COMMISSION OF THE EUROPEAN COMMUNITIES

NINTH REPORT OF THE MINES AFETY AND HEALTH COMMISSION

YEAR 1971

JULY 1972

C O N T E N T S

LIST OF ANNEXES

1. Common statistical summary of underground accidents at mines in 1971 (Annex I)

2. Decision of 9 July, 1967 concerning the terms of reference and rules of procedure of the Mines Safety Commission (Annex II)

3. Terms of reference of the various Working Parties of the Mines Safety and Health Commission (Annex III)

4. Composition of the Mines Safety and Health Commission and its Working Parties (Annex IV)

5. Report and Recommendations on the preparation of common statistics on victims of accidents underground, in accordance with Community Definitions (Annex V)

6. Summary Table of regulations and directives regarding rescue operations in mines (Annex VI)

7. Eighth Report of the "Mine Rescue and Mine Fires" Working Party concerning the organisation of the Mines Rescue Service for 1969/70 (Annex VII)

8. Implementation of Recommendations of the Mines Safety and Health Commission (Annex VIII)

9. Policy statement on the deleterious effects of dust-binding processes using saline pastes and powders upon electrical plant underground (Annex IX)

10. Comparison of safety provisions concerning electric trolley locomotives underground and, in particular, possibilities of reducing the incidence of trolley sparks (Annex X)

11. Report and conclusions on overvoltages caused by lightning (Annex XI)

12. Motion by the Mines Safety and Health Commission on the subject of campaigns to promote safety in mines (Annex XII)

13. Bibliography of the work of the Mines Safety and Health Commission (Annex XIII)

Have been printed separately :

- Fourth Report on specifications and testing conditions relating to fire-resistant fluids used for power transmission

- Usual accidents involving intermediate connexions and rope joints and experience relating to rope counter balancing in multi-rope winding installations (Report by the Rope Testing Office, Bochum)

INTRODUCTION

The Ninth Report of the Mines Safety and Health Commission contains:

1. The synopsis of the activities of the Mines Safety and Health Commission and its Working Parties for 1970, which this year contains a special heading covering the Conferences organized to publicize the results obtained from its work.

2. A recapitulation of the accident statistics for the years 1958 to 1971, with comments on their trend and a survey of the statistics collected in accordance with the new extended scheme.

3. A study of the manner in which the Recommendations of the Mines Safety and Health Commission have been implemented.

The items listed on the preceding page have been relegated to the annex, and comprise - apart from the conventional information regarding the detailed statistics - the terms of reference and the composition of the Mines Safety and Health Commission and its Working Parties, the text of the Recommendations, Reports and Opinions approved by the Mines Safety and Health Commission in 1971.

SECTION I

ACTIVITIES OF THE MINES SAFETY AND HEALTH COMMISSION

The activities of the Commission can be summed up as follows.

In 1971, the Mines Safety and Health Commission held two meetings preceded by two meetings of the Restricted Committee; the Working Parties and their Sub-committees held 31 meetings, two of which can be considered as information conferences organized by the Secretariat of the Mines Safety and Health Commission. The overall total of meetings was therefore 37 (49 in 1970). This appreciable reduction is due to the fact that the Secretariat lost two staff.

The breakdown of the meetings and the Working Parties and their Sub-committees is as follows:

Rescue arrangements, Mine Fires of Underground Combustion (2 plenary meetings, the others restricted):	7
Rescue arrangements:	1
Ventilation Sub-committee:	7
Fire-resistant fluids Sub-committee:	3
Winding and guide ropes:	2
Electricity: (2 plenary meetings, the others restricted)	6
Explosive dusts:	2
Joint accident statistics:	1
Health:	1
Psychological and sociological factors affecting safety: (Conference)	1

During this reporting year, the Mines Safety and Health Commission was able to bring to fruition certain work, with the consequent approval of 8 Recommendations, expert reports or general reports which are reproduced as annexes as set out in the list on page 5.

These are:

(i) in the electricity sector:

(a) an expert report on the disturbances due to the salt pastes and powders used to immobilize the dust (Annex IX),

(b) a report dealing with the comparison of the safety measures in respect of electric trolley locomotives and in particular in respect of the possibility of reducing the frequency of contact sparks (Annex X), (these terms of reference have been extended: see Section "Electricity" and Annex II),

(c) a report on the penetration of lightning into underground workings (Annex XI),

(ii) in the rescue sector:

(a) a summary table of regulations and directives in respect of rescue operations in mines (Annex VI),

(b) the Eighth Report on the Organization of Rescue Arrangements (Annex VII).

(iii) in the fires and underground combustion sector:

the Fourth Report on specifications for non-flammable liquids (separate reprint).

(IV) in the accident statistics sector:

a Recommendation relative to an extension of the intake of statistics (Annex IV). The terms of reference of this group have been supplemented by a mathematical-statistical survey and an assessment of the differences between the rates of incidence. (See Chapter on Statistics and terms of reference in Annex III).

(V) in the Human Factors sector:

a motion regarding Community safety campaigns in coal-mines (see Annex XII).

At its meeting of 26 March 1971, the Mines Safety and Health Commission approved the proposals of the Restricted Committee of the 12 November 1970 in respect of the new working objectives. It also modified the old terms of reference of the Working Parties (see Annex III) and set up three new Working Parties: "Strata Control and Supports", "Mechanism", and "Ventilation and Firedamp".

The establishment of these Working Parties meets the desire expressed by the European Parliament and takes account of the following important factors:

(i) increasing degree of concentration and mechanization of the workings: this is what gave rise to the Working Party on "Ventilation and Firedamp",

(ii) lessons to be drawn from the statistics: an increasing number of serious injuries resulting from mechanization; this gave rise to the "Mechanization" Working Party; the high incidence of accidents due to roof falls (40 % of fatalities), which gave rise to the Working Party on "Strata Control and Supports", this being also justified by the increasing frequency of major roof falls due to the increase in working depth.

The basic principles of these terms of reference, which will need to be more precisely formulated by the new Working Parties, are also produced in Annex II. Authority was also given to study the medical factors in connection with health, including the environmental factors: noise, vibration, heat, light etc. as well as the safety factors in respect of the employment of foreign workers. Work on these items has not yet begun, by reason of the staffing situation of the Secretariat.

In respect of the propagation of the data obtained, the Secretariat of the Mines Safety Commission has organized certain information and study conferences.

On 12, 13 and 14 October 1971, a Conference of this type was organized in Saarbrucken (Saar coalfield) and attended by 220 mining engineers from the Community countries and the United Kingdom.

On 27 and 28 October 1971, a Conference was held at Houthalen (Campine Coalfield) for 60 union safety delegates from the CISL and CMT organizations.

The synoptic report on these Conferences is given in the section on "Publicizing the results of the work of the Mines Safety and Health Commission".

The members of the Mines Safety and Health Commission were also invited to attend information Conferences on the control of the emission of methane and the improvement of mine climate, held in Luxembourg on 24 and 25 February 1971. These conferences assisted the new Working Party on "Ventilation and Firedamp", inter alia, in defining the basic principles of its terms of reference.

Finally, reference must also be made to the Conference on Community safety campaigns held on June 1971 in Luxembourg, attended by 60 safety campaign specialists. These experts exchanged views on the results of their experience in this field, with a view to organizing similar campaigns - the first of which was put under way in the Ruhr at the end of 1971 with financial support form the Community - the desirability of such campaigns had already been expressed in the motion referred to above made by the Mines Safety and Health Commission (see Section I H, page 24).

Among the meetings which fall outside the framework of the Working Parties and particularly of the group of experts on stabilization of ventilation, reference should be made in particular to an international meeting regarding management of ventilation in a mine in the event of fire; this meeting was held in Brussels on 1 October 1971 at the School of Public Health of the University of Louvain, a computer being made available for the Conference (see Section I A). This is also mentioned under Section III (Publicizing the results of the work of the Mines Safety and Health Commission).

The accident list includes collective accidents, i.e. more than five fatalities or serious casualties, discussed on page 22, and accidents resulting in incapacity to work, which are listed by coalfield in Annex 1; of these accidents those causing death or over 56 days of incapacity are also the subject of a summary report and a commentary on their frequency trend, to be found in Section III, page 28.

Briefly, 3 collective accidents caused the death of 20 persons, the causes being an outburst of CO_2 and two falls of rock.

In absolute figures serious casualties and fatalities are decreasing - 182 fatalities compared with 188 in 1970, and 6,429 serious casualties compared with 6 580 in 1970. The rate of these accidents per million working hours can be regarded as practically stationary. It was 0.440 in 1971 compared with 0.429 in 1970, which is a statistically insignificant increase of 2.6 %, following a regular decrease since 1958 (0.610); the rate of serious casualties was 15 088 compared with 15 022 in 1970. It was 13 551 in 1958 and 15 160 in 1969.

Production in the E.E.C. collieries continued to decrease; it went down from 170 355 m metric tons in 1970 to 164 970 m metric tons in 1971, which is a decrease of 3.2 %. The number of hours worked fell from 438 m to 414 m, which is a decrease of 5.5 %. The number of registered workers in 1971 was 315 900 (220 900 underground and 95 000 on the surface) compared with 330 800 in 1971 (233 500 underground and 97 300 on the surface). To complete these data supplied by the Energy Directorate of the Statistical Office, it should be mentioned that coal stocks went up from 10 275 000 metric tons at the end of 1970 to 12 853 000 at the end of 1971, while stocks of coke from the coking plants, whose production went from 70 228 000 metric tons in 1970 to 65 682 000 tons in 1971, went up by 1 294 000 metric tons to 7 001 000 metric tons.

Finally, industrial relations were disrupted only in Belgium, where a practically general strike lasted 9 to 10 days.

I - TECHNICAL PROBLEMS

A. Rescue arrangements, mine fires, underground combustion

The Working Party held three Plenary Meetings, on 26 February 1971 and 7 June 1971, with two Restricted Meetings, the first of which was devoted to preparations for the international study conference for mining engineers held in Saarbrucken on 12, 13 and 14 October 1971 under the aegis of the Working Party (see Section III below), and the second on 24 September 1971 to review its terms of reference and draw up a new list of priorities. The Sub-committee on "Rescue Arrangements" met on 9 and 10 November 1971 at the "Coordinatiecentrum Reddingswezen" at Hasselt (Belgium), while the Sub-committee of ventilation experts met seven times, and the Sub-committee on Non-Flammable Fluids three times. The activities of this group thus totalled fifteen meetings.

(a) The Working Party was able to complete:

1. The Fourth Report on the specifications and test conditions for Non-Flammable Fluids

Having been approved by the Working Party on 26 February 1971, and approved by the Mines Safety and Health Commission on 25 March 1971, this Report of the committee of experts was issued as a separate reprint. Because it was given a specific distribution at that time, it is not reproduced as an Annex to the present Report. This Report replaces the Third Report which dates from 1967, and takes into account the experience gained since that time by the research institutes and in the manufacture and use of these fluids.

The changes introduced have already been mentioned in th Eighth Report, on page 12. These are:

(i) the criteria of assessment and the various methods of test for the Second Flammability Test by determining the propagation of a flame in a coal/oil mixture. In order to avoid any scatter between the results obtained, the research institutes jointly carried out a large number of new tests, and have arrived at comparable results, after they had developed a more precise formulation of this criterion.

(ii) in addition, the threshold of propagation has been raised, without affecting the significance in respect of safety of this criterion;

(iii) in the statement of the criterion with regard to protection against wear, the four-ball test, which gives results which are not always reproducible, has been supplemented by a test with the Vickers type paddle pump, which gives a closer approximation to reality. It must, however, be pointed out that these two tests are not as yet sufficient by themselves to describe the very complex phenomenon of wear, and that they should therefore be treated until further information is available as being only experimental in nature;

(iv) the health criteria have been modified only in respect of method. Here too, the new criteria applied are not final and will need to be supplemented later.

In approving the Fourth Report, the Mines Safety and Health Commission requested that this document should be distributed to all persons and organizations (of whom there were very many) who received the Third Report.

The Mines Safety and Health Commission was also concerned with the major problem of recognition on the Community level of the approval certificates issued by the research institutes, since the consequence of this would be that a product which had been tested and certificated by the competent authority for underground

use in one country in the Community would be accepted, without further examination, by the competent authorities of another country. The Mines Safety and Health Commission shares the Working Party's view that this reciprocal recognition should be effective when the product in question was without any shadow of doubt identical in each country, and the Commission further decided that the covering letter sent out with the Fourth Report to the responsible authorities should mention this desideratum. The group of experts has been charged with finding methods which would make it possible to identify the product clearly in respect of its chemical components, since this is a major problem especially from the health point of view.

2. The synoptic table of the regulations and directives in respect of rescue in mines (Annex VI)

The Mines Safety and Health Commission adopted on 26 March 1971 this synoptic table which was prepared by its Secretariat to meet a request of the European Parliament.

The Mines Safety and Health Commission has observed that the organization of rescue arrangements in the Community countries and in the United Kingdom does not exhibit any important differences, and that the rare points of difference are attributable to local conditions. The Commission therefore adopted the view put forward by the Working Party, namely that any comparative study and detailed evaluation of the provisions in this connection were unnecessary.

The Mines Safety and Health Commission decided that this synoptic table should immediately be distributed for information purposes to the Mines Inspectorates and to all interested parties and organizations.

3. List of specialists in drilling and of the rescue apparatus available in the Community: situation as at 1 January 1971

This list, also prepared by the Secretariat at the request of the European Parliament, was approved by the Commission on 26 March 1971. It had already been reproduced in Annex III of the Eighth Report. This list should be brought up-to-date at regular intervals, particularly once Community research into the techniques of drilling rescue holes has been completed, this work having been referred to the Commission itself by the Mines Safety and Health Commission.

The state reached by the work in this sector is briefly covered below under the heading "Rescue by means of boreholes".

4. Eighth Report of the Working Party for the organization of rescue arrangements for 1969/1970 (Annex VII)

In point of fact, this bi-annual report prepared by the Secretariat in 1971 was approved by the Mines Safety and Health Commission in 1972 (24 January 1972). Taking into account the period covered by this report (1969 to 1970), the Mines Safety and Health Commission decided to annex it to the Ninth Report to ensure that it received a wide distribution in as short a time as possible.

