH IN THE BOARD'S STRUCTURE

The National Coal Board is controlled by a Chairman and a Deputy Chairman who are assisted by functional directors responsible for production, industrial relations, staff, marketing, finance and scientific development. The Safety organisation is part of the Production Department which is under the technical control of the Director-General of Production.

Until the end of March 1967, the organisational pattern was one of five stages:- National Headquarters, Divisions (of which there were seven), Areas within the Divisions (a total of 38), groups of mines, and the separate mines. At the beginning of April this year, a 3-stage command was introduced - Headquarters, Areas (17) and Mines. Organisational references in this paper are to the new arrangement.

THE STRUCTURE OF THE SAFETY BRANCH

The pattern of the Safety Branch follows the general pattern of the industry's organisation. The Director of Safety controls general safety policy and co-ordinates the work of the Branch throughout the United Kingdom. An Area Safety Engineer acts in a similar way for each Area.

The extent of an Area varies somewhat according to the size and geographical distribution of the mines situated therein (see Appendix I for map of Areas). The quantity of coal mined in the Areas varies between seven million tons and 13 million tons and the manpower between 18,000 and 33,000. Each Area is controlled by a Director who is assisted by two deputies - one concerned with mining operations and the other with administration. The day to day mining management is the concern of the Area Chief Mining Engineer and it is to this officer that the Area Safety Engineer is responsible.

The Director of Safety and the Area Safety Engineers each have a number of assistants who are required to specialise in particular fields as well as to give general help.

There is a safety officer at each mine who is responsible for the supervision of safe working and for certain routine matters throughout the mines - both the surface and underground - on all shifts and in all departments. At some of the very large mines there are two safety officers, whilst at the other end of the scale two small units may be covered by one safety officer.

It will be noted that reference is made to safety engineers and to safety officers. The distinction is that safety engineers are required to be fully qualified mining engineers holding the Mining Qualifications Board First Class Certificate whereas the safety officers need hold only a minimum qualification of the Mine Deputies Certificate.

In December, 1962, the National Board decided to strengthen the Safety Branch by authorising the appointment of Safety Engineers at each mine where the annual output exceeded 500,000 tons per annum, and also at mines where the geological and mechanisation problems are particularly difficult. There is a total of 140 such mines and more than half the appointments have now been made. This appointment is additional to that of safety officer.

#### SAFETY COMMITTEES

Whilst the duty of implementation of safety measures falls squarely upon the members of the Safety Branch in consultation with their Production colleagues, there are at all stages from the National Board to the mine committees with the task of considering safety policy and making recommendations for further steps to be taken.

At National level safety matters are considered from time to time by the Board and also by the General Purposes Committee which consists of the Board Members and Directors General of all Departments; this latter is the Board's chief committee for the control of all matters in the industry.

Similarly, safety matters are from time to time considered by Area Management Committees. There are, however, separate committees at each level of the Board's organisation whose prime concern is safety.

At National level there are two committees with these responsibilities. The first of these is the Safety and Health Sub-Committee of the Coal Industry National Consultative Council. The C.I.N.C.C., as its name implies, is a committee of representatives from the Board and from the Trades Unions and it deals with all matters jointly affecting management and men. The Safety and Health Sub-Committee consists of certain members of the C.I.N.C.C. and of Safety specialists. The second is the "National Safety Committee", and it is particularly concerned with special Safety Campaigns incorporating publicity and propaganda activities.

In each Area there is a Joint Safety Committee which is constituted from senior officers of Area Management, Trades Unions officials and safety experts from both sides of the industry.

At every mine in the country there is a colliery safety committee which is usually a joint organisation of management and trades union representatives. It is almost identical in structure with the Colliery Consultative Committee and in some cases the Colliery Consultative Committee deal separately with safety and with management subjects at alternate meetings.

The Area and Colliery Safety Committees normally meet once each month whilst National Committees meet as and when there is important business to transact.

#### THE DUTIES AND RESPONSIBILITIES OF MINE SAFETY OFFICERS

It needs to be made quite clear that there is no statutory requirement for the Board to have a Safety Organisation and, therefore, the Safety Officers have no authority in law as have mine managers, under-managers, overmen, deputies and others. The function of the Branch is to guide and advise on all matters relating to the safe working of the mines and the safe conduct of workmen and officials.

A Safety Officer is to some extent a "freelance"; he usually makes underground inspections on five days each week and he also makes a tour of the surface works. The visits may be made on day, afternoon or night shifts. He operates directly under the colliery manager, but is functionally responsible to the Area Safety Engineer and takes from the latter his general guidance on policy and on technical matters.

The principal duties of the safety officer come under the following headings:-

##### (i) Inspections

The most important part of the Safety Officer's task is to make regular inspections of all parts of the mine in order to look for bad practices and unsafe equipment so that remedial action can be applied before an accident can occur. This task is most onerous because of the very wide variety of operations in mining engineering. Appendix II outlines the subjects upon which a safety officer needs to be knowledgeable if he is to perform his duties adequately.

##### (ii) Accident Assistance

Whenever a serious accident occurs the Safety Officer is immediately called to the scene. He assists with the recovery of men trapped by falls of ground or by machinery and plays a principal part in dealing with fires and explosions and other serious occurrences.

##### (iii) Accident Investigations

The Safety Officer is required to investigate all accidents which cause men to be incapacitated from work for more than three days (this is the basis of mining accident statistics in the United Kingdom). He is assisted with the investigation of fatal accidents and dangerous occurrences by the Area Safety Engineer.

##### (iv) Reports

A daily examination is required of all statutory reports. Mining Law permits a colliery manager to appoint someone to examine all the statutory reports and bring to his attention any matters of importance of which he should be personally made aware. This responsibility is often vested in the Safety Officer.

##### (v) Authorisations

It is customary to make the Safety Officer responsible for ensuring that all persons who need statutory authorisation to do certain tasks are so authorised. The Manager signs the authorities, but they are usually prepared by the Safety Officer who maintains a list of all duties for which authorisation is needed and the names of the men who are authorised in this respect.



(vi) Statistics

Accidents are reported on Form S.301 of which an example is given in Appendix III. The Safety Officer studies these reports, but he is also responsible for their entry into the accident register and for the extraction of the relevant data at the end of each month for inclusion in the statistical returns. From these returns are compiled Form S.308B and 308C - examples at Appendices IV and V. He is usually also required to be responsible for other statistical returns relating to dust suppression, use of explosives, etc.

(vii) Protective Clothing

Vast quantities of protective clothing are used in the mines; for example, helmets, safety boots, gloves, goggles. The Safety Officer authorises their issue and ensures that adequate quantities are available and properly distributed.

(viii) First Aid

The Safety Officer works with the Medical Branch and the Training Officer to ensure that there are always adequate supplies of first aid material and that throughout the mines there are sufficient men trained in first aid to be immediately available to help injured men.

Monthly meetings are held by the Area Safety Engineers at which the Safety Officers can discuss their problems, and obtain advice. The Director of Safety meets the Area Safety Engineers at a little longer intervals - usually bi-monthly.

The Board also has specialist officers to deal with matters not directly concerned with accidents but of equal importance in maintaining a high standard of safety. These include Ventilation, Dust Suppression, Fires, Explosives and Civil Defence Officers. In some cases these officials are directly responsible to the Safety Branch, whilst in others they work parallel with them.

MINE SAFETY ENGINEERS.

The Mines Safety Officer is so heavily weighed down with his day-to-day duties that he has little time to make careful studies of accident trends and to observe carefully those places which statistics indicate are more productive of accidents than other parts of the mine. Hence the appointment of Safety Engineers at large mines. The appointments at these specially selected mines are additional to the pit safety officers and carry a high status and remuneration. The Mine Safety Engineer is free from routine duties so that he can devote all his time to investigation and research into the causes of accidents and the means of bringing about reductions.

The main functions of the new Mine Safety Engineers are as follows:

- (i) To stimulate the interest of both officials and workmen in safety.
- (ii) To create district investigation panels to enquire into the cause of an accident as soon as practicable after the accident occurred.
- (iii) By careful examination throughout the mine to determine any danger spots and institute measures for improvement.
- (iv) To study the statistics of accidents at the colliery in order to isolate the most important factors.
- (v) To introduce means of focussing the attention of officials and workmen on places where accidents occurred, such as accident location plans, posters, notices and charts, etc.

## PRE-ENTRY TRAINING OF WORKERS

The National Coal Board operate what is probably the most extensive training scheme in Europe for both juvenile and adult entrants to the Industry. This is under the aegis of the Industrial Relations Department and is aimed at teaching every new entrant to perform his duties correctly and safely. There are large training centres in all parts of the country staffed by full-time, expert instructors. Special lectures are given by members of the Safety staff, but they are supplementary and complementary to the syllabus of instruction.

## SAFETY CAMPAIGNS, PUBLICITY AND PROPAGANDA

The most important part of accident prevention work is concerned with improving the standards of mining engineering practice - in other words, "action on the shop floor". Nevertheless, the proper use of publicity and propaganda is important - both in drawing attention to human error and in making everyone conscious at all times of their responsibility to think in terms of "is this safe?".

This is the aspect of accident prevention to which this paper is primarily devoted.

The year 1962 was designated in the Mining Industry as "Safety Year", and saw the commencement of major national safety campaigns. Since then, every year has been a "safety Year" and accident prevention schemes introduced which have been implemented at every mine.

### (i) National Safety Competition

The Safety Competition was the first attempt made to introduce a high degree of enthusiasm for inter-pit and inter-Area rivalry on a nation-wide basis. The purpose of the competition is to choose the safest colliery in the country in each of three size groups and to find the safest Area. The basis of calculation upon which the competition is established takes into account the severity as well as the frequency of accidents. A trophy was designed for presentation to the Area which had the best record in the country and a further trophy for the winning mine in each of three size groups. A further section of the competition relates to improvement at high accident rate pits with prizes but no trophy.