This Report, laid out to the usual pattern which is normal within the framework of the general terms of reference of the Working Party (see Annex III), contains not only the classical statistical information regarding the organization and activities of the Rescue Centres, but also comprises two annexes, one on the state of the work being carried on by the Rescue Centres and subsidized by the Commission at the request of the Mines Safety and Health Commission in respect of the detection of trapped miners and their rescue by means of large boreholes, and the other dealing with a closed-circuit type of breathing apparatus with recent improvements.

(b) In addition, the Working Party and its Sub-committees have continued the work envisaged in their own terms of reference, these having been reviewed - with the other terms of reference - by the Restricted Committee on 23 November 1970 and approved by the Mines Safety and Health Commission on 26 March 1971 and reworked by the Working Party on 9 and 10 January 1971 (see new text reproduced as Annex III).

Special mention should be made of the following problems:

1. Fire in shafts

This problem was deleted in the reworked terms of reference, since it was considered to have been fully dealt with. What is involved is the series of modifications to be made to the Recommendation of the Mines Safety and Health Commission of 20 April 1960, in respect to fire-fighting measures by spraying in the event of fires in shafts, these modifications having been found necessary as a result of tests carried out in abandoned shafts.

The major points of these modifications have already been listed in the Eighth Report, on page 11. The draft, which was prepared by a group of experts, was not approved by the Working Party at its meeting of 26 February 1971, since they considered further amendments to be necessary. It was only possible to present these amendments again to the Working Party in 1972 (10 March 1972) and the draft modifications were adopted by the Mines Safety and Health Commission only on 11 July 1972. They will be incorporated in the Tenth Report.

In essence they cover:

(i) a correction to the nomogram attached to the directives, to allow for the observed fact that the aeromotor force produced by the fall of the spraying water is from 10 to 30% lower than the values shown on the nomogram;

(ii) an increase in the number of extinguishing devices, brought about by installing such devices at each shaft landing in the main shafts together with devices making it possible - in the event of a fire in a downcast shaft above a given horizon - to slow down the reversed and smoke-laden air current in the main intake airways on that horizon.

2. Fire-resistant fluids

At its meeting of 5 October 1971, the group of experts examined the request by the Mines Safety and Health Commission with regard to the mutual recognition of inspection certificates and attestations of certification. While recognizing the cogency of this request, the group of experts considered that in pratical terms it was premature, at least if applied generally. In point of fact, major differences had been found in the results obtained in Germany and in France in the thermal decomposition tests applied to anhydrous fluids (type B); investigations were carried out in 1972 with a view to selecting strictly identical test apparatus and methods. The group of experts did, however, examine the possible methods of achieving this mutual recognition - in particular in respect of the problem of the analysis certificates intended to indicate the precise chemical composition of the product, and especially of the additives it contains - in order to be completely sure of the identity of the product without the necessity for revelation of any of the secrets of its manufacture.

The group of experts examined the results of the questionnaire regarding possible disturbances occasioned by the use of hydraulic fluids of type D. The experts observed that the fluids in question had already been used for considerable periods of time, (7 years in the Ruhr), that they were being consumed in increasing quantities (150 000 kg in 1970) and that further increases could be expected by reason of the present trend in mechanization. Nevertheless, the experts did not consider that they were able to give a final judgment, but they did note that, in the present state of knowledge in respect of acute toxicity (lesions of

the eyes, of the skin or irritation of the mucous surfaces) provided that certain conditions and rules were observed. Nevertheless, certain investigations carried out by the medical experts - in particular at the Pharmacological Institute of the University of Hamburg - raised the question of chronic toxicity (in particular as a result of deposition in the fatty tissues of the human body) of certain chlorinated diphenyl products; this is a problem which will be examined during 1972.

3. Rescue by means of large boreholes

The Working Party took note of the results of the Community research carried out by CERCHAR and the Steinkohlenbergbauverein at the suggestion of the Mines Safety and Health Commission in 1968. Community financial aid was granted in 1969 for a period of two years. The work carried out in Lorraine is reported on in Annex VII (Eighth Report of the organization of rescue arrangements for the years 1969 and 1970).

Since that time, the work has progressed as follows:

(i) the detection of trapped miners can be carried out from a distance of 150 metres with an accuracy of 2 to 3 metres, and the presence of trapped miners (without precise localization) can be observed at a distance of 300 metres,

(ii) the first communication with the trapped miners has now been developed: this is achieved by two small-diameter holes, one for a telephone link and the other for passing supplies,

(iii) the rescue procedure using large boreholes has been dealt with in a film. Two trials were carried out, one at an angle of 45° and the other at 82°. On the latter test, with a hole 80 metres long and 610 millimetres in diameter, the total time taken to drill the hole was 254 hours. Other research work will still be required to reduce this time by at least one-third. The Working Party requested that financial aid should be granted to this supplementary research programme. *1)*

4. Stabilization of ventilation in the event of a fire

After seven meetings, the experts have completed the study of the problem of ventilation in the event of a fire arising in a descensionally ventilated airway, but they were not able to complete work on the problem of the stability of ventilation in diagonal ventilation airways (terms of reference D1 and 2 in Annex VII).

The Working Party also met, with a larger number of delegates than usual, at the University of Louvain (see Section II below) under the heading "Publicizing the results of the work of the Mines Safety and Health Commission".

5. The Working Party also discussed, in accordance with its term of reference A3, the case of the reopening of a large district damaged by fire at the Gneisenau pit at Dortmund; in accordance with its term of reference B 2b, it further noted the experience gained in the Federal Republic of Germany in using the CO self-rescuer of the Dräger 810 type.

Finally, a restricted group of experts met on 24 September 1972 to review the complete list of terms of reference, bringing each point up-to-date, in order to study the way in which the work already carried out is to be continued, how the new terms of reference should be fulfilled and the priorities for these items established.

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1) This additional financial aid has been granted.

B. Winding and guide ropes

The Working Party met twice in plenary session, on 19 January and 16 September 1971.

(a) The Working Party came to a conclusion in respect of the research project dealing with points 6 and 7 of its terms of reference (Annex III). This covers a: "Project for Community research into premature fatigue of the winding ropes in heavily-loaded shafts".

At its meeting of 19 January 1972, the Working Party took note of the observations made in the Ruhr, the Saar and in Lorraine which indicate that a large proportion of the main shaft winding cables (60% in the Ruhr) does not achieve the planned utilization life of two years, the average effective life in heavily-loaded pits being 9 to 12 months.

The Working Party examined the causes of this premature fatigue, which takes place with unexpected rapidity, and which not only imposes early replacement of the cables - a factor with an appreciable economic significance - but above all raises the problem of a gap in the safety inspection of the cables. The Working Party discussed the causes of this premature fatigue on the basis of an investigation carried out by the Westfälische Berggewerkschaftskasse at Bochum; this report indicates that, on the one hand, the mechanical, dynamic and geometrical stresses on the cables are far greater in the shafts which transport a high output and are at great depth, and on the other hand, that there are problems arising in connection with the manufacture of the cables, namely that the cable-making process has been speeded up and that new types of cables are being made (steel-cored cables).

The Working Party requested the director of the above-named institute to prepare a draft research programme to cover the new risks which have thus been revealed. This draft was studied on 16 September 1971. It envisages systematic dynamic and geometric investigations of the existing cables, with the special equipment which the institute has available, in order to develop a new design of cable or to arrive at improvements in the structure and manufacture of cables, in order to make them better suited to the present working conditions.

With the unanimous agreement of its members - representing the Governments, the employers and the workers - the Working Party reached the conclusion that this research is necessary to ensure safety in coal-mines, and has requested the Mines Safety and Health Commission to propose - in virtue of Article 5 of its terms of reference - that the Commission itself should as rapidly as possible grant financial aid to this Community research programme. *1)*

(b) In addition, the Working Party continued the study of the following problems:

(i) in accordance with its term of reference 2: the formulation of directives to achieve standard safety provisions in respect of suspension gear. These directives will be concluded in 1972.

(ii) in accordance with its term of reference 8: discussion of accidents which occured on haulage cables in roadways, to the balance-rope attachments, cases of breakage of rope cores in Lang semi-balanced ropes.

(iii) in accordance with its term of reference 1: due note was taken of the new developments in Great Britain in respect of the remote control of transport equipment using cables and the protection of winding ropes by means of a dynamometer.

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(1) This proposal was made before the Commission in Brussels by the Mines Safety and Health Commission (at the session of 24 January 1971), and the Commission decided to approve holding measures until the results of the research become available.

(iv) in accordance with its term of reference 7: a discussion of the modifications of the mining regulations in respect of the utilization of winding and haulage ropes in the British mining industry, *1)* as well as of a report covering the main characteristics of winding ropes in the Ruhr mines.

One of the members has requested an investigation to develop a formula or a single index making it possible to give a standard assessment of winding ropes in terms of their conditions of use and the work performed.

C. Electricity

The Working Party met twice in plenary session on 23 April and 8 October 1971, and four times in restricted session.

(a) The Working Party was able to finish its work on the following three terms of reference, after a period of work covering several years.

1. Expert report on the subject of the disturbing effects on underground electrical equipment of salt pastes and powders used to immobilize coal dust

The Working Party on electricity finished this expert report at its plenary session of 23 April 1971, and the Mines Safety and Health Commission approved it on 29 June 1971. It is reproduced as Annex IX of this report.

The origin of this term of reference, dating from 1966, is connected with the catastrophe at Luisenthal and the development, by the German mines inspectorate authorities, of the salt paste and powder method as a means of combatting coal dust explosions.

Having made use of the results of a large number of observations, trials and practical experiments - summarized in the Report and listed in the bibliography reproduced as an annex - the Working Party sought to identify and enumerate the measures which make is possible to moderate the disturbing effects resulting from the use of salt pastes and powders on electrical equipment. The Working Party reached the conclusion that the restrictions imposed by these measures should not constitute a hindrance to applying them, to the extent that this method offers definite advantages in providing protection against dust explosions. The Working Party has therefore declared its view solely in respect of the effects of the method on electrical equipment, and not on the value of the method itself during dust explosions; in consequence, new doubt could be thrown on these conclusions if other methods were to be found equally efficacious in the future.

The Mines Safety and Health Commission authorized the Working Party on "Flammable dusts" to investigate this question. The Commission adopted the Report in the form of an "expert report" and not as a "Recommendation", because the conclusions cannot be incorporated in the mining regulations.

It was decided to send this expert report to the Governments for appropriate action, as well as to the employers' and workers' associations.

2. Report on the comparison of safety measures with respect to underground electric locomotives, and in particular the possibility of reducing the frequency of electric sparks on the trolley wires.

The Working Party on "Electricity" terminated this Report at its plenary session of 23 April 1971 and the Mines Safety and Health Commission approved it on 29 June 1971. It forms Annex X of this Report.

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1) It was decided that a visit should be made to Great Britain early in 1972.

This particular authority takes its origin from an incident involving a firedamp explosion which occured in 1962 at the Adolf mine in the Aix-la-Chapelle Coalfield.

The Working Party enumerates in its Report the current provisions in the International Labour Office Regulations and in the regulations of the different Community countries. The Working Party did not consider it was necessary to make a synoptic comparison of these measures, but has summarized them in respect not only of the risk of ignition of firedamp and the resulting fire risk, but also in respect of the risk of electrocution. The Working Party also studied a large mass of documents, in particular dealing with a process capable of suppressing the sparks. The Working Party's view is decidedly that at the present moment it is not possible to eliminate with complete certainty the formation of any sparks on the contact lines used by trolley locomotives and that, in consequence, the only measures which can be envisaged as means of avoiding the ignition of methane are concerned with ventilation and working techniques. The Working Party made a synthetic compilation of measures embodied in the various sets of national regulations and noted that not all the measures were used in the different countries.

The Mines Safety and Health Commission instructed the new Working Party on "Ventilation and firedamp" to produce a uniform formulation of these ventilation and working precautions.

Bearing in mind the conclusions reached by the Working Party and the trials carried out in Provence with the financial aid of the Community on a linear induction motor, the Mines Safety and Health Commission instructed the Working Party on "Electricity" to:

"Keep a close watch on techniques for the total suppression of sparks occurring in electric traction systems (excluding motors supplied from accumulators) and in particular to take note of the new linear motor method for propelling 'trains' of conveyor pans."

Finally, it was decided to distribute this Report to the Governments and to the employers' and workers' organizations.

3. Opinion and conclusions on voltage surges caused by lightning

The Working Party adopted this Report at its plenary session of 8 October 1971. Although only approved by the Mines Safety and Health Commission in 1972 (24 January 1972), it is reproduced as Annex XI in this Report, thus giving it the widest possible distribution in the shortest possible time.

The origin of this item was an explosion of firedamp and dust which occured in 1963 at the Mainsforth Pit in Great Britain, happily without any victims.

The Report lists the documents studied in the bibliography, in connection with a number of discussions; some of the material comes from Eastern countries (it is also available in French and in German).

According to the point at the surface where the lightning strikes and the path followed by the lightning in penetrating into the underground workings, the Report envisages various measures to moderate the effects of the voltage surges and stray currents which can occur underground and which involve risks of firedamp ignition, fire, premature initiation of detonators and various disturbances to the working operations underground.

The Working Party did not study very deeply the recent hypothesis advanced by the Geological Institute of Zagreb regarding the propagation of energy from lightning by electromagnetic waves, because this hypothesis does not introduce any precautions other than those which follow from the currently-accepted hypotheses.

The Mines Safety and Health Commission considered at its meeting of 24 January 1972 that this opinion report could not be treated as the basis for a Recommendation because the majority of the measures proposed are governed, as to their application, by local conditions and cannot be transferred without modification into the national regulations. Moreover, the investigation of this problem has clearly shown that it is not so important in the deep coal-mines of Western Europe as it is in the iron mines or in other metalliferous mines and underground quarries worked at shallow depths or from drifts.

The Mines Safety and Health Commission adopted this opinion report and decided to send it out - for appropriate use according to the circumstances - to the Mines Inspectorates and to all interested circles in the mining industry, as well as to other sectors of the extractive industries whose activities are regulated by the same Mines Inspectorates.

(b) The Working Party on "Electricity" has moreover made progress in the examination of its terms of reference covering the following items: No. 4, study of the constitution of high-tension cables (1 000 to 6 000 volts) used underground as well as the protective devices used on these cables; No. 6, periodic report on the trends in the operation of circuit-breakers and oil contacters in firedamp atmospheres; and No. 3, measures to be taken when the necessity arises of carrying out work on electrical equipment under voltage.

D. Flammable dusts

This Working Party met twice in plenary session, the first time at Dortmund on 19 and 20 April 1971 and the second on 6 October 1971.

In the course of these two meetings, the Working Party continued its work on the neutralization of dust and on dust barriers, these two items being the main themes of its terms of reference (see Annex III).

At Dortmund, the Working Party visited the Tremonia experimental mine, and took note of the trials carried out with the financial support of the Commission of the European Communities. These were trials on dust binding carried out in a section of roadway neutralized by salt pastes and powders; the length of the zone is varied to see to what extent this treatment can stop an explosion. The neutralizing agents, salt pastes and powders, have been subjected to laboratory tests to determine their neutralizing power. The Working Party also took note of the trials, carried out with financial support of the Community, on the corrosion effects in electrical equipment caused by the salt pastes and powders; these effects can be reduced by precautions during the application of the method and by suitable maintenance (see C1 above). The Working Party also visited a roadway fitted with wide-action water barriers (three polystyrol troughs with lids, containing 30 litres, set every 3 metres). Finally, the Working Party was able to see an experimental dust explosion of average force, stopped at a distance of 200 metres by means of a concentrated water barrier triggered by an infra-red detector.

The visit to the experimental mine was supplemented by underground visits in two mines belonging to the Bergbau AG Dortmund: the Minister Stein Pit, which uses the salt paste method (a solution of $CaCl_2$ or of $MgCl_2$) by means of pipelines under pressure (20 kilometres of line have been laid); and the Gneisenau Pit, which uses the wide-action water barrier and the salt powder method (81 to 85% $CaCl_2$, 3% wetting agent, water of crystallization).

During the meeting of 6 October 1971, the Working Party dealt with the following items:

1. The Working Party took note of the "Opinion of the Working Party on 'Electricity' with regard to the disturbing effects on electrical equipment resulting from the use of salt pastes and powders used to fix coal dust".

As indicated in Section C above, this investigation had been asked for by the Mines Safety and Health Commission on 29 June 1971. The Working Party "Flammable dust" therefore examined this document in respect of the efficaciousness of the method in suppressing dust, this aspect not being within the responsibility of the Working Party on "Electricity".

The Working Party made full use of the results of the visit referred to above to West Germany and of the experience obtained in that country, where current annual consumption is 30 000 tonnes of paste, 7 500 tonnes of powder and 4 500 tonnes of flakes.

Taking into account the places where the salt method cannot be applied, such as faces, loading points, roofs in monorail roadways, as well as the disadvantages of this method which have in particular been underlined in the conclusions of the Report of the Working Party on "Electricity", the Working Party on "Flammable dust" reached the conclusion that the method using salt pastes, powders and flakes is an effective method in the prevention of dust explosions, and should be used in association with the other methods, such as those which suppress the dust at source and with safety barriers.

2. The Working Party continued the assessment of the results of its visit to Germany by examining the points in which the water barriers are superior to the dust barriers, as well as the superiority of the wide-action barriers over the concentrated barriers.

   Without wishing to impose on the collieries a particular type of safety barrier, the Working Party decided to present to the Mines Safety and Health Commission a report on safety barriers, and the draft of this document will be examined at the next meeting.

3. Finally, the Working Party took note of the partial results from the trials and investigations carried out with Community financial aid on triggered safety barriers; these trials are still under way.

E. Joint accident statistics

The Working Party met on 11 March 1971 and was able to complete its work within the framework of its term of reference *1)* by presenting to the Mines Safety and Health Commission a "Report and a Recommendation regarding the presentation of joint statistics relating to the victims of underground accidents, in accordance with Community definitions." The Working Party proposed a revision of its terms of reference in respect to the mathematical/statistical study of the incidence of accidents.

The Mines Safety and Health Commission adopted this document. (See Annex V).

In addition, the Mines Safety and Health Commission gave new terms of reference to the Working Party, as follows:

"In order to make it possible for the Mines Safety and Health Commission to reach, if possible, conclusions regarding the presentation of the accidents, the rate of incidence of underground accidents in Community coal-mines should be examined with the following aims in mind:

1. Establishment of the appropriate mathematical/statistical systems;
2. By means of the methods referred to above, to assess the differences in the rates of incidence in chronological order, as well as the differences from one country to another or from one coalfield to another."

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1) See Annex III.

Annex V comprises a Report and a Recommendation, as well as the new tables of statistics in their final form.

The Report contains a chronogical survey which recalls :

(i) the initial mandate given by the 1957 Safety Conference to a group of experts, in order to establish a simplified statistical framework as the basis of a standard statistical system for the entire Community,

(ii) in accordance with this framework, the statistical information presented since 1958, classifying under 12 headings the underground accidents - either fatal or giving rise to more than 8 weeks incapacity,

(iii) the differences observed subsequently in the rates of incidence in the different countries and the new mandate of the Mines Safety and Health Commission with a view to establishing, on the one hand, if these differences are significant indications of a different level of safety practice, and, on the other hand, to extend the statistical data,

(iv) the tasks delegated to the Working Party to meet the requirements of this mandate.

The Annex also contains:

(i) an analysis of the distortions which are, in point of fact, only slight, and which have existed since the setting up of the joint statistical presentation in 1958, and which therefore give rise to systematic errors which do not affect the chonological comparability of the statistics for a given country and for the Community. These distortions are due to a certain extent to the classification of one and the same accident under different headings;

(ii) the new proposals made by the Working Party in respect of the accidents reported, which have been extended to injured persons rendered incapable of work for more than four days or over. On this point, the Working Party expressed reservations regarding accidents involving less than 21 days incapacity, since their frequency can depend to an important extent on factors quite unconnected with safety and accident prevention, all of which is liable to lead to wrong conclusions being drawn when the frequency figures for this category are being compared.

These proposals go on to classify the accidents in accordance with their causes which, to make it possible to compare them with the preceding statistics, have been distributed in accordance with the same 12 causes listed in the outline table of 1958, but with sub-division of certain headings and a more precise explanation of what these headings of causes cover, to eliminate or to considerably reduce the observed distortions.

Finally, there is the proposed extension of the distribution of accidents under location of injury (in 9 headings) and under nature of injury (under 8 headings); this is based on the ILO classification, but with major redistribution and rearrangement.

The Report also mentions the results of a test carried out with the new layout proposed for 1969; the results of test were considered to be satisfactory.

Lastly, the Report proposes re-formulation of the mandate of the Working Party from the viewpoint of the search for a "level of safety".

The Recommendation attached to the Report (Annex V) calls for presentation of the lists of victims of accidents by coalfield, starting with 1971, in four tables grouped by definitions, which are explained in notes.

F. Investigation of the accidents

In 1971, 3 group accidents were reported to the Mines Safety and Health Commission.

These were:

(a) Accident at the Houillères du Dauphiné, La Mure, 4 May 1971

Instantaneous outburst of CO2 - 8 fatalities

A financial grant of 24 000 French francs was made to the families of the victims, and the Secretary of the Mines Safety and Health Commission attended the funeral.

A first report from the French Government representative was received too late to be examined by the Mines Safety and Health Commission.

The main circumstances of this accident can be summarized as follows:

An instantaneous outburst occurred at a depth of 350 metres in a working which was being started-up; the outburst expelled some 500 t of coal and a large quantity of CO_2, and caused the death of 8 workmen, four of them being buried in the coal and four suffocated by the CO_2; four other workmen, also severely affected by the CO_2, were rapidly revived by the rescuers.

In the district in question, work had begun on winning an anthracite seam ranging from 10 to 20 metres in thickness, with a dip from 45 to 80°; at this point the seam was in the shape of a dome, an unusual occurence. Working is carried on there by a method which has been proven in another district for working the same dome structure: this is working with bunker-withdrawal of the coal from below, starting from a series of parallel roadways of 4 m^2 cross-section, at intervals of 8 metres and rising at an angle of 24°; these roadways run out of the horizontal rock-drift driven in the floor of the seam and entering the seam to allow the coal to be withdrawn from below.

Driving these roadways and opening-up the seam is carried out by a conventional method, approved by the chief mining engineer: heading in the rock, preceded by exploratory boreholes to determine the position of the seam; once these boreholes have reached the coal, a separating wall of rock of sufficient strength is maintained, the seam being finally exposed by a special shotfiring method, comprising one round to bring down the rock wall and an inducer round of longer shotholes to shake up the seam and to induce at that moment the occurence of any instantaneous outburst which might have been threatening, no workmen being present. Driving in the coal is carried out in accordance with the working plans, either with inducer shotfiring or with free shotfiring, in accordance with indexing of the seam based on tests carried out by the Service d'Etude (Research Department) of the Houillères du Dauphiné.

Nine roadways had already been driven to expose the seam: the shotfiring had been followed by six instantaneous outbursts (the whole district being evacuated), five of these outbursts during exposure of the seam and one when winning the seam.

The instantaneous outburst which occured on 4 May 1971 occured in another roadway, which had exposed the seam on 30 April, using the conventional shotfiring method described above, without having caused either an instantaneous outburst or any seismic disturbance which could be detected by recording apparatus. The face of the working had penetrated one metre into the seam. A free round was subsequently carried out to bring down the coal (using half-second delay detonators), the working being evacuated; this was done with the approval of the Service d'Etude, at the end of the first shift on the 4th of May, without any seismic disturbance

which could be recorded. The instantaneous outburst took place 3 hours later, when two workmen were loading the coal brought down; the other six victims were working in neighbouring roadways.

The enquiry at national level threw up certain improvements to be made to the method (which is to be maintained) particularly in respect of the information required for the Service d'Etude to index the working more precisely.

(b) Accident at Hanover 2/S pit of the Ruhrkohle AG at Bochum-Hordel, 4 May 1971

Rock-burst - 6 fatalities

This accident occurred on the same afternoon as the previous accident.

A financial grant of 13 200 DM was made to the families of the victims.

The enquiry has not yet been completed, and no final report has therefore been submitted to the Mines Safety and Health Commission.

The circumstances may briefly be described as follows.

A rock-burst occurred in a winning working in the Roettgersbank seam, on the 950 metre horizon, causing collapse of the lower section of the face over a length of 40 metres and burying 7 workmen, one of whom was recovered, only slightly injured, by the rescue workers.

The seam is from 1.20 to 1.50 metres thick and dips at between 50 and 55°. The oblique face is 180 metres long and is worked by pneumatic picks. A fault with a throw of 3.7 metres cuts across this face some 40 metres from the bottom road. It is the lower part of this face which collapsed abruptly, probably as a result of the release of the strains which had accumulated in that area.

The enquiry has not yet been completed; it is particularly directed towards determining the observance or otherwise of the safety precautions laid down by the Chief Mines Inspectorate Office at Dortmund to establish the existence of a risk of a rock-burst by means of small-diameter boreholes, with a view to the possible reduction of excessive strains by means of large-diameter boreholes. This question will be investigated by the Mines Safety and Health Commission in 1972, at the same time as the next accident described.

(c) Accident at the Ewald 1-7 colliery at the Ruhrkohle AG at Herten, 14 December 1971

Rock-burst - 6 fatalities

A grant of 16 000 DM has been made to the families of the victims. The Secretary and another member of the Secretariat visited the accident area on 22 December 1971.

The circumstances of this accident can be briefly summarized as follows:
11 men were working in a rise-drift being driven in a seam 2 metres thick, dipping at 5g (5.5° approx.), at a depth of 950 metres. The rise-drift had been advanced 20 metres to the east of the boundary of a working in the same seam which had been abandoned in 1970; it had reached the length of 63.5 metres at the moment when the accident occurred. The coal in the west safety pillar abruptly flowed into the rise-drift, burying or trapping 11 workmen; one of them managed to free himself, another was freed by the rescue workers who subsequently recovered 6 bodies. The three men working at the face of the rise-drift were rescued a day later, because the upper one-third of the drift had remained partly unblocked and the compressed-air line, although displaced, was still supplying air.

The presumed causes are the presence in the roof of an overlying bed of sandstone some 20 metres thick and the accumulation of stresses - caused by the ribside of a working in the same seam - at the boundary between a caved area and a pneumatically stowed area in a seam some 25 metres above, with some effects also from an overlying pillar left standing in a seam 69 metres above the point.

The enquiry is still going on to determine the way in which the relaxation and exploratory drillings laid down in the directives of the Dortmund Chief Mines Inspectorate, already mentioned above, *1)* have been carried out.

G. Health

The Working Party did not hold a single Plenary Session; there was a meeting of a group of experts on 24 March 1971 to finalize the draft schedule of dust levels.

An expert report intended to encourage collaboration between the machine manufacturers, the mine managements and the research departments at the stage of designing and manufacturing the winning and heading machines was approved by the Mines Safety and Health Commission on 26 June 1970 (Annex VIII of the 8th Report). Since no regulation provisions exist on this point, the expert report envisaged the preparation of a type schedule for use of managements to enable them to formulate, for presentation to the manufacturers, the desiderata in respect of dust production.

A restricted group of experts prepared on 24 March 1971 a draft of such a specification schedule, but since no plenary session of the Working Party was possible in 1971, this schedule has not yet been approved.

The specification schedule is topical because of the increase in dust levels in the workings brought about by further mechanization, since the machines were not provided at the design stage with adequate means for suppressing a prohibitive degree of dust production, and the dust-suppression systems added by the users are frequently no more than partial palliatives.

The directives contained in this draft are therefore formulated to draw attention to the minimal requirements to be imposed upon the designers; it is not intended that certification procedures should be introduced immediately for the machines, nor that threshold levels of respirable dust be laid down, but rather to define the technical conditions requisite to maintain the atmosphere in the workings constantly in an acceptable condition. These measures cover cutter-loaders and ploughs in coal-winding workings and also comprise suggestions for new lines of research in this field; the rules also cover the modern types of roadway-heading machine and propose special technical measures in respect of the ventilation of these working-points.

H. Psychological and sociological factors affecting safety

This Working Party met in Luxembourg on 1 June 1971; this was a meeting attended by a large number of delegates and took the form of a colloquium on the Community safety campaigns in coal-mines, in accordance with the first point of its terms of reference (see Annex III): Safety Campaigns.

These safety campaigns were the subject of a motion of the Mines Safty and Health Commission taken at its session of 25 March 1971 (see Annex XII).

One of these campaigns, on the subject of "Continuous transport systems", has been in preparation in the Ruhr since the end of 1971, and was supported by financial aid from the Community.