In addition to the trophy for the individual mines there are valuable prizes which are ballotted for at the winning mines and also awarded as consolation prizes at mines which do not reach the top of their groups. The total value of the prizes is £35,000 of which £10,000 is awarded to winning mines and the other £25,000 used for "consolation" prizes. Of the £10,000 for winning mines £5,000 is used for the main competition to find the safest pit whilst the remaining £5,000 is used to reward the mine in each of the three size groups which obtains the greatest improvement in its accident position.

The competitions were started in "Safety Year, 1962" and continued since that time with considerable success.

The Trophies were designed by eminent artists in the United Kingdom and were entries in a competitive event arranged for the purpose of obtaining novel and artistic designs. The Judges in the competition for Trophy design were three of the most eminent men in the Art world - Henry Moore, the Sculptor, Joseph Herman, the artist and Sir John Rothenstein, at that time Director of the Tate Gallery. Illustrations of these Trophies are given at Appendix VI.

### (ii) National Prize Draw Scheme

Since it had become obvious that the National Trophy Competition was arousing major interest only amongst those collieries where there was a reasonable chance of success, it was decided to start a prize-draw scheme which would give equal opportunity of prize-winning to every colliery in Great Britain.

A sum of money based upon the number of men on books was allocated in respect of every colliery and a catalogue of prizes prepared from which could be chosen attractive prizes to the value of the sum allocated. Each month a draw was made from the check numbers of all workmen who had been free from "over 3-day" accident and had made 90% of possible attendances. The prizes were awarded to those men whose names are "first out of the hat".

This was not an incentive scheme but an advertising campaign to create further interest in accident prevention. There was maximum publicity and attractive prizes were displayed in showcases to attract attention.

There was some praise and some criticism for the scheme. Allegations have been made of "trying to buy safety", and of using "bingo methods". The Safety Branch is prepared to do anything which will reduce accidents!

The draw scheme was quite successful, but it was decided after a time to replace it with other publicity measures so as to vary the methods of approach.

### (iii) Posters

The use of posters on a National Scale has a double value. Firstly, it is possible to organise poster competitions which stimulate the interest in safety of the vast number of miners with artistic and imaginative tendencies and, secondly, the best of the posters can be reproduced and exhibited at every colliery.

A competition was held in 1962 which produced 3,200 entries. The best hundred of these were printed and circulated for exhibition at all collieries during 1963. This very successful effort was repeated in 1965 and the posters exhibited in 1966.

Substantial prizes are given for the best three entries and £5 paid for every poster used.

The posters have - like all other safety efforts - received both praise and condemnation. One critic expressed surprise that we, in London, should design posters so far removed from the realities of mining. It must have been a shock to him to learn that the designs were "by miners, for miners!" Many of the posters illustrated real mining risks - dangers which have actually resulted in serious accidents.

Posters are also commissioned from Artists and Cartoonists - some of them not in any way associated with Coal Mining. Examples of the contributions made by miners and by professional artists are given in Appendix VII.

### (iv) Slogans

Safety slogans also give scope for both competition and presentation and an effort similar to that used for posters was equally successful.

There are a number of devices which can be used for the presentation of slogans:- illuminated signs which may be moving or stationary and which take various forms. These are excellent for use at collieries provided that the slogans are regularly changed.

A popular slogan from one competition was:-

"Think first - Act after  
Safety First Prevents Disaster".

### (v) Tape Recorders.

Another method of putting over information which is extensively used throughout the Industry is that of recording on tape commentaries about some particular safety matter affecting an individual pit, together with a few words about the safety position at the mine. These comments are recorded by well-known personalities at the mine, including officials of the mineworkers and the Deputies Unions. The messages are then broadcast throughout the

baths and the canteens during each change of shift. They are repeated from time to time so that all men hear what is being said. This makes a most excellent method of quickly putting over new information. Popular music is recorded on the tapes, interspersed with the messages, so that workmen's attention has already been focussed upon the "broadcast" and is then retained whilst the message is put across.

#### (vi) Safety Booklets

The use of booklets is rather different from materials such as posters, slogans and tapes in that the instruction or advice is more detailed and specific.

A total of 18 booklets has been issued, each dealing with a specific subject such as Armoured Face Conveyors, Shearers, Trepanners, Tidiness, Materials Handling, etc.

The method adopted is to sub-divide the subject into its main features and for each feature to describe the danger in a few lines of script and then, on the facing page, to illustrate it - usually by depicting an accident. The "pin-figure" is used when illustrating a human being so as to avoid any semblance of the macabre. The "pin-figure" is not a form of humour - as has been alleged in some of the criticism, but it permits exaggeration without causing distress.

Three of the diagrams are shown in Appendix VIII in order to illustrate the way in which particular dangers or bad practices are brought to the attention of the workmen. Samples of the actual booklets are on the display stand.

This series of booklets is considered to be very important because they are used to draw attention to the causes of extremely serious accidents which, whilst in total for the Industry are numerous, are very rare in the experience of individual workmen. For instance, in one year eight men were killed whilst taking materials from A.F.C.'s - a ghastly total, yet only one per mechanised mine per 50 years.

Each booklet is distributed to all workmen who are in any way concerned with the particular subject.

#### (vii) Picture Competitions

In the first of this series of competitions the contestants were asked to say what was wrong from the point of view of safety on a photograph of a mining scene. In the first competition the picture was of a coal-face; the second was taken at the surface of a mine, whilst the third was an underground roadway. All the photographs were taken at working mines, but the scenes are, of course, staged for the purpose. A reproduction of the first photograph is given in Appendix IX. A motor-car was the first prize in each of these competitions.

In a competition which is at present mid-way in presentation there are two parts. Miners were invited to send drawings - or ideas for drawings - illustrating important matters relating to safety. Cash prizes of £25 each were awarded for the best eight. These eight drawings - improved as necessary by professional artists - are currently being used in the second part of the competition. Employees are invited to place these in order of merit for their safety content. Eight prizes will be given for the most nearly correct entries and these will be of furniture and house fittings, the winners being invited to furnish a room - kitchen, bathroom, dining room, bedroom, etc.

The competitions are held through the medium of the Industrial Newspaper "Coal News". This paper has a circulation of over 220,000 and reaches almost every mining home. It is, therefore, an ideal medium and enables men to sit quietly in their homes to try and solve the competitions and so absorb far more of the "safety message" than they do from posters.

In the first competition there were more than 7,000 entries; in the second - limited to surface workers - over 3,000. Enquiries indicate that many more men study the photographs without troubling to enter, but this means that the safety motive is achieved.

This is one of the safety activities which appears to have been extremely successful.

(viii) Newspapers and Other Publications

(a) "Coal News"

This is the mining industry's national newspaper. It has a circulation of more than 220,000 which is more than half of the total labour force and since there are many fathers, sons and brothers employed in the mines, it is probable that the paper is seen by the majority of the workers.

The newspaper is issued monthly and is sold at the pithead for 3d. a copy. The sellers are volunteers and a proportion of the proceeds are allocated to charities selected by each Colliery Consultative Committee. There are 18 editions - all contain some pages devoted to the national news and the remainder is devoted to local items.

The paper disseminates news about all matters connected with mining but in every issue and every edition safety items are included. The use made of the newspaper by the Safety Branch is very clearly shown in the current issue where the main item is the Competition to which reference has already been made. For this reason, free copies of the paper are available for all present at this lecture since the information may be of some future value.

(b) "Management News"

This is a quite different type of publication from the newspaper and its circulation is limited to Colliery Managers and officials senior to the Managers. It is part of the Board's system of "communication" and contains short articles about new procedures, new equipment and also brings to the attention of management the national trends in production and safety. It is published bi-monthly and every edition contains an article on safety.

Sample editions are displayed on the "publications stand" but are not to be taken away.

(c) "Inbye"

This is similar in nature and purpose to "Management News" but is directed towards the officials junior in status to the Colliery Managers. It is published bi-monthly and safety features in every edition. Samples are on display.

(d) Other Publications

The Board publishes many "Information Bulletins", "Broadsheets", "Codes of Practice", "Technical Instructions", "Research Reports" etc. etc., but as these are purely technical and not related to this subject of "Publicity and Propaganda" no further reference will be made to them.

(ix) Exhibitions

Full-scale exhibitions are a regular feature of the safety drive. Some of these are organised on a national basis and some on a regional or Area basis but the most successful are those which are staged entirely by the mine personnel with planning guidance and financial assistance from Headquarters.

The usual method is to erect a full-scale model of part of a coal-face and the roadways leading to it and equip it with machinery identical with that in use at the mine concerned. Common errors are staged in one part of the 'mine' and the correct way in another. Examples of mal-treated equipment are displayed and attention drawn to the dangers caused. Opportunity is also taken to show miners scientific and technical equipment which is concerned with their well-being but which they do not normally see.

Every effort is made to enable the maximum number of men to visit the exhibitions and simple competitions are arranged - with modest prizes as further encouragement to attend. At the request of Local Authorities and schools, the exhibitions are often opened to the public so that others may see "what mining is like".

A number of the exhibitions have been so successful that local management have made sound-films of them. The Board's professional film-unit have not been consulted and some of the films are a little amateurish but they do indicate the enthusiasm with which the safety exhibitions have been received. An excerpt from one of these films will now be shown.

#### (x) Films

The Board has a large and very expert Films Unit which serves the Mining Industry for its technical, training and public-relations requirements of film. The Safety Branch has its own entitlement of films to be made out of the overall budget but in addition has an allowance of £15,000 p.a. which can be spent on the special safety requirements.

There are two methods of approach used in the extensive programme of films on safety. One is to make very short films - two or three minutes showing time - each dealing with only one or two accident-risks. These films are for showing on daylight projectors in the colliery canteens during change of shift times so that men having a cup of tea before going home will see them. The other is to make more informative films describing in detail the whole of a main subject such as haulage operations, materials handling, etc., lasting for 20 to 40 minutes, and to show them to specially invited audiences in Welfare Halls and other semi-public places.