In respect to the second point of the terms of reference (dealing with the measures to be taken in setting on foreign workers to ensure that they work in properly safe conditions), several delegations sent in their contributions to a Recommendation which is being prepared.

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1) On 24 January 1972, the Mines Safety and Health Commission instructed the new Working Party on "Supports and strata control" to carry out a study of rock-bursts as a matter of urgency.

1. Motion by the Mines Safety and Health Commission in respect of Community safety campaigns in coal-mines

This motion, reproduced in Annex XII, expresses the decision of the Mines Safety and Health Commission to promote the organization of safety campaigns in the various Community coalfields and requests the Commission in Brussels to grant financial aid to these campaigns, to cover part of the expense thereof. The first campaign will be carried out in all the coalfields, each in turn, during the next three years, on the selected subject of continuous transport systems.

By reason of the restriction of the competence of the Mines Safety and Health Commission to coal-mines, this financial grant can at present be made only for the coal-mines, although two delegations have requested that metalliferous mines interested in this campaign theme should be allowed to participate.

On this point, the Mines Safety and Health Commission decided to study in a future meeting the question of extending the field of competence of the Commission to the other extractive industries.

The chairman of the Mines Safety and Health Commission decided that a sum of 500 000 Bfr. be set aside from the budget of the Commission for the campaign which has been organized in the Ruhr; this has now been done.

In addition, a supplementary budget has been requested for the years 1972 and 1973.

2. Colloquium on the Community safety campaigns

A total of 60 experts, including the members of the Working Party, took part in this colloquium, the purpose of which was two-fold: firstly, to inform the authorities responsible for carrying out the Community campaign on the national level of the objectives of this campaign and of the progress of the preparatory work carried out by the Working Party, and secondly, to initiate an extensive exchange of information and data obtained during past campaigns in the coalfields or individual mines of the Community and of the United Kingdom.

The exchange of views at the colloquium was set off by the presentation of papers by experts from the Federal Republic of Germany, in connection with the preparation and carrying out of the campaign on "Movement of workers in the mine" which had been initiated early in 1971 in the Ruhr coalfield by the Bochum regional office of the Bergbau-Berufsgenossenschaft with the aid of the mining companies of the Ruhr, the various features of this campaign having already been brought into line with the principles worked out by the Working Party and its experts in respect of safety campaigns in general.

During the discussion, other contributions were made which made it clear that other themes and other patterns of action could be selected by certain coalfields in the next few years.

3. Setting on foreign workers

The contributions made by the delegations regarding the recruiting, welcoming, job-training and language instruction affecting the safety of the new foreign workers have not yet been studied.

Since certain data were not available, the various delegations have not yet been able to prepare the statistics of accidents for which they have been asked, separating foreign workers from native workers, this having been suggested in order to assess the relative incidence of accidents to foreign workers.

SECTION II

INFORMATION AND STUDY CONFERENCES, COLLOQUIA, TO MAKE KNOWN THE WORK OF THE MINES SAFETY AND HEALTH COMMISSION

Four meetings, occupying a total of seven days, were held in 1971 with the intention not only of making known the results of the work of the Mines Safety and Health Commission, but also to obtain from the participants - senior officials, members of the workers' specialist associations or scientific experts - information regarding the future lines to be followed by the work undertaken by the Mines Safety and Health Commission.

One of these meetings, the colloquium of 1 June 1971 on safety campaigns, has already been summarized in B 2 above, since it falls more directly within the field of activity of one Working Party.

A brief report of the aims and achievements of the three other meetings is given below.

Colloquium on Ventilation Measures in the Event of a Mine Fire, Brussels, 1 October 1971

The practical conclusions regarding the stabilization of ventilation in the case of an ascensionally-ventilated road, adopted by the Mines Safety and Health Commission in 1969 (Annex III to the Sixth Report), raised certain reservations in the minds of some ventilation experts at the Steinkohlenbergbauverein in regard to their practical utility; the employment of the theory of ventilation stabilization seems unnecessary to certain experts who claim to be able to solve these problems by means of computers, which are after all now in wide use.

Two meetings have already been held at Merlebach and at Essen, between the experts of the Ventilation Sub-Committee and the German experts referred to above.

At the third meeting, held on the premises of the University of Louvain in Brussels, there were also present members of the Mines Inspectorate, university professors and other ventilation experts.

The meeting began by recalling the essential points of the Budryk theory and the way of adapting the computer calculation methods of ventilation for the particular case of mine fires.

As an example of an application, the ventilation data for a large Ruhr colliery had been put in the memory of a computer, and a fire was simulated at one point in that mine. The computer was then interrogated as to the steps to be taken to stabilize the ventilation, using the Budryk theory. This demonstration showed the complementarity of the two competing methods. Moreover, the Budryk method as envisaged by the Mines Safety and Health Commission is essential to achieve rational and rapid solutions to the problem of stabilizing ventilation in the event of a fire, in cases where the mine itself does not have a computer available.

Information and Study Conference on Problems on Mine Safety Saarbrucken, 12, 13 and 14 October 1971

This conference was organized by the Saarbergwerke and the Secretariat of the Mines Safety and Health Commission with the financial support of the Community. There were 220 participants, 110 being mining engineers, colliery managers or safety officers, together with the members of the Mines Safety and Health Commission from Germany and France, the members of the Working Party on "Rescue arrangements, mine fires and underground combustion", as well as experts in the prevention of underground fires of the Community and the United Kingdom.

The proceedings of this Conference were collected and printed by the services of the Directorate-General for "Propagation of knowledge".

The aim of this conference was, on the one hand, to inform the engineers responsible for making use of the work of the Mines Safety and Health Commission and, on the other hand, to initiate, with the experts and the members of the Working Party on "Mine fires and underground combustion", an exchange of experience in respect of mine-fire prevention, a subject which had been given priority among the various tasks of this Working Party, with a view to getting the results of their work applied in the field.

The first day of the information conference was devoted to papers by the responsible Minister for the Saar and officials of the Saarbergwerke on the situation of the Saar in the Saar-Lorraine-Luxembourg triangle and on the results of the rationalization carried out in the Saar collieries. A member of the Secretariat of the Mines Safety and Health Commission presented a historical sketch of the European Communities and of the Mines Safety and Health Commission, describing its structure and its activities, particularly in the field of human factors.

The Secretary of the Mines Safety and Health Commission followed this by presenting, on the basis of the Eighth Report, the activity of each of the Working Parties and in particular the work now in hand or being prepared, the latter referring to the work of the three new Working Parties for: "Supports and strata control", "Ventilation and firedamp" and "Mechanization". The broad outline of these terms of reference was discussed, together with the new terms of reference for the "Health" Working Party; suggestions which might help in deciding future lines of activity were also

The second day was devoted to nine papers by experts on the problems of preventing underground fires and on certain aspects of firefighting procedures. In respect of the former, the papers read dealt only with proven methods; these included detection of stray currents, their neutralization by means of pressures and sealing roadway walls, early detection of fires by the presence of carbon monoxide and, in certain instances, by the Infrared thermometer, as well as the assessment of the degree of development of a fire by the Graham index. As far as firefighting was concerned, the papers dealt with the determination of the explosiveness of the fumes, and certain actual examples of ventilation stabilization by means of the Budryk theory, as recommended by the Mines Safety and Health Commission - with or without the use of a computer.

These papers were subsequently discussed.

The third day gave the participants the opportunity to visit one of five modern Saar mines.

Information Conference for Union Delegates,
Houthalen, 27 and 28 October 1971

This conference was organized by the union organizations CISL and CMT with the cooperation of the Secretariat of the Mines Safety and Health Commission and the financial aid of the Community.

Sixty delegates concerned with safety matters from the Community countries took part.

Papers, followed by discussions, were read by experts on the latest results of epidemiological research into pneumoconiosis and on the state of research into flame-proof clothing and the rescue of trapped miners by large boreholes; the members of the Secretariat of the Mines Safety and Health Commission presented the Recommendations of the Commission in the field of technical measures of dust suppression, the organization of rescue arrangements in the Community countries and in the United Kingdom, the organization of safety campaigns, the use of safety barriers and hygroscopic salts as a precaution against dust explosions.

A hot mine with a high degree of mechanization of operations the Campine coalfield was visited, together with the Lanacken Medical Institute, the Rescue Station Coordination Centre at Hasselt and the Institut d'Hygiène des Mines at Hasselt.

SECTION III

JOINT ACCIDENT STATISTICS

As mentioned on pp. 20 ff., the statistical return relating to the victims of underground accidents has been enlarged: the new tables have been relegated to Annex 1. Tables 1a and 1b give the distribution of underground accident victims by cause, site and period of incapacity, 1a in absolute figures and 1b in frequency rates. Causes I to XII of the former tables have been retained for purposes of chronological comparison of serious casualties (more than 56 days incapacity) and fatalities with preceding years. The sites are subdivided into 4 categories, and the period of incapacity of the injured into 3 categories, 4 to 20 days, 21 to 56 days and longer than 56 days.

Tables 2a and 2b give, in absolute figures and frequency rates respectively, the distribution of underground accident victims according to the seat of the injuries (9 categories), the nature of the injuries (8 categories) and the period of incapacity (2 categories; over 56 days and killed).

This return has been made on a trial basis for 1971, by coalfield, with a recapitulation by countries. It is incomplete for Belgium, and has not therefore been recapitulated at Community level.

Data have been extracted from these tables to enable completion of the recapitulatory Tables from 1958 concerning deaths and serious injuries. These Tables appear in section III, arranged in the same manner.

The comments on the trends of the accident rates, (fatal and serious) should still be read with the same reservations as before, pending the results of the mathematical and statistical study which the Joint Accidents Statistics Working Party has been instructed to prepare. Thus the rates should not be compared according to their actual magnitudes, but a certain margin or confidence interval should be allowed.

As in previous reports we shall first examine the recapitulatory Table D, and the graphs I and K showing the rates of serious and fatal accidents in the context of production and o.m.s..

Community production in 1971 was 164, 910 m. metric tons compared with 170,355m. metric tons in 1970. Thus there is a drop of 5,445m. tons, or 3.2% (compared with 3.6% in 1970).

The number of hours worked was 414m. compared with 438m. in 1970, which is a decrease of 24 m. or 5,5% (8% in 1970).

In absolute figures the number of fatalities was 182, compared with 188 in 1970, or a drop of 3%, while the number of serious casualties was 6,294 compared with 6580 in 1970, or a drop of 5%. For comparison, the figures per million tons are as follows: the number of fatalities remained at 1.10, or the same rate as in 1970 (higher than 3 in 1958) and the number of serious casualties went down from 38.63 in 1970 to 37.89 in 1971.

Let us next examine the number of fatalities per million working hours (Tables B, D and graph), which is more meaningful from the safety point of view.

The rate of frequency of fatal accidents was 0.440 in 1971 compared with 0.429 in 1970, an increase of 2,6% which can still be regarded as part of a levelling-off after the constant decline observed since 1958.

The accidents listed against casues I to V were responsible for 80% of the total fatalities, broken down as follows: - cause I (falls of ground) - 30% compared with 31% in 1970; causes II and II (haulage and transport and movement of personnel) - 33% compared with 40% in 1970, and causes IV and V (machines, tools and falling objects) - 16% compared with 12% in 1970.

Taking into account on the one hand the relatively high number of accidents appearing this year under XII (other causes), and on the other hand the possible transfer of accidents from one heading to another consequent on the revision of the definitions, the only conclusion which can be drawn from a comparison of the figures is that the totals are more or less unchanged.

The number of serious casualties per million working hours is shown in table A and graph F. The rate of frequency of 15,088 after rising to the highest rate of 15,160 in 1969, levels off after that date.

Headings I to V comprise 96% of the serious casualties, divided up (as in other years) into 3 almost equal parts: -heading no. I (falls of ground) - 27%, headings II and III (haulage and transport and movement of personnel) - 33%, and headings IV and V (machines, tools and falling objects) - 36%.

Falls of ground continue to be the main source of accidents; their frequency rate of 4 109 is substantielly the same as in 1970.

A. Comparative Table of

numbers of persons incapacitated by underground accidents

for eight weeks or longer

years 1958-1971

per '000,000 man-hours

CAUSE (1958-1964)	Germany							Belgium							France (1)							Italie							Netherlands							Community						
	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964
1) Falls of ground	4.843	4.779	4.886	4.797	4.682	4.663	4.894	5.911	4.294	4.324	4.071	4.439	4.432	4.417	5.027	4.665	4.774	4.416	4.222	4.177	4.308	1.355	1.378	1.808	-	0.792	0.366	0.893	1.326	1.464	1.305	1.829	2.238	1.742	2.017	4.846	4.490	4.571	4.434	4.387	4.337	4.509
2) Haulage and transport	2.550	2.569	2.445	2.458	2.501	2.433	2.385	4.132	2.979	2.709	2.770	3.331	3.565	3.419	1.980	1.695	1.920	2.106	2.196	2.364	2.278	1.335	0.984	1.205	0.676	1.847	1.465	1.787	1.511	1.562	1.898	1.924	2.590	1.826	1.952	2.602	2.347	2.310	2.371	2.521	2.520	2.346
3) Movement of personnel	2,497	2.463	2.348	2.512	2.608	2.646	2.744	1.354	0.998	1.008	1.062	1.136	1.066	0.961	1.505	1.118	2.873	2.334	2.458	2.368	2.383	0.668	0.394	1.005	1.578	1.056	0.732	1.787	0.324	0.386	0.187	0.514	0.580	0.630	0.472	2.003	1.823	2.185	2.185	2.282	2.261	2.326
4) Machinery, handling of tools and supports	0.767	0.914	0.920	0.867	1.046	1.213	1.242	2.804	2.085	2.386	2.097	2.461	2.414	2.310	0.914	1.022	1.621	2.523	2.991	3.096	3.042	1.169	0.984	0.603	0.902	1.584	1.465	3.127	0.617	0.402	0.780	0.915	1.015	1.050	1.094	1.098	1.064	1.264	1.423	1.712	1.818	1.848
5) Falling objects	2.537	2.719	2.738	2.945	3.077	3.038	3.242	0.414	0.371	0.354	0.301	0.445	0.547	0.397	1.890	2.187	1.893	2.292	2.073	2.278	2.074	1.169	1.698	1.808	2.029	2.375	3.296	3.574	0.401	0.515	0.492	0.819	0.642	0.630	0.923	1.962	2.161	2.105	2.353	2.375	2.406	2.442
6) Explosives	0.015	0.011	0.010	0.009	0.008	0.006	0.006	0.027	0.007	0.032	0.018	-	0.019	0.018	0.043	0.051	0.031	0.017	0.051	0.009	0.013	0.167	-	-	0.225	-	0.366	-	-	-	-	-	-	-	0.021	0.023	0.020	0.017	0.012	0.018	0.010	0.011
7) Explosions of firedamp or coal dust	0.011	0.016	-	0.002	0.123	0.010	-	-	-	-	-	-	-	0.009	0.047	0.088	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.017	0.030	0.010	0.001	0.071	0.006	0.001
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	0.011	-	-	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	-	-	-	-	-
9) Underground combustion and fires	-	-	0.003	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	0.001	-	-	-
10) Inrushes of water	0.004	-	-	-	-	0.004	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	0.018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	-	-	0.001	0.002	0.003
11) Electricity	0.010	0.014	0.012	0.014	0.006	0.012	0.009	0.011	-	0.016	0.018	0.010	0.009	-	0.014	-	0.004	0.029	0.004	0.014	0.009	-	-	-	-	-	-	-	-	-	-	-	0.021	-	0.021	0.010	0.008	0.010	0.018	0.007	0.012	0.008
12) Other Causes	0.487	0.522	0.457	0.503	0.488	0.473	0.477	0.260	0.255	0.260	0.301	0.351	0.198	0.268	2.956	2.768	0.793	0.362	0.240	0.354	0.227	0.334	0.591	0.603	0.451	-	-	-	0.262	0.161	0.390	0.210	0.497	0.147	0.129	0.985	1.012	0.513	0.428	0.404	0.390	0.364
TOTAL	13.721	14.007	13,819	14.109	14.539	14.499	14.999	14.924	10.989	11.089	10.638	12.161	12.250	11.799	14.380	13.594	13.909	14.079	14.239	14.660	14.347	6.197	6.299	7.032	5.861	7.654	7.690	11.168	4.441	4.490	5.051	6.212	7.583	6.025	6.629	13.551	12.954	12.986	13.227	13.781	13.781	13.861
(1965-1971)	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971
1) Falls of ground	4.732	4.721	4.524	4.618	4.736	4,321 $	4.354	3.574	3.568	3.850	3.676	5.075	4,673	3,989	3.941	3.927	3.634	4.162	4.044	3,761	3,721	5.572	6.360	5.580	0.812	3.656	-	5.958	1.923	1.688	2.466	2.450	2.737	2,634	2,528	4.215	4.186	4.060	4.261	4.492	4,135	4.109
2) Haulage and transport	2.411	2.067	1.913	1.994	2.195	2,007	1.724	2.866	3.269	2.960	3.220	3.169	3,018	3,365	2.153	1.858	1.918	1.946	1.556	1,666	1.959	-	0.707	0.797	0.812	-	-	3,404	2.808	2.621	1.866	2.407	2.562	2,634	1,820	2.416	2.173	2.037	2.139	2.118	2.016	1.953
3) Movement of personnel	3.032	2.852	2.974	3.300	3.399	3,370	3,246	0.771	0.936	0.903	1.122	1.186	1,144	1,496	2.087	2.239	2.174	2.815	3.226	3,372	3,667	-	0.707	1.594	0.812	1.462	-	1,702	0.774	0.605	0.766	1.160	1.165	0,905	0,404	2.364	2.320	2.354	2.795	3.023	3.084	3.117
4) Machinery, handling of tools and supports	1.234	1.244	1.124	1.396	1.291	1,382	1.597	2.126	2.146	2.265	1.903	2.353	1,801	2,469	2.272	2.639	2.773	3.016	3.070	3,332	2.373	7.164	7.067	13.552	7.304	8.043	6,896	2.553	1.282	2.066	0.833	1.031	1.689	1.894	3,033	1.773	1.815	1.790	1.945	1.865	2.011	1.876
5) Falling objects	3.344	3.272	3.642	3.773	4.036	4,166	3,313	0.292	0.349	0.459	0.358	1.244	1,242	1,870	1.839	1.785	2.114	2.386	2.537	2,515	4,566	0.796	-	6.377	6.493	3.656	-	1,702	0.862	0.958	0.866	1.590	1.106	0,659	1,213	2.415	2.362	2.638	2.858	3.185	3.308	3.506
6) Explosives	0.005	0.005	0.017	0.011	0.007	0,008	-	-	0.013	0.056	0.049	-	-	0,025	0.037	0.010	0.011	-	0.050	0,016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.013	0.007	0.019	0.015	0.019	0,011	0.002
7) Explosion of firedamp or coal dust	0.014	0.013	-	0.004	0.004	-	0.012	0.031	-	-	-	0.019	-	-	-	0.029	-	-	-	0,087	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.011	0.016	-	0.002	0.004	0,025	0.007
8) Sudden outbursts of firedamp, suffocation by natural gases	0.005	-	0.003	-	-	-	-	-	0.013	-	-	-	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	0.001	0.003	-	-	-	-
9) Underground combustion and fires	-	-	-	0.004	-	-	-	0.021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	-	0.002	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	0,025	-	0.005	-	0.006	-	0,032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-	0.002	-	0,009	0.002
11) Electricity	0.002	0.010	0.006	0.011	0,026	0,012	0.008	0.010	0.013	-	0.016	0,019	-	-	0.014	-	0.005	0.006	0.014	0,024	0,009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.006	0.007	0.005	0.010	0.021	0,014	0.007
12) Other Causes	0.354	0.414	0.396	0.429	0,402	0,532	0,632	0.333	0.362	0.278	0.228	0,175	0,195	0,324	0.174	0.200	0.185	0.233	0.291	0,294	0.314	1.592	3.360	3.189	0.812	-	5,172	0,851	0.088	0.353	0.700	0.301	0.116	0,165	0,202	0.289	0.354	0.337	0.341	0.333	0,434	0.509
TOTAL	15.133	14.598	14.599	15.540	16,096	15,798	14,886	10.024	10.669	10.771	10.572	13.240	12,097	13,563	12.517	12.692	12.819	14.570	14.788	15,099	16,609	15.124	18.201	31.089	17.043	16.817	12,068	16,170	7.737	8.291	7.497	8.939	9.375	8.891	9,201	13.506	13.242	13.246	14.370	15.160	15,047	15,088

(1) Including Provence as from 1970.

B. Underground accidents resulting in death within eight weeks

years 1958-1971

per '000,000 man-hours

CAUSE (1958-1964)	Germany							Belgium							France (1)							Italy							Netherlands							Community						
	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964	1958	1959	1960	1961	1962	1963	1964
1) Falls of ground	0.268	0.290	0.263	0.216	0.280	0.260	0.200	0.223	0.213	0.299	0.266	0.246	0.264	0.222	0.235	0.192	0.186	0.219	0.167	0.120	0.127	0.167	-	0.201	0.225	-	0.366	-	0.262	0.064	0.034	0.114	0,062	0.084	0.043	0.253	0.242	0.235	0.217	0.234	0.217	0.175
2) Haulage and transport	0.179	0.169	0.182	0.196	0.149	0.178	0.300	0.101	0.124	0.157	0.168	0.142	0.245	0.166	0.115	0.085	0.082	0.122	0.077	0.121	0.141	-	0,197	-	-	-	-	-	0.077	0.145	0.067	0.095	0.062	0.105	0.172	0.147	0.141	0.146	0.168	0.124	0.167	0.178
3) Movement of personnel	0.094	0.097	0.070	0.086	0.059	0.089	0.071	0.011	0.027	0.008	0.035	0.010	0.057	0.028	0.007	0.018	0.027	0.008	0.043	0.009	0.009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.057	0.063	0.047	0.056	0.045	0.060	0.045
4) Machinery, handling of tools and supports	0.010	0.027	0.012	0.027	0.037	0.019	0.028	0.005	0.014	0.016	0.027	0.047	-	0.018	0.018	0.040	0.016	0.008	0.030	0.009	0.036	-	-	-	-	-	-	-	0.015	0.016	-	-	0.041	-	-	0.011	0.028	0.012	0.021	0.037	0.013	0.030
5) Falling objects	0.065	0.041	0.039	0.065	0.094	0.072	0.054	0.016	-	0.008	-	0.010	0.019	0.018	0.025	0.007	0.004	0.017	0.030	0.009	0.018	-	0.197	-	-	-	-	-	-	0.016	-	-	-	-	0.043	0.045	0.027	0.024	0.041	0.062	0.046	0.037
6) Explosives	0.009	0.003	0.003	-	0.004	-	0.002	0.011	0.014	-	-	-	-	-	-	0.026	-	-	-	0.005	0.005	0.501	-	-	-	-	-	-	-	-	-	-	-	-	-	0.009	0.010	0.002	-	0.002	0.001	0.002
7) Explosives of firedamp or coal dusts	0.011	0.012	-	-	0.660	0.002	0.002	-	-	0.016	-	-	-	-	0.115	0.121	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.032	0.036	0.002	-	0.375	0.001	0.001
8) Sudden outbursts of firedamp, suffocation by natural gases	0.005	0.003	0.002	0.004	0.002	-	-	0.016	0.014	-	-	0.047	-	-	0.043	0.026	0.019	0.004	-	0.019	0.009	0.167	-	-	-	-	-	-	-	-	-	-	-	-	-	0.016	0.010	0.006	0.003	0.007	0.005	0.002
9) Underground combustion and fires	-	0.003	-	0.002	-	0.006	0.009	-	0.007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	-	0.001	-	0.003	0.005
10) Inrushes of water	-	0.003	0.002	-	-	0.004	-	0.011	-	-	0.044	0.047	0.019	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	0.002	0.001	0.006	0.005	0.005	-
11) Electricity	0.022	0.008	0.002	0.005	0.010	0.002	0.004	0.021	-	0.024	-	-	0.009	0.009	-	0.011	0.012	-	0.009	0.024	-	-	-	-	-	-	-	-	-	-	-	0.019	-	-	-	0.016	0.007	0.007	0.004	0.008	0.008	0.003
12) Other causes	0.025	0.025	0.036	0.049	0.049	0.025	0.017	0.005	-	0.008	0.009	0.019	0.028	0.009	0.036	0.029	0.008	-	0.009	0.014	0.014	-	-	-	-	-	-	-	-	-	-	0.017	-	-	-	0.023	0.021	0.024	0.029	0.032	0.021	0.014
TOTAL	0.687	0.680	0.611	0.651	1.344	0.657	0.587	0.420	0.413	0.536	0.549	0.568	0.641	0.471	0.594	0.555	0.354	0.382	0.369	0.330	0.359	0.835	0.394	0.201	0.225	-	0.366	-	0.355	0.241	0.119	0.229	0.166	0.189	0.258	0.610	0.590	0.507	0.546	0.932	0.547	0.492
(1965-1971)	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971	1965	1966	1967	1968	1969	1970	1971
1) Falls of ground	0.184	0.197	0.206	0.148	0,192	0.113	0.147	0.239	0.324	0.264	0.179	0,214	0.268	0.100	0.164	0.214	0.159	0.177	0.149	0.143	0,117	-	-	-	-	-	-	-	0.044	0.050	0.100	0.172	0.058	0.082	0.101	0.177	0.208	0.192	0.160	0.176	0.135	0.133
2) Haulage and transport	0.191	0.175	0.150	0.126	0.143	0.128	0.103	0.166	0.187	0.180	0.114	0.017	0.170	0.125	0.052	0.126	0.088	0.101	0.186	0.127	0,108	-	-	0.797	-	-	-	-	0.177	0,126	-	0.086	-	0.165	-	0.149	0.160	0.128	0.115	0,145	0.132	0.104
3) Movement of personnel	0.070	0.094	0.076	0.079	0.056	0.058	0.032	0.011	0.025	-	0.033	-	-	0.049	0.042	0.024	0.016	0.025	0.014	0.016	0,072	-	-	-	-	-	-	-	-	-	-	-	0,058	-	-	0.051	0.060	0.044	0.054	0,038	0.039	0.043
4) Machinery, handling of tools and supports	0.025	0.030	0.020	0.014	0.034	0.031	0.032	0.052	0.025	0.028	0,065	-	-	0.025	0.009	0.015	0.016	0.006	-	0.032	0.027	-	-	0.797	-	-	-	-	0.022	-	0.067	-	0,117	-	-	0.024	0.023	0.024	0.017	0,023	0.027	0.029
5) Falling objects	0.058	0.048	0.063	0.051	0.049	0.035	0.047	-	-	-	0.016	-	-	-	0.019	0.015	0.011	0.031	0.014	0.016	0.045	-	-	-	-	-	-	-	-	-	-	0.043	-	-	-	0.037	0.030	0.036	0.040	0,031	0.025	0.041
6) Explosives	-	-	-	0.004	-	-	-	-	-	-	0.016	-	-	-	0.009	0.005	0.005	0.006	-	0,008	0.018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	0.001	0.002	0.006	-	0.002	0,005
7) Explosives of firedamp or coal dust	0.019	0.056	-	0.061	-	-	0,008	0.011	-	-	-	-	-	-	0.155	-	-	0.038	-	0.127	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.053	0.030	-	0.044	-	0.037	0.005
8) Sudden outbursts of firedamp, suffocation by natural gases	0.002	0.002	0.007	-	0.004	-	0.008	0.041	0.013	-	-	-	-	0,025	-	0.005	0.027	0.019	0.007	-	0,072	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.006	0.004	0.012	0.006	0.004	-	0.027
9) Underground combustion and fires	0.005	-	-	-	-	-	-	0.011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.005	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	0.012	-	-	-	-	-	-	-	-	0.005	-	0.005	-	-	0.016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-	0.002	-	-	0.011	-
11) Electricity	0.005	-	0.003	0.004	0,004	0.004	-	0.011	-	0.014	0.033	0.019	0.024	-	-	0.010	-	-	0,007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.004	0.003	0.004	0.006	0,006	0.004	-
12) Other causes	0.023	0.027	0.017	0.022	0,022	0.027	0.083	-	0.013	0.042	-	-	-	-	-	0.005	0.005	-	0,007	-	0.009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.013	0.017	0.015	0.012	0,015	0.016	0.053
TOTAL	0.582	0.629	0.542	0.509	0.504	0.408	0.460	0.542	0.587	0.528	0.456	0.330	0.462	0,324	0.455	0.419	0.332	0.403	0.384	0.484	0.468	-	-	1.594	0	-	-	-	0.243	0.176	0.167	0.301	0.233	0.247	0,101	0.522	0.536	0.457	0.460	0.438	0.429	0.440

(1) Including Provence as from 1970.