Between them, the two methods of approach can cover the whole field but the short films have, by far, the greatest potential audiences. Care is needed in arranging the exhibition of films in the canteens so that good sound and vision is possible without expecting the "audience" to sit still. Some of the implementation of this requirement leaves much to be desired.

Most of the longer films are really excellent "documentaries". In some of the films "Ghost" photography is used so that "accidents" can be seen actually taking place. Colour cartoons have also been tried, although there has been severe criticism of them from some quarters on the grounds that they are humorous and there is no place for humour in accident prevention. It has been observed, however, that these films often make a greater and longer lasting impact than more conventional efforts and they are well worth while.

In the most recent of the longer films "shock" tactics have been adopted. It is a colour film dealing with machinery accidents and feelings have not been spared in reproducing accidents and the gross injuries resulting therefrom. This film has only recently been released and so far has been very well received. It is intended to ensure that as far as possible it is seen by every workman and official in the industry.

To demonstrate to this audience the versatility of film as used both in the canteen and the lecture hall, a number of excerpts have been cut from library copies and put together on one loop. It is not intended to

show the value of any particular film but only the adaptability of the medium. This film will now be shown.

(xi) Film Juke-boxes (Scopitone)

This is a device which follows logically the aim to show short films in canteens during the periods between shifts. The one in use is a French development which has been widely used in coffee bars and holiday camps on the Continent for its entertainment value. It has been tried in this country but it is not widely known.

Instead of gramophone records as used in the conventional juke-box, the Scopitone contains films so that both music and picture is obtained. There is an excellent variety of entertainment film available - mostly of the "pop" variety.

Each unit contains 36 spools of film, any one of which can be pre-selected. As an entertainment device, the machine has a coin box for pre-payment, but in the application to safety this has been eliminated and "payment" is in the form of watching a safety film.

The entertainment films have a three-minute showing time but the spools will hold four minutes of film. A one-minute safety film has been added before each entertainment section. The units are installed in colliery canteens and a workman can choose which entertainment film he wishes to see, press the appropriate button and then see the safety loop before the entertainment.

A total of 90 units was purchased and an itinerary arranged so that each colliery is visited twice per year for two weeks each time. The Scopitone has proved enormously popular and the safety films are watched with just as much interest as the entertainment.

Short extracts will now be shown and members may themselves operate the machine to see the full four-minute films after the conclusion of the lecture. The first extract is from a film specially made by Lord Robens, Chairman of the National Coal Board, to introduce the device and this shows how the Scopitone can be used for the rapid broadcast of special messages.

(xii) Closed Circuit Television

This is the latest and most up-to-date of the publicity activities. A complete television studio and an equipment/control room are housed in a large vehicle. There are fixed and roving cameras, telecine equipment, a video-tape recorder and five monitor screens which can be installed at convenient points up to 200 yards away from the studio. A total of five units are now in use, the country having been divided into five geographical areas to give complete coverage.

Using both inside and outside cameras, extensive T.V. programmes can be broadcast through the closed network.

The studios visit collieries, normally spending one week at each. The monitor screens are erected in the canteen, lamp-room, shaft head and other convenient points where workmen can be expected to congregate at change of shift times.

Short programmes on safety matters - each about 10 to 15 minutes duration - are broadcast during the shift changes.

Colliery and Trades Union Officials take part in these programmes. The subject chosen is one which is of particular importance to each colliery concerned, and the manner of presentation is agreed between the Colliery Manager, N.U.M. branch Chairman or Secretary. The permanent operating team on each studio consists of a T.V./Electronics expert and a lady interviewer. There is a spare team to cover holiday periods, sickness, etc.

The studios are currently touring throughout Great Britain. They have been extremely well received and although the size of audiences varies considerably from pit to pit, the average number and the interest shown by the workmen makes the activity worthwhile.

The type of programme varies considerably according to the ideas of the Colliery Officials concerned. One particularly successful programme was based on photographs taken underground at the colliery, showing unsatisfactory and unsafe environments. These photographs were greatly enlarged and then discussed by the joint Colliery Safety Committee in the conference room. With the aid of the inside and outside cameras, shots were shown alternately of the conference and of the photographs under discussion. The whole of the discussion was broadcast in sound.

It will readily be seen that this medium lends itself admirably to very varied and "up-to-the-minute" presentation. It is most important that those taking part in the programme behave completely naturally and so there is very little rehearsing. Programmes are sometimes put out 'live' but mostly video-recordings are used so that a mixture of 'outside' and studio work can be built into each show.

A T.V. studio is operating from the car-park outside this lecture hall and it is now proposed to receive from it a live broadcast featuring the President of the I.I.S.O. This will be followed by an extract from a video-recording of an actual pit-programme. After the conclusion of this lecture the studio will be broadcasting 'live' and members of the audience may visit it and discuss details with the engineer and the interviewer - as well as see themselves on the monitor screens.

Appendices 10 and 11 reproduce photographs and a drawing of the unit.

(xiii) Special Campaigns

It is worth while to choose from time to time a 'cause célèbre' as a reason for a special effort. Last year it was decided to concentrate specially on the fifty mines which had the worst accident records in each of the mining areas - not all of these are among the worst in the industry since there is considerable variation in different parts of the country.

Before the publicity campaign started, each of the mines was carefully inspected by an expert safety team and a list made of all defects in mining engineering standards. Management was required to remedy these faults as a preliminary. The publicity propaganda efforts were launched by Lord Robens at a function to which had been invited the managers, safety officers and the Trades Union representatives of workmen and officials from the 50 mines concerned together with representatives at higher levels of management and trades unionism.

All the items of publicity to which reference has been made in this paper were concentrated in a carefully planned six months drive. In addition, a special booklet was prepared for each of the three main groups of workers - those at the mine surface, on underground roadways and at the coal-face. These were posted to the home of every man employed at the 50 mines together with a letter from Lord Robens explaining the reason and asking for co-operation. Copies of the booklets can be seen on the display stand.

The posters used in this scheme were specially designed for the purpose by professional artists. A total of 10 was used during the 26 weeks, each one being posted at every mine on the same date and withdrawn after one week. The interval between posters was occupied by notices saying "Watch this Space", a question mark, or similar interest-stimulating device.

A detailed time-table of events was planned nationally for each of the mines in the scheme but blanks were left for additional activities devised by the Colliery Consultative Committees.



This scheme officially closed at the end of March this year but the improvements continued to snowball. At the end of June the average reduction in accident rate for all 50 mines was 17%. At some of the individual mines there was no improvement, at others there was a reduction in rate of more than 50%. The campaign can therefore be considered as having been very successful.

A further 50 mines have been chosen and a similar campaign started again this month (October 1967).

#### INDEPENDENT SURVEY OF PUBLICITY/PROPAGANDA ACTIVITIES

It is not easy for those who plan and operate these schemes to make a realistic assessment of their results or potential results. It was therefore agreed to invite an Independent Body to make a survey of all that had been done and advise on relative merit so that those items of particular value could be extended and any worthless ones discarded.

This task was vested in a team from the London School of Economics led by a Professor of Psychology and a mathematician.

The team employed large numbers of investigators who visited many mines and interviewed thousands of workers. The questions asked had been predetermined and led directly as well as indirectly towards measuring the impact upon workers of the publicity and propaganda methods.

The team produced a number of voluminous reports and it is not proposed to discuss them in this paper. It may broadly be said that all the efforts were of value but that at some mines the results were not very good because of indifferent implementation. The advice received from the team enabled the Board to strengthen the organisations and committees and so improve implementation.

If any Firm or Organisation represented here is contemplating a similar assessment it may be possible to loan copies of the reports.

#### SAFETY BRANCH ANNUAL REPORT

An Annual Report need not be a wearisome statistical exercise but can be used as a further plank in the safety bridge. In the N.C.B. Safety Branch report, each main cause of accident is analysed and then some of the principal accidents are described, attention drawn to the underlying cause with complete frankness where there were inadequacies and suggestions made for rectification. This is in addition to any action taken at individual mines at the time of the accident.

This method brings a greater awareness of accident potential to all in the Industry and this is very important when it is borne in mind that one particular type of accident may occur at an individual mine possibly only once in 60 or 70 years.

Other interesting and useful information is contained in the report to make it as readable as possible. Detailed statistics are of course included for completeness and for the benefit of specialists.

The report is printed and circulated to all principal officials and Trades Union leaders and also to the Mining Universities and Technical Colleges. Copies of the 1965 report are on the display stand.

#### THE COST - IS IT WORTH IT

Much can be said - and often is said - about the moral value of accident prevention. Of the responsibility of owners, managers and Trades Unionists to ensure that Industry does not demand the sacrifice of life or of the enjoyment of life in its pursuit of economic viability. It has oft been stated that a million pounds is less than the value of a life and that cost must not be considered for a moment when measures need to be taken to avoid the risk of

serious accident. To those who have been so often associated with the grief caused by fatal accidents or who have helped to piece together again the life of a physically broken man, moral arguments are not needed.

But, whatever may be said when tears are flowing, hard cash comes into this picture and it is now opportune to examine a few figures and find out whether or not accident prevention pays its way. This is not a detailed statistical exercise - if anyone wishes to examine the mining industry's complete accident figures they may ask for a copy of the Safety Branch 1966/67 report - at present being printed or see the more limited information in the N.C.B. Annual Report which is now on sale through H.M. Stationery Office.