C. Comparative Table of underground group accidents (see (1) below)
years 1960-1971

CAUSE (1960-1965)	Germany												Belgium											
	1960			1961			1962			1963			1964			1965			1960			1961		
	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b
1) Falls of ground	2	2	10	-	-	-	1	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-	2	5	14	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	3	6	23	38	-	-	-	-	-	1	4	8	-	-	-	-	-	-
8) Sudden outbursts of firedamp suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	2	10	-	-	-	4	6	33	44	-	-	2	5	14	1	4	8	-	-	-	1	2	6

CAUSE (1960-1965)	Belgium									France (1)												
	1962			1963			1964			1965			1960			1961			1962			1963	
	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b
1) Falls of ground	1	2	6	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7	1	-	6	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	2	-	33	-	-	-	-	-	-	-	-	-	-	-	-
8) Sudden outbursts of firedamp suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	1	2	6	-	-	-	-	-	-	2	-	33	-	-	-	1	-	7	1	-	6	-	-	-

CAUSE (1960-1965)	France (1)						Italy						Netherlands						Community					
	1964			1965			1960			1961			1962			1963			1964			1965		
	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	10
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	18
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	5	14
8) Sudden outbursts of firedamp suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	6	23
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	41

(1966-1971)	Germany												Belgium											
	1966			1967			1968			1969			1970			1971			1966			1967		
	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	12	-	-	-	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	2	5	21	-	-	-	1	-	17	-	-	-	-	-	-	-	-	-	1	6	-	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	5	21	-	-	-	1	-	17	-	-	-	-	-	-	2	-	12	1	6	-	-	-	-

(1966-1971)	Belgium									France (1)												
	1968			1969			1970			1971			1966			1967			1968			1969	
	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	6
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	5
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	11	16
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	11

(1966-1971)	France (1)				Italy												Netherlands											
	1970			1971	1966			1967			1968			1969			1970			1971			1966			1967		
	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	1	11	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	1	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	1	11	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(1966-1971)	Netherlands												Community											
	1968			1969			1970			1971			1966			1967			1968			1969		
	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	6
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	5
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	-	-	-	3	11	21	-	-	-	1	-	17	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	3	11	21	-	-	-	1	-	17	2	-	11

(1966-1971)	Community												
	1970			1971									
	N	a	b	N	a	b							
1) Falls of ground	-	-	-	-	-	-							
2) Haulage and transport	-	-	-	-	-	-							
3) Movement of personnel	-	-	-	-	-	-							
4) Machinery, handling of tools and supports	-	-	-	-	-	-							
5) Falling objects	-	-	-	-	-	-							
6) Explosives	-	-	-	-	-	-							
7) Explosions of firedamp or coal dust	1	11	16	-	-	-							
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	1	-	8							
9) Underground combustion and fires	-	-	-	-	-	-							
10) Inrushes of water	-	-	-	-	-	-							
11) Electricity	-	-	-	-	-	-							
12) Other causes	-	-	-	-	-	-							
TOTAL	3	11	16	3	-	20							

(1) Accidents involving more than five casualities of type (a).
(N) Number of group accidents.
(a) Casualties were unable te resume work below ground for at least eight weeks.
(b) Casualties died within eight weeks.
(1) Including Provence as from 1970.

D. RECAPITULATION: COMMUNITY OVERALL

Year	Extraction (1)	Underground o.m.s. (kg.)	Million man-hours worked	Fatalities	Serious injuries (4) (disablement for 8 weeks or over)	Fatalities per m.tons	Serious injuries (4) per m. tons	Fatalities per m. man-hours	Serious injuries per m. man-hours
1958	252.278	1,634	1.260	770	17,074	3.052	67.68	0.610	13.551
1959	240.602	1,788	1.122	622	14,539	2.585	60.43	0.590	12.950
1960	239.967	1,958	1.037	526	13,459	2.192	56.09	0.507	12.986
1961	235.848	2,100	962	527	12,720	2.235	53.93	0.548	13.227
1962	233.233	2,229	901	840(2) 541(3)	12,418	3.602(2) 2.320(3)	53.24	0.932(2) 0.600(3)	13.781
1963	229.769	2,331	849	465	11,686	2.024	50.86	0.547	13.761
1964	235.007	2,395	841	411	11,726	1.749	49.89	0.493	13.860
1965	224.249	2,461	784	410	10,595	1.828	47.25	0.522	13.506
1966	210.189	2,611	698	374	9,247	1.779	43.99	0.536	13.242
1967	189.484	2,824	587	269	7,781	1.420	41.06	0.457	13.246
1968	181.170	3,065	522	240	7,501	1.326	41.44	0.460	14.370
1969	176.900	3,265	476	209	7,222	1.181	40.82	0.438	15.160
1970	170.355	3,442	438	188	6,591	1.104	38.69	0.429	15.047
1971	164 910	3 514	414	182	6 249	1,104	37.89	0.440	15.088

(1) Net extraction, slurry and dust.
(2) Incl. Luisenthal explosion.
(3) Excl. Luisenthal explosion.
(4) Casualties were unable to resume work for at least eight weeks.

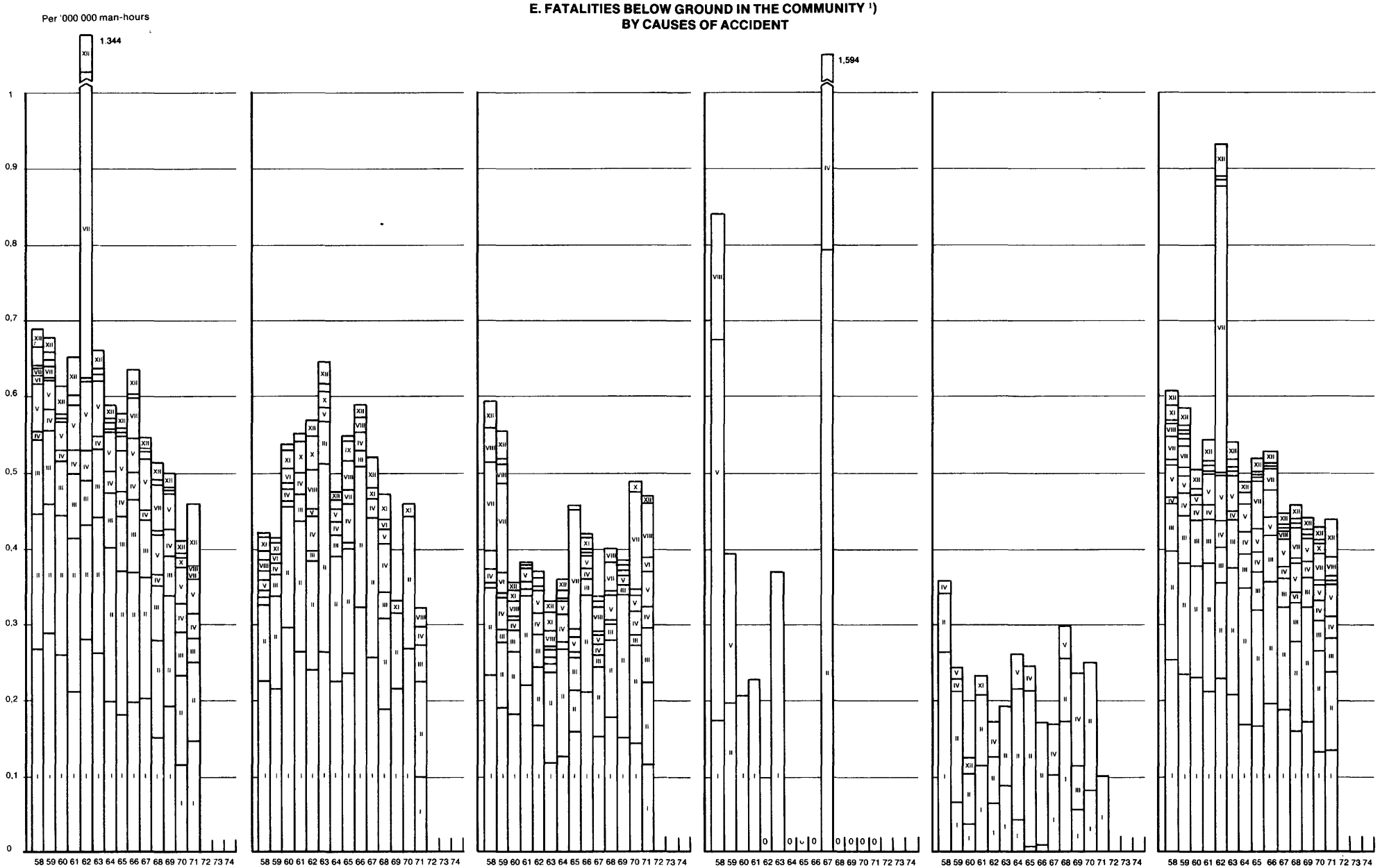
GRAPHS
OF FATAL AND SERIOUS CASUALTIES
IN COMMUNITY COALMINES [1)]

KEY
to Roman figures in Graphs

I	Falls of ground
II	Haulage and transport
III	Movement of personnel
IV	Machinery, handling of tools and supports
V	Falling objects
VI	Explosives
VII	Explosions of firedamp or coal dust
VIII	Sudden outbursts of firedamp, suffocation by natural gases
IX	Fires and uderground combustion
X	Inrushes of water
XI	Electricity
XII	Other causes

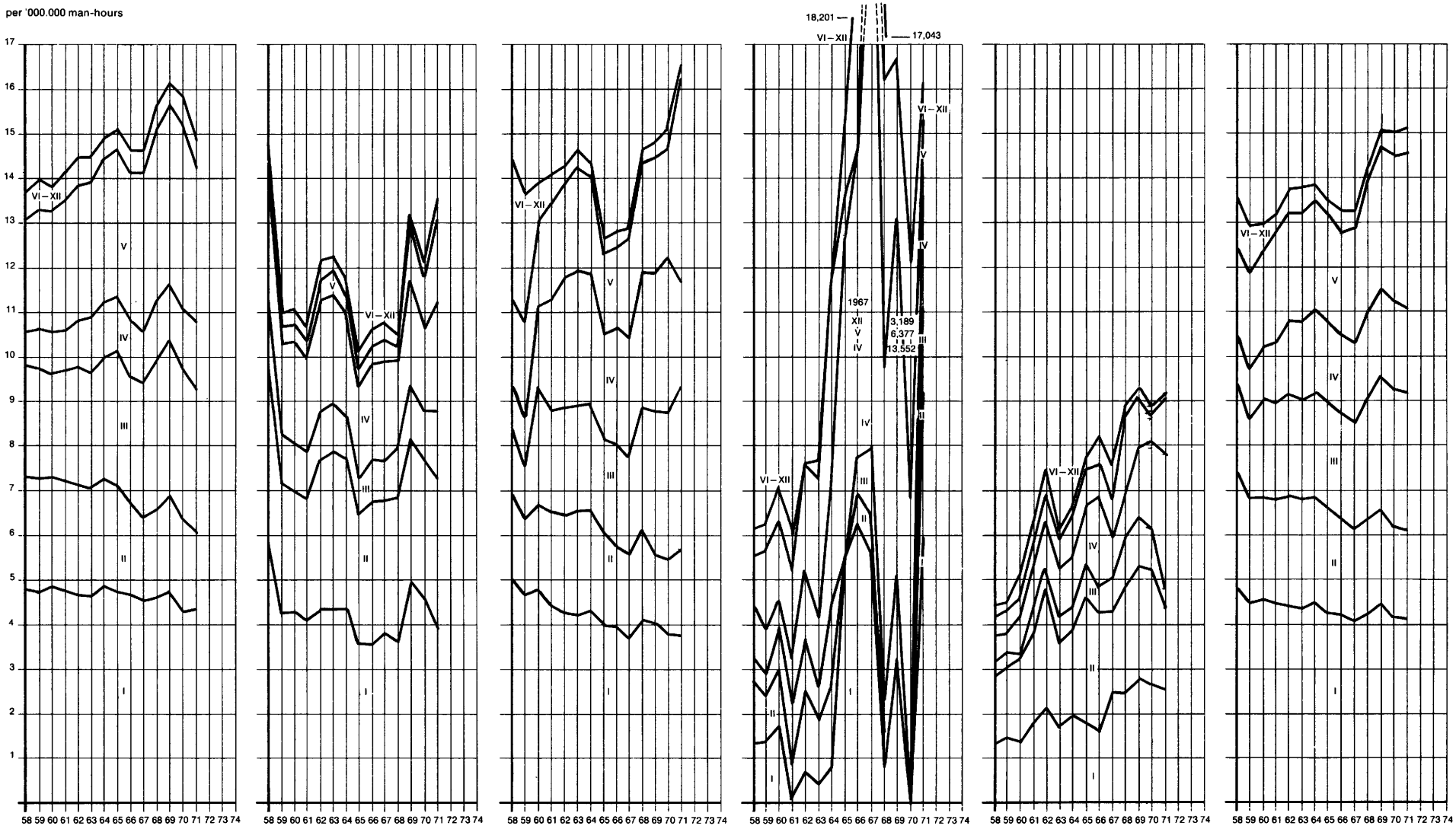
(1) Casualties were unable to resume work for at least eight weeks.