(a) Cost of the N.C.B.'s Safety Organisation

It is by no means a simple matter to ascertain the cost of the Safety Organisation. Some of the work carried out by Safety Staff could properly be charged to other spheres of the Board's activities; certain items of expenditure are related equally to social requirements and to safety. Arguments one way or the other can easily arise; for instance, if a safety officer asks for a piece of machinery to be equipped with a guard, should the cost of this be charged to safety or does it legitimately belong to 'equipment' since the guard should have been supplied with the machine in the first place. However, charging all salaries of safety staff to the budget, and estimating generously when there is any uncertainty, the costs are approximately as follows:-

Salaries and expenses of Safety staff	£ 825,000
Cost of subsidies for protective clothing	£ 350,000
Implementation of efforts described in lecture	£ 175,000
Cost of other activities not described	£ 50,000
Proportion of Research costs	£ 100,000
	<u>£1,500,000</u>

No reference is made to the cost of activities supervised or co-ordinated by Safety staff but not related to accident prevention, e.g.:-

Ventilation - financial return in respect of increased efficiency

Dust suppression - reduced pneumoconiosis

Fire Service - reduced fire damage

Civil Defence - no return

(b) Cost of Accidents Causing Fatal or Other Serious Injury

There is a considerable number of very serious accidents each year in the Mining Industry - paralleled now by the Construction Industry - and for this reason it is useful to examine the cost of these accidents separately from the cost of minor injuries.

First of all then, an examination of the trends in fatal and serious accidents from five years before a national safety organisation was established to the end of 1966.

See Table on next page

5 year Periods	Fatal		Serious	
	Average No. per year	No. per 100,000 men employed	Average no per year	No. per 100,000 men employed
1942 - 1946	661	93	2,529	358
1947 - 1951	493	70	2,198	314
1952 - 1956	372	53	1,877	268
1957 - 1961	320	51	1,796	290
1962 - 1966	214	44	1,290	265
The year 1966 -	158	36	1,063	246

There was a steadily falling manpower from about 710,000 in 1942 to approximately 430,000 (average) in 1966 but it is seen that the number of accidents in relation to men employed fell considerably.

Fatal

If the fatality rate of 93 per 100,000 men employed, which existed before the creation of the safety organisation, had remained the same, the number of men killed during 1966 would have been:-

$$\frac{430,000}{100,000} \times 93 = 400$$

But actual number of men killed was 158

A reduction of 242

The cost of a fatal accident varies considerably. The main direct item is that of Common Law damages; most fatalities do result in successful claims - even if the employer has provided the safest possible equipment and system of work, the responsibility for negligence on the part of a fellow-workman very often is an over-riding feature. Another substantial item is loss of productivity for what is often a major proportion of a shift. In mining law, the scene of a serious accident must remain untouched until inspected by a representative of the Trades Union and by a Ministry Inspector of Mines.

It is not proposed to enter here into detail and proof of the cost of a fatality although all factors have been considered in arriving at an average figure. Indirect costs have been left out and the figure arrived at of £10,000 per accident relates to employers costs only and not in any way to Social Insurance payments. It is not thought that any Employer will consider this sum to be in any way excessive.

The reduced cost of fatalities to the National Coal Board for the year 1966 is therefore 242 x £10,000

$$= \underline{\underline{£ 2,420,000}}$$

Serious Injury

Similar arguments to the foregoing apply in respect of serious but non-fatal injury. Accidents of this type must, by law, be reported forthwith to H.M. Inspector of Mines and to the injured man's Trade Union representative. These injuries vary from a simple fracture of the main bone(s) of a limb to probably the worst non-fatal injury of all - fractured spine with complete

/paralysis

paralysis of the lower half of the body.

Common Law damage claims are often successful and the amounts awarded can be much higher even than for fatalities; the largest amount awarded against the Board for a single case was £23,000.

Using the same parameters as before, it is estimated that the average direct cost of a serious injury is £5,000.

If the average serious injury rate which existed before 1947 had continued, the number of injuries related to the smaller labour force in 1966 would have been:-

$$\frac{430,000}{100,000} \times 358 = 1,540$$

But actual number injured was 1,063

A reduction of 477

Reduction in cost was therefore:-

$$477 \times \text{£ } 5,000 = \text{£ } 2,385,000$$

Fatal and Serious Injury in Relation to Method of Mining

During the past six years, the Industry has carried out a very intensive programme of mechanisation of coal production and the proportion of coal won by machinery has increased in that period from 30% to nearly 90% of the total output. It cannot by any stretch of imagination be claimed that huge coal cutting and loading machines, often working in a seam height of only 3 ft. to 4 ft., are as free from accident potential as picks and shovels. The period of change-over from hand to machine mining has been particularly onerous and the load on the Safety Branch very heavy. Nevertheless, the downward trend of serious accidents was maintained during a period when productivity per worker increased by 30%.

(c) Minor Injuries (more than 3 days' incapacity)

This is the cost item which will be of most interest to the less hazardous industries. It is not an easy one to assess because of the effect upon accidents of constantly improving social insurance benefits - each increase in benefit has been accompanied by an increase in reported minor injuries. This may be due partly to the minority who take advantage of social security to escape the responsibilities of employment and partly because men have previously carried on working although suffering from disabling injury since they could not afford to give up for a time.

Relative stability appeared to have been reached during 1965; the recent average earnings provision has not had any major impact. Certainly, the "over 3 day" accident rate in the Mining Industry is now falling - although it is noted from the report for 1966 of H.M. Chief Inspector of Factories that in most industries the figures continue to rise.

Since the fatal and serious injury rates in mining have fallen consistently, it would seem to be a reasonable assumption that the increase until 1965 of the minor injury rate is a reflection of matters other than safety. There is nothing to account for the reduction since 1965 except improved safety measures and it is on this basis that the cost saving has been calculated.

The greatest loss due to minor injuries is that of production - arising out of the absence of injured workers from their employment. This is the only factor used in the following calculation although reference is made later to other items which in total, represent substantial sums of money.

Workdays lost per 100,000 manshifts worked in 1965	4,772
Workdays lost per 100,000 manshifts worked in 1967 (10 months)	<u>4,192</u>
Reduction in rate	<u>580</u>

Approximate number of shifts worked in one year, 90,000,000.

Extra shifts available by virtue of reduced accident rate:-

$$\frac{90,000,000}{100,000} \times 580 = 522,000$$

Approximately half of these shifts relate to actual coal producers - the rest are to men who transport the mineral out of the mine and prepare it for the market.

The average amount of coal per productive worker per shift is 116 cwts. The additional coal produced as a result of fewer injuries is then:-

$$\frac{522,000}{2} \times 5.8 = 1,513,800 \text{ tons}$$

The average proceeds per ton of coal is £5. The cost of producing this extra coal does not include fixed charges and the like, which go on irrespective of the amount produced. Allowing for wages, insurance and similar costs, power and for a proportion of materials and general items, the cost per ton of this additional coal is approximately £3.

The additional proceeds resulting from a reduction in accident rate of the order described is then:-

$$1,513,800 \times (\pounds 5 - \pounds 3) = \pounds \underline{3,027,600}$$

The foregoing assessment does not take into account the reduction in accidents causing three-days incapacity or less. These accidents are, of course, recorded but no statistical summaries are prepared.

Neither is any account taken of damage to equipment, machinery, mine roadways etc., when accidents occur whether or not injury is caused. Derailed locomotives, runaway mine-cars, objects falling down shafts, collapse of roof - these are only a few of the accidents which, apart from injury, cost vast sums of money and which are reduced in frequency and severity by effective safety measures.

Summary of Cost Analysis

It would need a separate and very detailed paper to present fully the financial arguments in favour of operating an effective Safety Organisation. An attempt has been made to indicate what appears to be the rewards obtained in the Mining Industry - without exaggeration - indeed, rather the reverse. This shows that £1,500,000 p.a. is spent directly on Safety, whilst the savings can be said to total nearly £8,000,000 p.a. The results appear fantastic, but can the calculations be criticised?

It is not claimed that the improvement is due only to the efforts of the Safety Branch. Led and inspired by Lord Robens, the efforts to make the mines of the country as safe as human endeavour can contrive, go on ceaselessly at all levels.

(d) Is there Anything Left

On the basis of calculation used, accidents are still costing the Mining Industry £16 million per year without trying to evaluate "consequential losses".

Mining is a hazardous occupation, but at least half of the serious accidents which still occur are due to human failure rather than to the environment in which coal is won.

There is much work still to be done.

## CONCLUSION

### CAN SMALLER INDUSTRIES OPERATE AT THIS LEVEL

A number of the schemes described need considerable capital to launch them and an appreciable revenue expenditure to operate them. For example, each T.V. studio costs £20,000 to buy and about £7,000 p.a. to operate - excluding depreciation. Colleagues in smaller industries have appeared somewhat envious of the facilities available to the Safety Branch in the Mining Industry. When it is borne in mind that the number of workers employed in mining and its ancillaries such as Coal Products, Brickworks etc. is nearly half-a-million, that there are about 500 mines and works, and that the annual turnover is nearly £1,000 million it will be appreciated that these major safety operations are well within the capacity of the industry.

Even with five T.V. studios costing £100,000 it will be possible to visit each mine only once in two years and this cannot be considered as even slightly extravagant. Similarly with the other activities - the expenditure of money and effort at any one mine will not be more than could reasonably be expected at any factory or works employing the same number of workers. It is only the overall size of the Industry which enables these big and spectacular efforts to be made.

Cannot other Industry get together under a sponsoring body to plan similar or more extensive coverage. Each participating firm would contribute a proportion of the cost either directly or as a per capita charge on the number of employees. There is a number of possibilities:-

#### The Ministry of Labour

The Ministry has always played a very big part in helping to combat Industrial accidents. Its 'Safety and Health' museum, its publications, and its financial assistance to R.o.S.P.A. are well known. The Minister has himself created the new Industrial Safety Advisory Council and personally presides over this body. Could this be the sponsoring authority for major publicity schemes? Certainly accidents cost the country far more in terms of hard cash alone than the cost to Industry and this should be an added incentive to Ministry intervention.

#### The Confederation of British Industry

The C.B.I. has for a very long time taken a great interest in Industrial accident-prevention. As at the M.o.L., current activity has considerably strengthened and the recent meeting of Chairmen and Presidents of Companies, devised and sponsored by the C.B.I. shows clearly how anxious is the Confederation to play its part. By raising a Safety Fund from voluntary or compulsory contributions the C.B.I. could initiate and operate major safety schemes.

#### The Royal Society for the Prevention of Accidents

The difficulty of a 'voluntary' organisation is in creating a source of income which could then be maintained at a high enough level to operate these schemes. If this problem could be solved, here is a ready-made body which has staff and facilities to immediately go into action. Could finance be provided by the Ministry of Labour, the C.B.I. or either of these bodies pressurise employers into becoming members of R.o.S.P.A. with this aim in mind?

#### The British Safety Council

The remarks relating to R.o.S.P.A. apply with equal logic to the B.S.C.

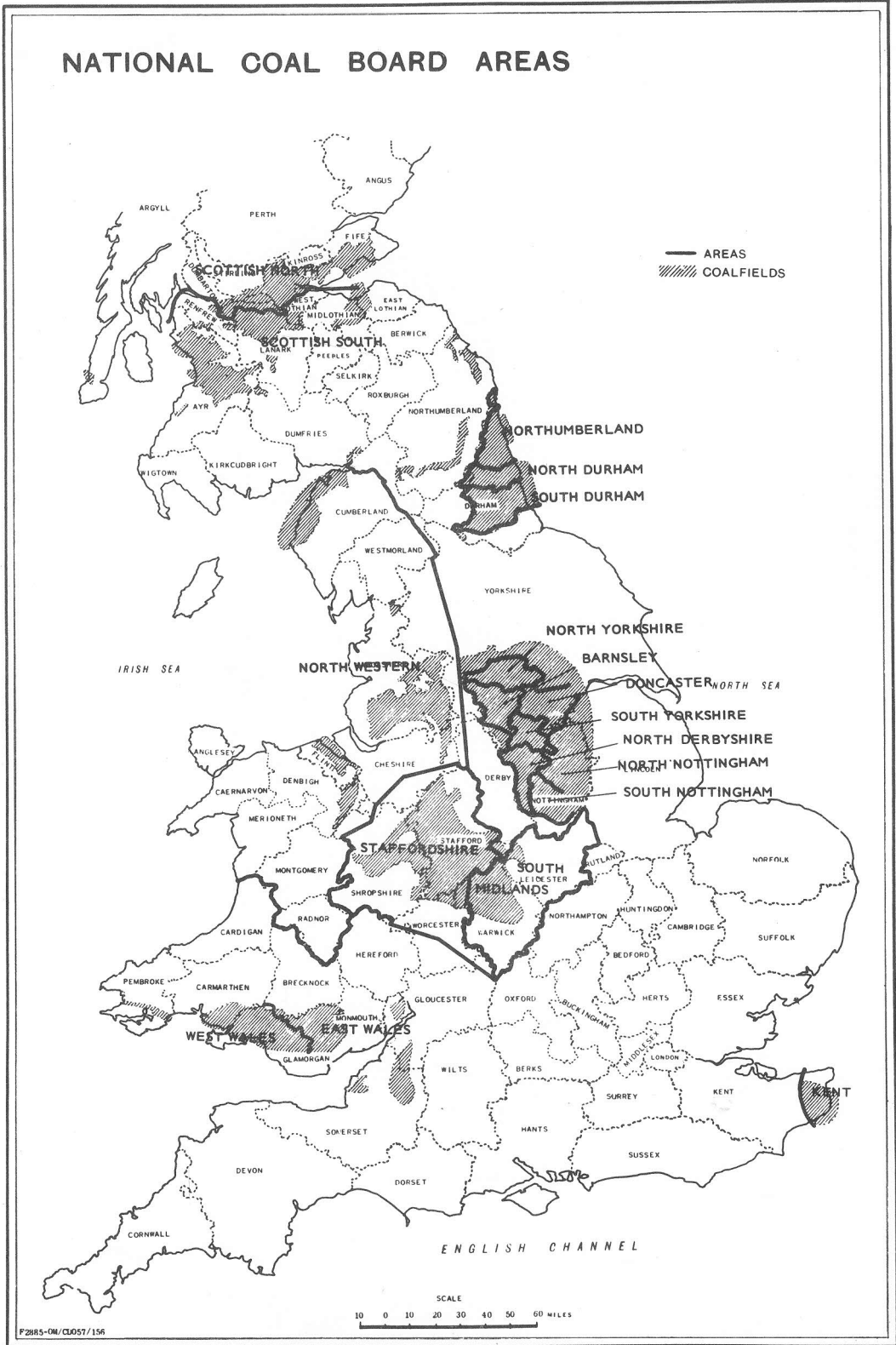
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This body has shown itself to be courageous and able to act with initiative, thoughtfulness and skill. It could easily provide the sort of service available within the mining industry if required so to do.

Finally, the author has attempted to outline the structure of the Safety Organisation in the largest single industry in Great Britain, to describe its activities, assess the costs and the benefits and suggest how smaller industry can combine to apply similar methods if these are considered to have been successful. The field covered in this lecture is enormous and it has been possible only to provide a skeleton upon which others will have to put the flesh and the clothes if they wish to see the complete picture. There will be time for a little discussion now but if members propose in the future to adopt any of the activities described, and would like more information, or opportunity to see the schemes in operation, the N.C.B. will be happy to try and help.

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# NATIONAL COAL BOARD AREAS



P2885-0M/CL057/156



## WHAT A SAFETY OFFICER NEEDS TO KNOW

## 1. SHAFTS AND WINDINGS

- (a) Shafts - fittings and fixing,
- (b) Winding-Engines - overspeed and overwind protection, braking systems, recorders - acceleration, speed and braking.
- (c) Multi-Rope and sheaf winding.
- (d) Suspension - capping, detaching hooks, chains, rigid and flexible, suspension of guide weights.
- (e) Cage Guides - construction and size, life of.
- (f) Ropes -
- (g) Landing Gear -
- (h) Banksmen and onsetters - duties and responsibilities.
- (i) Legislation.

## 2. METHODS OF WORKING. Principal reasons for choice of method.

(Briefly)

- (a) Longwall - advancing and retreating,
  - (b) Shortwall - advancing and retreating.
  - (c) Room and Pillar
- Special problems with each method.

## 3. STRATA CONTROL

- (a) Importance of always maintaining control.
- (b) Stresses in the strata - how caused, areas affected, measurement of.
- (c) Falls of ground due to stress - bed separation, cavities.
- (d) How stressed areas may be controlled.
- (e) Face Supports - Props:
  - construction, Loads, yields:-
  - friction ) maintenance
  - hydraulic )
- Bars:
  - unit, linked,
- prop/bar systems, chocks - characteristics and loads, fixed and yields.
- (f) Powered Supports - types, systems, method of operation, position of controls loads and yields, maintenance.
- (g) Roadhead Supports - under the lip - box section girders, props and chocks, face of ripping, newly exposed roof - early support.
- (h) Roadway Supports - types and construction, strength of materials, stilts, lagging.
- (i) Tunnels and headings - type of support, systems for roof and face.
- (j) Legislation - Support Regulations,

Manager's Support Rules,  
standard systems,  
Board Instructions,  
Exemptions.

4. VENTILATION

- (a) Mine Gases (briefly)
  - origin and dioxide, carbon monoxide, hydrogen.
  - barometric pressures - depth.
- (b) Systems
  - exhausting and forcing.
- (c) Fans
  - Main - emphasis on instrumentation.
  - Boosters - dangers of.
  - Auxiliaries - siting, performance.
- (d) Distribution
  - splitting and regulation.
- (e) Quantities
  - required for comfort,
  - dilution of noxious gases.
- (f) Measurement
  - quantity - anemometers, vane.
  - pressure - manometer.
  - quality - flame lamps, methanometers, C.O. detectors.
- (g) Losses
  - quantity surveys,
  - pressure surveys.
- (h) Legislation
  - Ventilation Regulations,
  - Board Instructions.

5. ELECTRICITY

- (a) Principles (very briefly)
  - generation,
  - distribution - including transformation, use.
- (b) Voltages
  - used in mining.
- (c) Earthing
  - systems,
  - bonding.
- (d) Flame proofing
  - what it is,
  - tests for,
  - how it can be destroyed.
- (e) Intrinsic Safety
  - what it is - limiting currents,
  - tests for,
  - how it can be rendered ineffectual.
- (f) Pilot Circuits
  - their purpose,
  - voltage and currents in.
- (g) Motors (briefly)
  - types,
  - horsepower,
  - electric power and current.
- (h) Switchgear
  - brief outline,
  - earth leakage protection-core balance and insulated neutral,
  - overload protection,
  - positioning and moving forward.
- (i) Cables
  - construction - armoured and flexible,
  - jointing,
  - core size and current capacity,
  - pilot cores,
  - screening.
- (j) Signalling
  - approved batteries and transformers,
  - methods - road and face,
  - warning of machinery starting.
- (k) Lighting
  - Roadways,
  - Face.
- (l) Fire
  - Causes - special risks,
  - extinguishing.

(m) Legislation

- M & Q Act Sections,  
Electricity Regulations,  
Board Instructions.

(n) Electric Shock

- artificial respiration,  
cardiac massage,  
persons who should be trained.

## 6. COMPRESSED AIR

(a) Compressors

- Reciprocating ) Brief  
Rotary ) description  
instrumentation,  
lubrication - dangers of oil/air,  
cooling systems,  
maintenance and protection.

(b) Receivers

- size and shape,  
dangers from oil sludge,  
spontaneous heating and  
explosions.

(c) Pipe Lines

- size and capacity,  
joints - types of,  
joint rings - dangers from.

(d) Motors

- reciprocating ) Brief  
rotary (turbine) ) descriptions.

(e) Pneumatic Control System

- application,  
valves,  
rams, sequencing.

(f) Air for cleaning down

- dangers - skylarking.

(g) Special Fire Risks

(h) Legislation

## 7. HYDRAULICS

(a) Principles for power

- briefly

(b) Pressures

(c) Power Packs

- method of operation,  
open and closed circuits,  
heat production and dissipation.