E. FATALITIES BELOW GROUND IN THE COMMUNITY [1])
BY CAUSES OF ACCIDENT



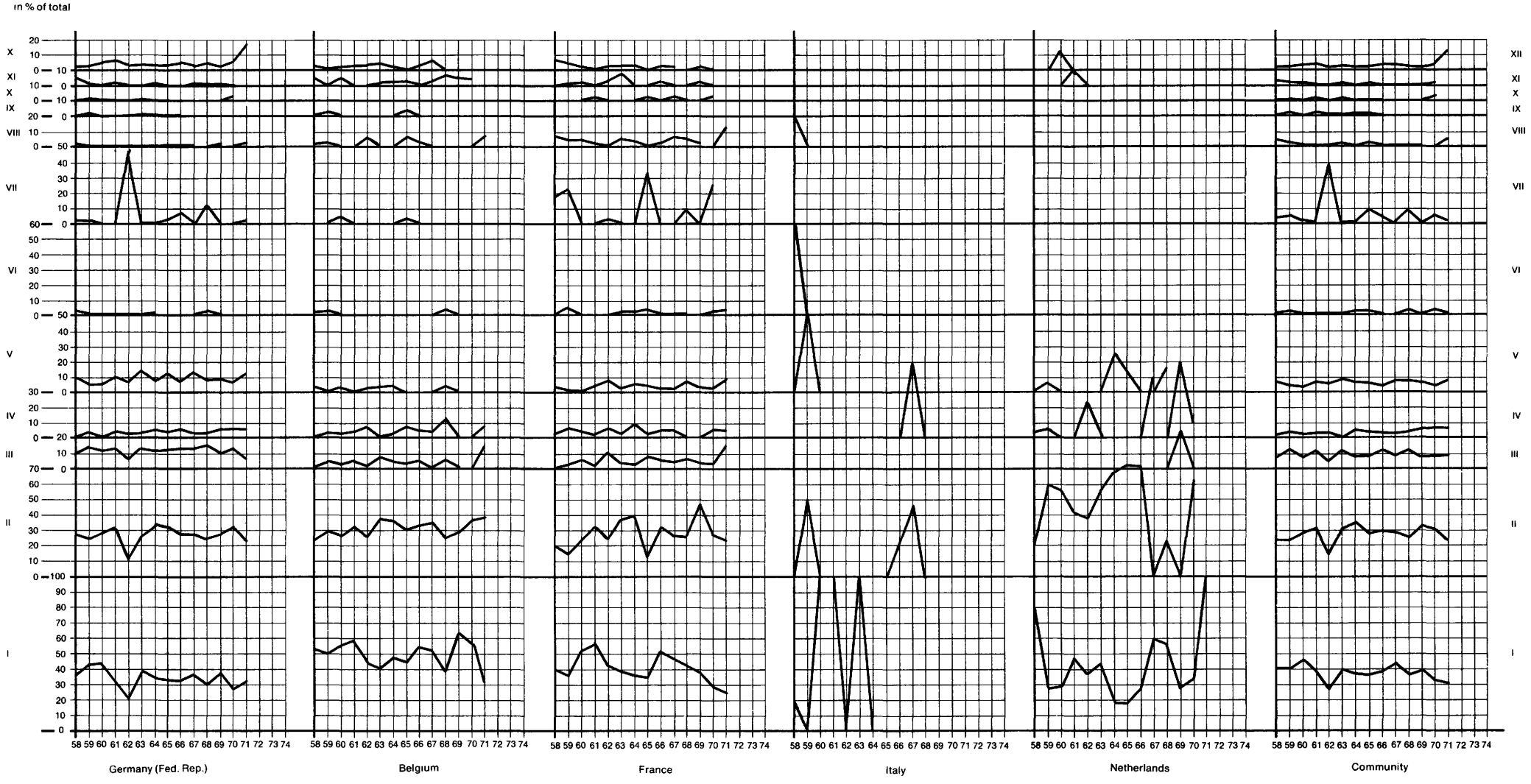
[1]) CASUALTIES DIED WITHIN EIGHT WEEKS

F. CASES OF SERIOUS INJURY BELOW GROUND [1]) IN THE COMMUNITY, BY CAUSES OF ACCIDENT



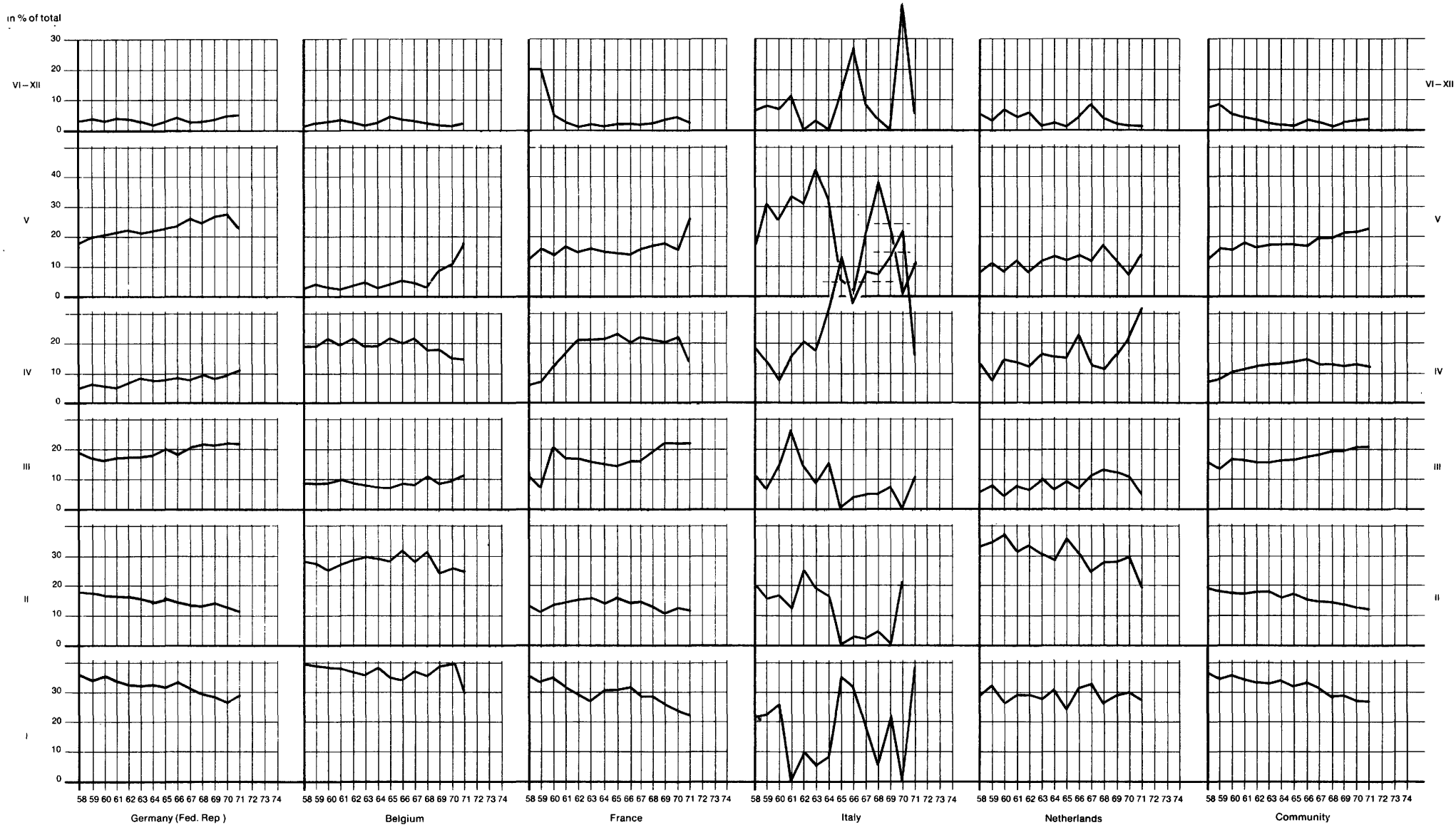
1) CASUALTIES WERE UNABLE TO RESUME WORK BELOW GROUND FOR AT LEAST EICHT WEEKS

G. FATALITIES BELOW GROUND [1]) IN THE COMMUNITY BY CAUSES OF ACCIDENT



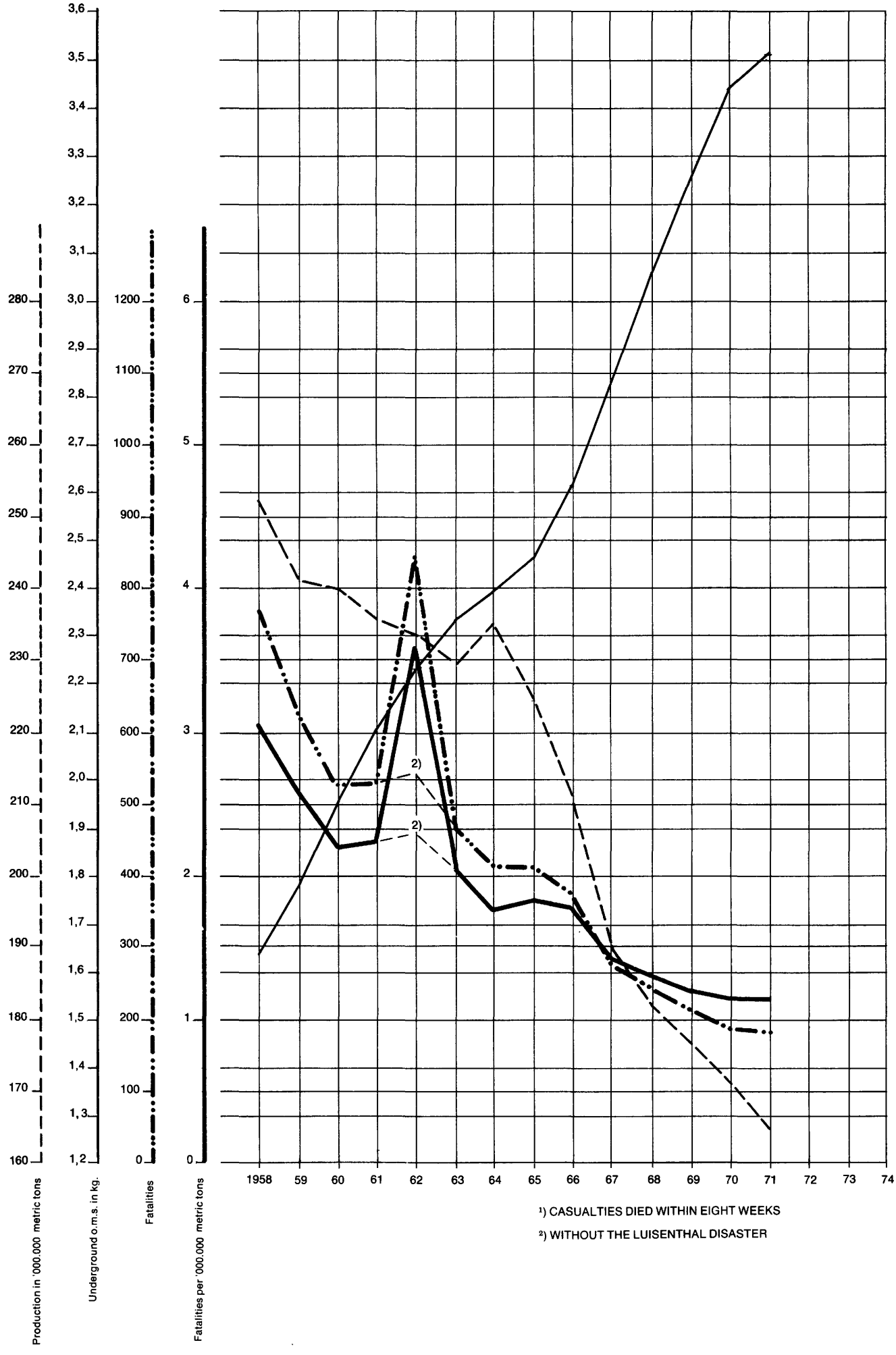
[1]) CASUALTIES DIED WITHIN EIGHT WEEKS

H. CASES OF SERIOUS INJURY BELOW GROUND [1]) IN THE COMMUNITY BY CAUSES OF ACCIDENT



[1]) CASUALTIES WERE UNABLE TO RESUME WORK BELOW FOR AT LEAST EIGHT WEEKS

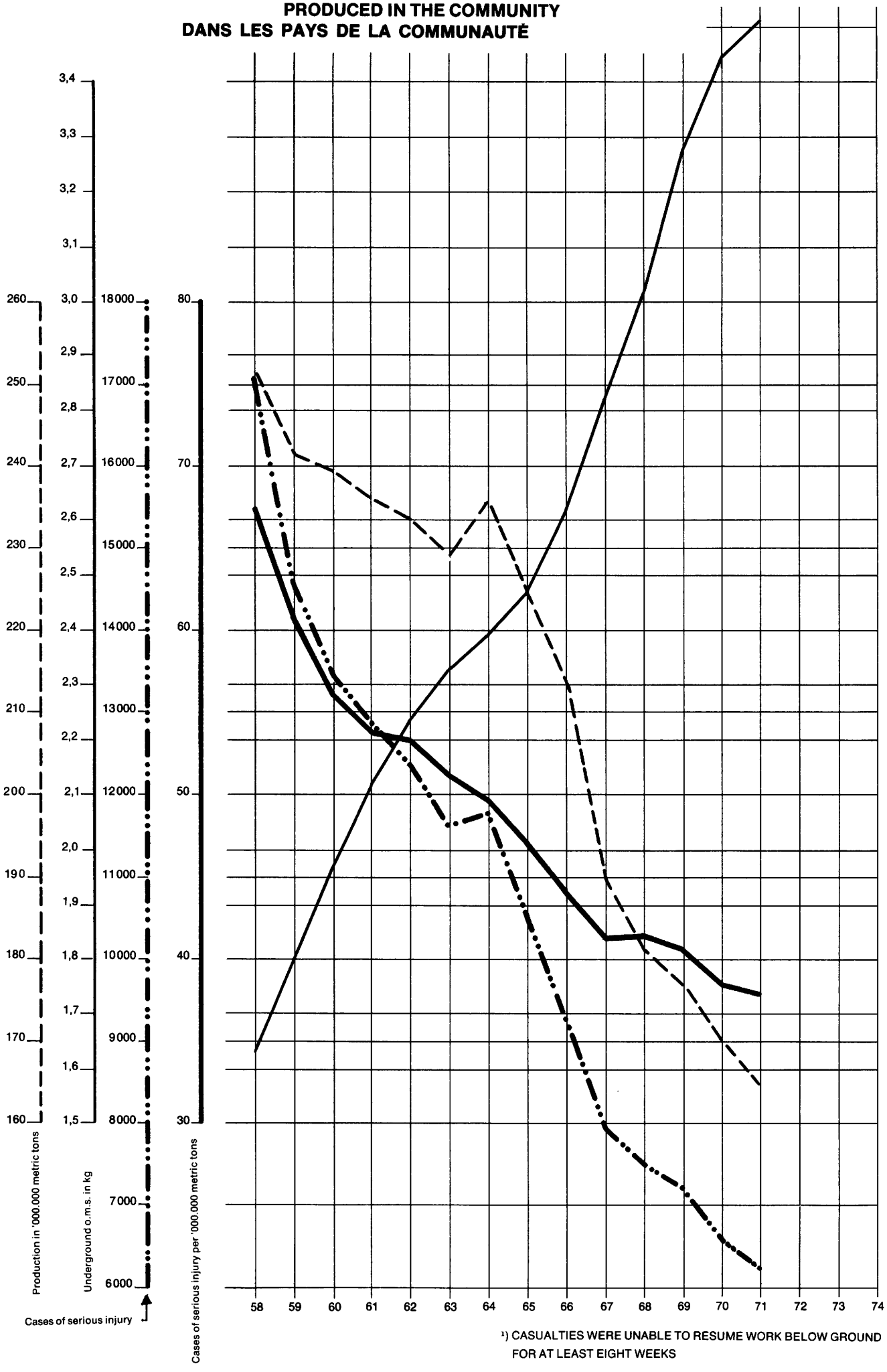
I. FATALITIES [1]) PER '000.000 METRIC TONS PRODUCED IN THE COMMUNITY



[1]) CASUALTIES DIED WITHIN EIGHT WEEKS

[2]) WITHOUT THE LUISENTHAL DISASTER

K. CASES OF SERIOUS INJURY [1]) PER '000.000 METRIC TONS PRODUCED IN THE COMMUNITY
DANS LES PAYS DE LA COMMUNAUTÉ



[1]) CASUALTIES WERE UNABLE TO RESUME WORK BELOW GROUND FOR AT LEAST EIGHT WEEKS

SECTION IV

IMPLEMENTATION OF THE COMMISSION'S RECOMMENDATIONS

Annex VIII sets out the recommendations, notices, opinions and directives which the Commission has worked out with a view to the improvement of safety and health in coal-mines, and which have been communicated to the governments concerned for further action.