(d) Pipes and Joints

- flexible and rigid.

(e) Motors

(f) Drives and Couplings

- fusible plugs.

(g) Liquids

- oil - flammable and non-flammable  
emulsions.

(h) Fire Risks and Fire Precautions.

(i) Legislation.

## 8. HAULAGE I Rope

(a) Systems

- Endless, main and tail, direct.

(b) Ropes

- construction,  
size, strength,  
safety factor,  
maintenance,  
deterioration,  
capping and splicing,  
breakages (S.M.R.E. reports).

(c) Engines

- types and sizes,  
methods of drives,  
speeds and tension,  
instrumentation and protection,  
remote control,  
lubrication - remote,  
fencing.

(d) Legislation

(e) Manriding

- additional precautions,  
overspeed and overrun protection,  
cars - types - clipping and  
attachment.

## II Conveyor

- (a) Gate and Trunk
  - types and sizes, methods of driving, protection from overheating, belt slips and torn belt.
- (b) Face
  - belt, chain, shaker, stage loaders.
- (c) Belting
  - materials, construction, strength, fire resistance, anti-static,
- (d) Fencing
  - Drives, delivery and returns, structure.

## III Locomotive

- (a) Diesel
  - general description, overheating, flame traps, conditioners, exhaust gases - carbon monoxide and nitrous oxides, limiting percentage methane, supply transporters, filling and repair stations.
- (b) Battery
  - general description limitations and restrictions, charging - short circuit, hydrogen, shuttle cars and supply transformers
- (c) Trolleywire
  - general description, supply systems, dangers, protective circuits.
- (d) Tracks
  - rails, points, radius of curves.
- (e) Legislation
  - including Board Instructions.

## 9. EXPLOSIONS AND IGNITIONS

- (a) Methane
  - explosive range - effect of oxygen shortage, temperature of ignition, effect of pressure history and statistics of methane explosions.
- (b) Hydrogen
  - explosive range, ignition temperature, history of explosions.
- (c) Coal Dust
  - how raised, limit of inflammability, effect of volatiles, pressures involved, degree of violence, history and statistics.
- (d) Prevention
  - sources of ignition, dilution of gases, firedamp detectors and alarms, cleaning up coal dust, general stone-dusting, stonedust barriers - description effect of.

## 10. FIRES AND FIREFIGHTING

- (a) Causes of Fires
  - flames and sparks, friction, oxidation.
- (b) Prevention
  - avoidance of flames, sparks and friction,

Fires and Firefighting (continued)

(c) Firefighting equipment

- avoidance of oxidation, restriction of inflammable material lying around, in materials and construction.
- extinguishers - types and uses,
- water mains, systems, pressures, hose and accessories,
- sand, sandbags, tools, etc.
- Fire Stations.

(d) Legislation.

11. INUNDATIONS

(a) Types

- water, peat, moss, sludge.

(b) Precautions against

- cover, barriers, boring,

(c) Legislation.

12. COAL FACE MACHINERY

(a) Conveyors

- types for various purposes - application, (construction etc. under "machinery"), erection and advance of.

(b) Coal Cutters

- longwall ) application
- shortwall ) of
- shearing ) of
- heading )

(c) Power Loaders

- shearers and developments on trepanners and developments on Meco-Moore, flight-loaders, ploughs-fast, slow and percussive, other types.

(d) Stable-hole machines

- application.

(e) Machines mounted on conveyors

- special risks, precautions.

(f) Handling of heavy machinery at the face

- lifting and pulling.

(g) Drills

- types and power, drill rods and cutting bits.

13. TUNNELLING Tunnels -

- sizes, methods of supports, methods of driving, machinery - shovels (Mechanical), buckets, gathering arm loaders and duckbills.

14. EXPLOSIVES

(a) Main types of powder

- gelatinous, ammonium nitrate, non-permitted, permitted - non-sheathed, non Eq. S, waterproof, Eq. S. Strength and application-

Explosives (continued)

(b) Detonators

- rock and heading, rippings and scours; coal - cut and solid.
- construction, single and simultaneous, delay action - gasless and lead element, wires - types and lengths, connections - method, electrical efficiency.

(c) Exploders

- single shot, 6-shot and 12-shot, non-approved for multishot, dangers of electrical sparks.
- from pilot circuits.

(d) Stray currents

(e) Drilling of holes

- clearances, breaks.

(f) Stemming

- efficiency of, clay, sand and other solids, sand bags, water-pulsed firing, plastic bags, pneumatic methods, foam injection, unstemming-procedure and limitations.

(g) shotfiring procedure

- examination, proper shelter, single shots, simultaneous, delay-action - small and large rounds, limitation of shots per hour and per shift.

(h) Long-hole blasting

- drilling and charging techniques.

(i) Legislation

- M & Q. Act, Regulations, Directives.

15. DUST SUPPRESSION

(a) Dust Production

- natural causes, geological working of the coal, pressure and disturbance from machines and tools.

(b) Use of water

- circuits, sprays, direction of spray, pressure and quantities, typical examples for specific machine, wetting agents, automatic control with m/c operation.

(c) Dry dust traps

(d) Use of foams

(e) Vacuum cleaners

(f) Respirators

(g) Measurement

- thermal precipitator (including long running type), Konimeter, P.R.U. pump, Gravimetric method.

## Dust Suppression (continued)

- (h) Particle size - Arbitrary agreement
- (i) Pneumoconiosis - Cause  
frequency,  
X-ray scheme,  
employment of pneumoconiotics.
- (j) Legislation

## 16. MINE LIGHTING

- (a) Standard of illumination
- (b) Surface lighting
- (c) Underground-shaft bottom and roadways
- (d) Coalface
- (e) Use of whitewash  
Use of colours - particularly in surface shops.

## 17. RESCUE

- (a) Purpose of
- (b) Approved apparatus for underground use:-
  - Compressed oxygen ) Types, construction,
  - Liquid air ) advantages and disadvantages.
  - Liquid oxygen )
  - Short period apparatus.
- (c) Other breathing apparatus:-
  - open circuit - general,
  - compressed air,
  - canister types.
- (d) Self-rescuers - tapes, purpose, limitations.
- (e) Training - fitness,  
methods.
- (f) Stations - Types A and B
  - Equipment
  - Galleries
  - Personnel
- (g) Organisation - Station,  
Mine Surface,  
Action schedules.
- (h) Legislation - M & Q Regulations,  
Instructions.

## 18. RADIO-ACTIVE MATERIALS

- (a) Description - dangers
- (b) Use of - metallurgical examination  
level indicators - steering of coal  
face machines.
- (c) Protection against - housing.
- (d) Measurement of radiations - geiger counters - dosimeters.
- (e) Code of practice.

## 19. HEALTH AND HYGIENE

- (a) Sanitation - surface and underground.
- (b) Cleanliness. Water supplies. Pithead baths.
- (c) Pests - types - methods of disinfestation.
- (d) Legislation.

## 20. MINE PLANS

- (a) N.C.B. standards,
- (b) Preparation of.

## 21. LEGISLATION

- (a) Making of - procedure and consultation.
- (b) Subjects covered.
- (c) Detail of items not dealt with by subject.

22. ACCIDENT STUDY

- (a) Investigation, information to be sought, interviews with witnesses.
- (b) Reporting - pro forma reports, plans.
- (c) Study of reports - analysis, deduction.
- (d) Statistics - N.C.B. standard forms and returns, accuracy of classification, study and use of.

23. PERSONNEL RELATIONS AND CONSULTATION

- (a) Importance of joint discussions,
- (b) Joint Safety Committees - Colliery, Area,
- (c) Joint inspections and accident investigations,
- (d) Consultative Councils.
- (e) Discussions with workmen - good relations.



Series 540

Form S.301

National Coal Board

Private and Confidential

Accident Report

Serial No. ....

Division ..... Area No. .... Colliery or Unit .....

Part I - To be completed and signed by Deputy, Surface Foreman, or other responsible person before Leaving Colliery or Unit

1 (a) Name of injured person ..... (b) Lamp or check No. ....  
 (c) Address ..... (d) Type of Lamp .....

2 Normal occupation .....

3 Occupation at time of accident .....

4 (a) Date of accident .... / .... / 19.... (b) Shift - Day/Afternoon/Night (delete as necessary)  
 (c) Time of accident ..... (d) Hours after beginning of his shift .....

5 Reported by ..... to ..... Date .... / .... / 19....

6 Did he cease work immediately after the accident? ..... If not, when? .....

7 (a) Place of accident (give as much detail as possible):  
 (b) Seam ..... (c) Deputy's District .....

8 (a) Apparent nature of injury (e.g. bruise, fracture, etc.) .....  
 (b) Slight/Severe/Fatal (delete as necessary)

9 Parts of body affected (state left or right) .....

10 State whether he was wearing: Safety boots/Goggles/Gloves/Helmet/Elbow pads/Knee pads/Shin guards  
 (delete items not worn)

11 (a) Nature of First-aid rendered .....  
 (b) By whom? ..... (c) Lamp or check No. ....

12 How conveyed outbye .....

13 What was he actually doing at the time? .....

14 (a) Was the injured person at his usual place of work? .....  
 (b) If not, was he at a place where he was authorised to be for the purposes of his work? .....  
 (c) Was what he was doing part of his normal duties? .....  
 (d) If not, was what he was doing something he was authorised or permitted to do for the purposes of his work? .....

15 Description of how accident occurred:

16 Witnesses to accident (a) Name ..... Lamp or check No. ....  
 (b) Name ..... Lamp or check No. ....  
 (c) Name ..... Lamp or check No. ....

17 Above information obtained from .....  
 (See Instruction No. 6)

18 Signed ..... Date .... / .... / 19....  
 Status .....  
 (Deputy, Surface Foreman, etc.)  
 Noted ..... (Manager)  
 Date .... / .... / 19....

For office use  
 Item No. on  
 Form STATS/308/NAT

Part II - To be completed at the colliery office

19 What were his working hours on that day? From ..... To .....

20 Was the accident recorded in the Accident Book, Form B.1. 510? .....

21 Highest level at which treatment was received - Hospital (insert name) .....  
 Home and own doctor/Ambulance room/First-aid man u/g (delete as necessary)

22 Date of birth ..... (Age ....) 23 Married/Single 24 Is individual a new entrant?...

25 Nationality, if not British .....

26 1st Medical certificate dated .....

27 Doctor's name .....

28 Certified nature of injury .....

---

Period in incapacity ..... weeks ..... days

ACCIDENT STATISTICS - ALL ACCIDENTS (N.C.B. MINES ONLY)

Period: weeks ended 1966, and comparison with similar period 1965

	FATAL				SERIOUS REPORTABLE				Total over 3 days incapacity (incl. Fatal & Serious Reportable)			
	Number of Accidents		Rate Per 100,000 manshifts		Number of Accidents		Rate Per 100,000 manshifts		Number of Accidents		Rate Per 100,000 manshifts	
	1966	1965	1966	1965	1966	1965	1966	1965	1966	1965	1966	1965
UNDERGROUND												
Falls of ground - At Face												
- On Road												
Haulage and Transport												
Machinery												
Gases, Coal Dust and Fires												
Shafts												
Explosives												
Other Causes												
TOTAL UNDERGROUND												
SURFACE												
Haulage and Transport												
Other Causes												
TOTAL SURFACE												
TOTAL UNDERGROUND AND SURFACE												

Statistics Department.

In addition there were reportable injuries at Colliery Associated Activities

NOTE: The rate per 100,000 manshifts for Underground and Surface Accidents are based on the number of manshifts worked below and above ground respectively

Source: Stats/308/NAT'A'

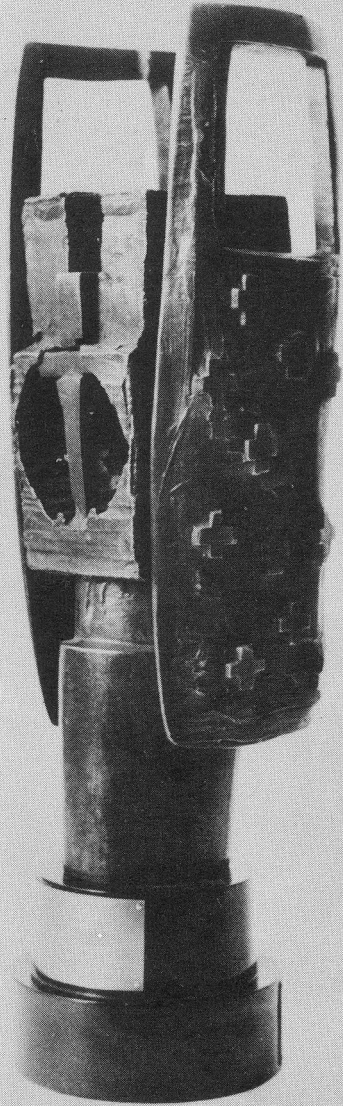
Analysis of Accidents and Injury Rates for the period weeks ended 19

GREAT BRITAIN

Ser.	CAUSE OF ACCIDENT	Deaths (1)	Persons Injured		TOTAL Deaths and Injuries (Cols. (1) to (3)) (4)	RATE per 100,000 Manshifts (a) (5)
			Immediately reportable to H.M. Inspectors (2)	Not reportable but of more than 3 days incapacity (3)		
<u>UNDERGROUND</u>						
<u>Falls of Ground</u>						
1	Face Working: Falls of Roof	...	...	...		
2	Falls of Face or Side	...	...			
Roadheads: Falls ahead of Ripping:-						
3	Roof	...	...	...		
4	Face or Side	...	...	...		
5	Falls from Ripping Face (Side)	...	...	...		
6	Falls outbye Ripping Face (Roof)	...	...	...		
7	Wastes (Roof)	...	...	...		
8	TOTAL Falls of Roof at Working Face	...	...	...		
9	TOTAL Falls of Face or Side at Working Face	...	...	...		
10	TOTAL Falls of Ground at the Working Face	...	...	...		
11	Roads (Total all causes)	...	...	...		
12	TOTAL all Falls of Ground	...	...	...		
<u>By Haulage and Transport (including Trackless Vehicles)</u>						
13	Breakages of Ropes or Drawgear (excluding Breakages caused by derailments)	...	...	...		
14	Total Locomotive Haulage	...	...	...		
15	Total other Mechanical Haulage	...	...	...		
16	Total Horse, Hand and Gravity Haulage	...	...	...		
17	Total by Conveyors and Gate-end Leaders (including Scraper-Hoists)	...	...	...		
18	TOTAL by Haulage and Transport	...	...	...		
<u>By Miscellaneous Causes</u>						
19	Total by Machinery	...	...	...		
20	By the use of Tools and Appliances (inc. Flying splinters)	...	...	...		
21	By Falling Objects (excluding falls of ground)	...	...	...		
22	While handling supplies, loose coal or stone, etc.	...	...	...		
23	Stumbling, Falling or Slipping (excluding accidents in connection with Haulage Operations)	...	...	...		
24	Gases, Coal Dust and Fires: Explosions	...	...	...		
25	Suffocation and Fires	...	...	...		
26	Shafts: Overwinding	...	...	...		
27	Other accidents:	...	...	...		
28	Explosives: Blows from projected material	...	...	...		
29	Others	...	...	...		
30	Electricity	...	...	...		
31	Inrushes of Water	...	...	...		
32	ALL Other underground accidents	...	...	...		
33	TOTAL Miscellaneous Causes	...	...	...		
34	TOTAL ALL Underground Accidents	...	...	...		
<u>SURFACE</u>						
35	By Haulage and Transport	...	...	...		
<u>By Miscellaneous Causes</u>						
36	Total by Machinery	...	...	...		
37	By the use of Tools and Appliances (incl. Flying splinters)	...	...	...		
38	While handling supplies, loose coal or stone, etc.	...	...	...		
39	Stumbling, Falling or Slipping (excluding accidents in connection with Haulage Operations)	...	...	...		
40	ALL other surface accidents (including Electricity)	...	...	...		
41	TOTAL Miscellaneous Causes	...	...	...		
42	TOTAL all Surface Accidents	...	...	...		
43	TOTAL UNDERGROUND AND SURFACE	...	...	...		
44	Injury Rates per 100,000 manshifts	...	...	...		

(a) The rates for underground and surface accidents are based upon the number of manshifts worked below and above ground respectively.

TROPHIES

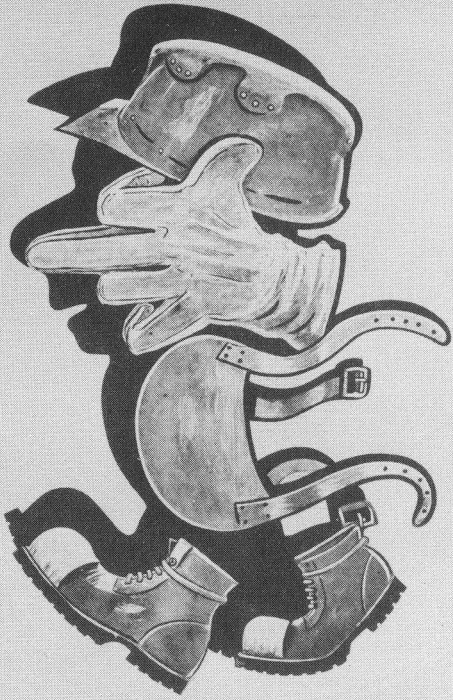


AREA TROPHY

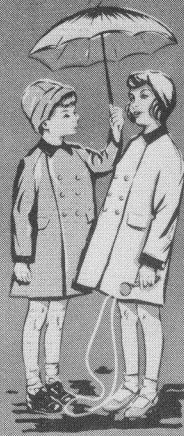


MINE TROPHY

MORE PROTECTION



LESS ACCIDENTS



YOUR SAFETY

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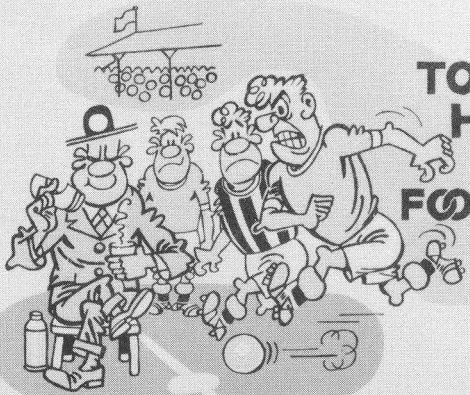
Their Security



GUARDS OFF ?

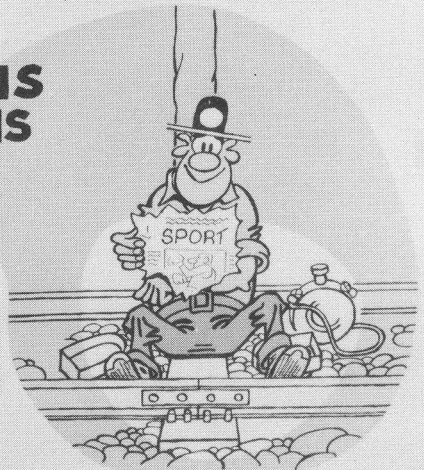
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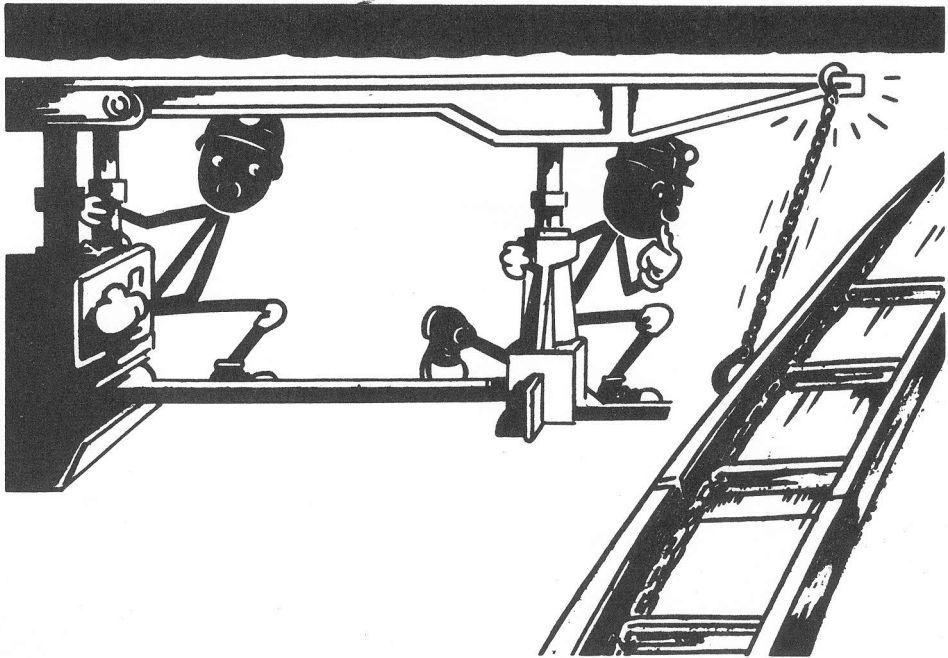
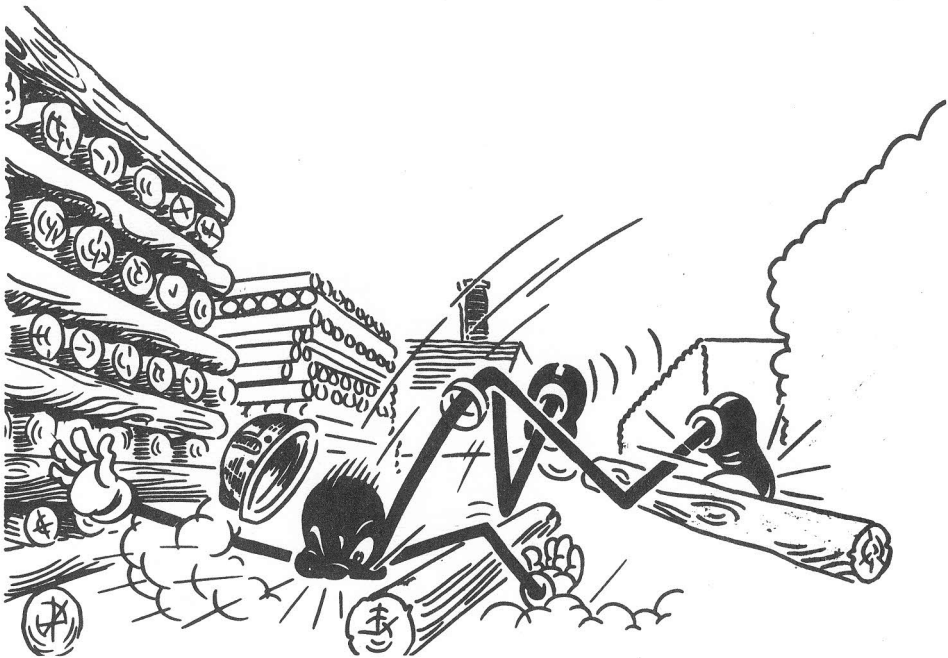
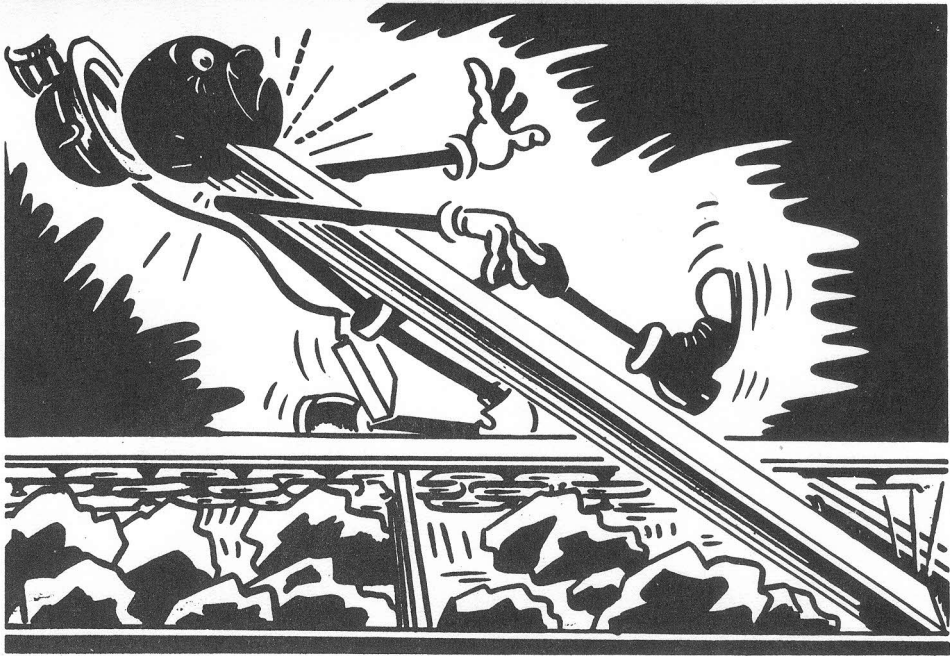
MAINTENANCE



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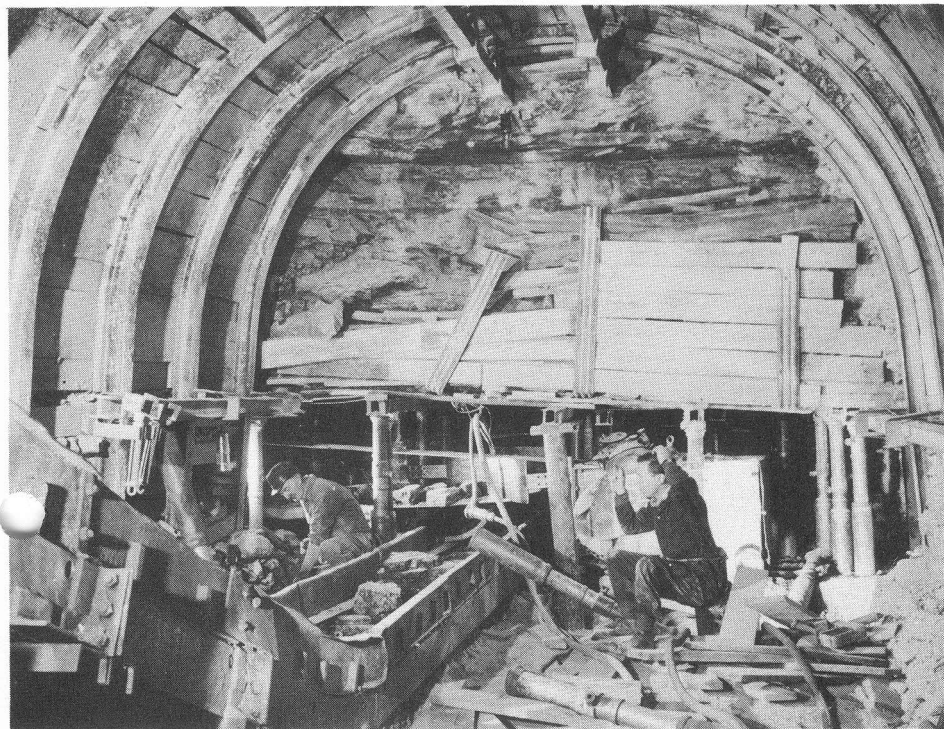
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Ref: AB.19715

17th January, 1968

Professor M.J. McCarthy,  
Centro Brasileiro de Pesquisas Educacionais,  
Rua Voluntarios da Patria 107,  
Caixa Postal, 1-02-Botafogo,  
Rio de Janeiro G.B.,  
Brazil.

Dear Professor McCarthy,

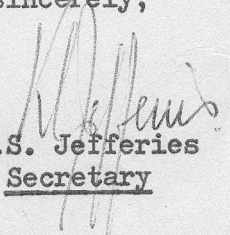
Thank you for your letter of 19th December.

The mobile T.V. studios you refer to are being used throughout Great Britain to assist the Board's current safety drive. These studios are manufactured by Systems Control Ltd., of Picador Coachworks Ltd., Portsmouth Road, Sholing, Southampton and cost approximately £20,000 each in this country. The Board's Director of Safety, Mr.W.A. Wood, has asked Systems Control Ltd. to send you technical details of the equipment.

I am sending you with this letter a copy of a recent lecture presented by Mr. Wood which describes on pages 10 and 11 the progress that has been made with the T.V. studios and gives, in an Appendix, photographs and a drawing. The remainder of the information in the paper relates generally to the Board's publicity and propaganda safety activities and may also be of interest to you.

I trust that you will find you have all the information you need about the studios.

Yours sincerely,

  
K.S. Jefferies  
Secretary



Prof Michael J McCarthy

19 December 1967

The Secretary  
National Coal Board,  
Buckingham Palace Road,  
London W.1. Ingleterra

Dear Sir,

I am informed that you are operating a new mobile T V unit for industrial training for teaching safety in mines etc manufactured by a firm in Scotland. I would be glad to have some information about your experience in this form of training , and this special equipment please. Perhaps you would be kind enough to ask the manufacturers shlo to send me technical information etc about their product ?

Education by T V is in the early stages in Brazil, and as this is the first mobile Closed circuit TV unit made in the U.K. for education broadcasts on sites at mines , it may well be of value in other educational processes. We shall be glad to know how successful its operation proves.

Thanking you for your co operation,

Yours sincerely,

Prof M J McCarthy

CBPE /19/12/67

MJMC