They are classified according to the 2-yearly periods in which the recommendations, notices, directives etc. were issued. Every two years the governments are invited to inform the Commission how they have followed them up; the situation described in the present report is as at 1st January 1972.

With regard to the preceding 2-yearly period, the governments have again amended their regulations concerning the 24 provisions laid down in the Commission's recommendations, so that it can be said that these recommendations are being followed to a very large extent.

In the sphere of human factors, the Commission issued two recommendations in 1970 concerning the campaign against dusts, and the organisation of the departments responsible for keeping a check on dusty conditions, and these were published in its 8th Report: all the governments have provisions in their regulations which conform to the Commission's recommendations.

ANNEXES

LIST OF ANNEXES

Have been printed separately :

- Fourth Report on specifications and testing conditions relating to fire-resistant fluids used for power transmission

- Usual accidents involving intermediate connexions and rope joints and experience relating to rope counter balancing in multi-rope winding installations (Report by the Rope Testing Office, Bochum)

ANNEX I

COMMON STATISTICAL SUMMARY OF UNDERGROUND ACCIDENTS AT MINES IN 1971

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY : Germany

YEAR : 1971

COAL-FIELD : Land North Rhine/Westphalie

MAN-HOURS WORKED *(1)* : 226 679 307

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	4662	2325	645	19	7651	2353	961	269	13	3596	38	19	12	-	69	26	20	2	1	49	7079	3325	928	33	11365	-	-	-
II. TRANSPORT, TOTAL	44	50	41	5	140	518	491	275	14	1298	79	75	45	3	202	9	2	6	-	17	650	618	367	22	1657	-	-	-
a) Continuous Transport	31	39	38	5	113	173	145	52	1	371	2	4	2	-	8	4	2	6	-	12	210	190	98	6	504	-	-	-
b) Discontinuous Transport	13	11	3	-	27	345	346	223	13	927	77	71	43	3	194	5	-	-	-	5	440	428	269	16	1153	-	-	-
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	1241	829	178	5	2253	3846	2351	505	2	6704	361	262	85	1	709	156	98	18	-	272	5600	3540	786	8	9938	-	-	-
a) while moving about the mine	79	43	11	-	133	718	376	103	-	1197	56	44	11	1	112	12	7	3	-	22	865	470	128	1	1464	-	-	-
b) in the course of other activities	1162	786	167	5	2120	3128	1975	402	2	5507	305	218	74	-	597	144	91	15	-	250	4739	3070	658	7	8474	-	-	-
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	1366	880	212	3	2441	609	308	73	3	993	33	17	2	-	52	40	20	7	-	67	2048	1205	294	6	3553	-	-	-
a) Machines	70	54	34	2	160	63	32	26	2	123	-	-	-	-	-	2	2	-	-	4	135	88	60	4	287	-	-	-
b) Tools	384	231	48	-	663	546	275	47	1	869	33	17	2	-	52	38	18	7	-	63	1001	541	104	1	1647	-	-	-
c) Supports	912	575	130	1	1618	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	912	576	130	1	1619	-	-	-
V. FALLS OF OBJECTS	2625	1497	418	5	4545	2552	1316	361	6	4235	147	86	32	1	266	114	58	15	-	187	5438	2957	826	12	9233	-	-	-
VI. EXPLOSIVES	-	2	-	-	2	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	2	-	-	3	-	-	-
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	3	2	5	-	-	-
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-
IX. HEATINGS OR FIRES	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-
X. INRUSHES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
XI. ELECTRICITY	-	-	-	-	-	6	12	1	-	19	-	-	-	-	-	-	1	1	-	2	6	13	2	-	21	-	-	-
XII. OTHER CAUSES	110	58	29	6	203	280	171	75	14	540	25	20	10	1	56	18	8	10	-	36	433	257	124	21	835	-	13	13
TOTAL	10048	5622	1523	43	17236	10165	5610	1562	56	17393	683	479	186	6	1354	363	207	59	1	630	21259	11918	3330	106	36613	-	13	13

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY : Germany

YEAR : 1971

COAL-FIELD : Land North Rhine/Westphalie

MAN-HOURS WORKED *(1)* : 226 679 307

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	20,57	10,26	2,85	0,08	33,75	10,38	4,24	1,19	0,06	15,86	0,17	0,08	0,05	-	0,30	0,11	0,09	0,01	.	0,22	31,23	14,67	4,09	0,15	50,13	-	-	-
II. TRANSPORT, TOTAL	0,19	0,22	0,18	0,02	0,62	2,29	2,17	1,21	0,06	5,73	0,35	0,33	0,20	0,01	0,89	0,04	0,01	0,03	-	0,07	2,87	2,73	1,62	0,10	7,31	-	-	-
a) Continuous Transport	0,14	0,17	0,17	0,02	0,50	0,76	0,64	0,23	.	1,64	0,01	0,02	0,01	-	0,04	0,02	0,01	0,03	-	0,05	0,93	0,84	0,43	0,03	2,22	-	-	-
b) Discontinuous Transport	0,06	0,05	0,01	-	0,12	1,52	1,53	0,98	0,06	4,09	0,34	0,31	0,19	0,01	0,86	0,02	-	-	-	0,02	1,94	1,89	1,19	0,07	5,09	-	-	-
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	12,41	3,66	0,79	0,02	9,94	16,97	10,37	2,23	0,01	29,57	1,59	1,16	0,37	.	3,13	0,69	0,43	0,08	-	1,20	24,72	15,62	3,47	0,04	43,84	-	-	-
a) while moving about the mine	0,36	0,19	0,05	-	0,59	3,17	1,66	0,45	-	5,28	0,25	0,19	0,05	.	0,49	0,05	0,03	0,01	-	0,10	3,82	2,07	0,56	.	6,46	-	-	-
b) in the course of other activities	5,13	3,47	0,74	0,02	9,35	13,80	8,71	1,77	0,01	24,29	1,35	0,96	0,33	-	2,63	0,64	0,40	0,07	-	1,10	20,91	13,54	2,90	0,03	37,38	-	-	-
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	6,03	3,79	0,94	0,01	10,77	2,69	1,36	0,32	0,01	4,38	0,15	0,07	0,01	-	0,23	0,18	0,09	0,03	-	0,30	9,03	5,32	1,30	0,03	15,67	-	-	-
a) Machines	0,31	0,24	0,15	0,01	0,71	0,28	0,14	0,11	0,01	0,54	-	-	-	-	-	0,01	0,01	-	-	0,02	0,60	0,39	0,26	0,02	1,27	-	-	-
b) Tools	1,69	1,02	0,21	-	2,92	2,41	1,21	0,21	,	3,83	0,15	0,07	0,01	-	0,23	0,17	0,08	0,03	-	0,28	4,42	2,39	0,46	.	7,27	-	-	-
c) Supports	4,02	2,54	0,57	.	7,14	-	.	-	-	.	-	-	-	-	-	-	-	-	-	-	4,02	2,54	0,57	.	7,14	-	-	-
V. FALLS OF OBJECTS	11,58	6,60	1,84	0,08	20,05	11,26	5,81	1,59	0,03	18,68	0,65	0,38	0,14	.	1,17	0,50	0,26	0,07	-	0,82	23,99	13,04	3,64	0,05	40,73	-	-	-
VI. EXPLOSIVES	-	0,01	-	-	0,01	-	-	-	-	.	-	-	-	-	-	-	-	-	-	-	.	0,01	-	-	0,01	-	-	-
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	0,01	0,01	0,02	-	-	-	-	-	-	-	-	-	-	-	-	0,01	0,01	0,02	-	-	-
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	-	-	-	0,01	0,01	-	-	-	-	-	-	-	-	-	-	-	-	-	0,01	0,01	-	-	-
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	-	-	0,01	0,01	-	-	-	-	-	-	-	-	-	-	-	-	-	0,01	0,01	-	-	-
IX. HEATINGS OR FIRES	-	.	-	-	.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.	-	-	.	-	-	-
X. INRUSHES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
XI. ELECTRICITY	-	-	-	-	-	0,03	0,05	.	.	0,08	-	-	-	-	-	-	-	-	-	0,01	0,03	0,06	0,01	-	0,09	-	-	-
XII. OTHER CAUSES	0,49	0,26	0,13	0,03	0,90	1,24	0,75	0,33	0,06	2,38	0,11	0,09	0,04	.	0,25	0,08	0,04	0,04	-	0,16	1,91	1,13	0,55	0,09	3,68	-	0,06	0,06
TOTAL	44,32	24,80	6,72	0,19	76,03	44,84	24,75	6,89	0,25	76,72	3,01	2,11	0,82	0,03	5,97	1,60	0,91	0,26	.	27,79	93,78	52,57	14,69	0,47	161,51	-	0,06	0,06

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY: Germany

COAL-FIELD : Land North Rhine/Westphalie

YEAR : 1971

MAN-HOURS WORKED *(1)*: 226 679 307

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	3	65	37	280	1	-	34	23	3	259	51	2	3066	-	-	11				-	1	1	2823	648	140	43	3654
II. Eyes	1	-	2							1	-	8	43	-	839	2	-	16				-	-	-	748	70	47	-	865
III. Trunk	-	-	-	131	19	486	4	-	50	3	6	86	64	1	1855	2	-	25				-	-	-	1420	852	204	26	2502
IV. Upper limbs (excluding the hands) *(3)*	6	-	11	265	-	504	22	-	287				90	-	3943	1	-	21				-	-	1	3278	1105	384	-	4767
V. Hands	85	-	231	691	-	3716	33	-	346				271	-	8883	1	-	22				-	-	3	6733	5387	1081	-	13201
VI. Lower limbs (excluding feet) *(4)*	1	-	1	496	3	691	115	-	1376				285	-	4870	-	-	12				-	-	1	3823	2228	897	3	6951
VII. Feet	12	-	14	341	-	1176	6	-	217				95	1	2237	3	-	12				-	-	1	1906	1293	457	1	3657
VIII. Multiple locations	2	1	3	76	21	167	2	-	13	3	-	23	30	1	765	4	3	11				2	2	9	517	327	119	28	991
IX. Not specified																-	-	-	-	4	13	1	1	12	11	8	1	5	25
TOTAL	107	1	265	2065	80	7020	183	-	2323	30	9	376	929	5	26458	13	3	130	-	4	13	3	4	28	21259	11918	3330	106	36613

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY : Germany

COAL-FIELD : Land North Rhine/Westphalie

YEAR : 1971

MAN-HOURS WORKED *(1)* : 226 679 307

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	0,01	0,29	0,16	1,24	.	-	0,15	0,10	0,01	1,14	0,22	0,01	13,53	-	-	0,05				-	.	.	12,45	2,86	0,62	0,19	16,12
II. Eyes	.	-	0,01							.	-	0,04	0,19	-	3,70	0,01	-	0,07				-	-	-	3,30	0,31	0,21	-	3,82
III. Trunk	-	-	-	0,58	0,08	2,14	0,02	-	0,22	0,01	0,03	0,38	0,28	.	8,18	0,01	-	0,11				-	-	-	6,26	3,76	0,90	0,11	11,04
IV. Upper limbs (excluding the hands) *(3)*	0,03	-	0,05	1,17	-	2,22	0,10	-	1,27				0,40	-	17,39	.	-	0,09				-	-	-	14,46	4,87	1,69	-	21,03
V. Hands	0,37	-	1,02	3,05	-	16,39	0,15	-	1,53				1,20	-	39,19	.	.	0,10				-	-	0,01	29,70	23,76	4,77	-	58,23
VI. Lower limbs (excluding feet) *(4)*	.	-	.	2,19	0,01	3,05	0,51	-	6,07				1,26	-	21,48	-	-	0,05				-	-	.	16,87	9,83	3,96	0,01	30,66
VII. Feet	0,05	-	0,06	1,50	-	5,19	0,03	-	0,96				0,42	.	9,87	0,01	-	0,05				-	-	.	8,41	5,70	2,02	.	16,13
VIII. Multiple locations	0,01	.	0,01	0,34	0,09	0,74	0,01	-	0,06	0,01	-	0,10	0,13	.	3,37	0,02	0,01	0,05				0,01	0,01	0,04	2,28	1,44	0,52	0,12	4,37
IX. Not specified																-	-	-	-	0,02	0,06	.	.	0,05	0,05	0,04	.	0,02	0,11
TOTAL	0,47	.	1,17	9,11	0,35	30,97	0,81	-	10,25	0,13	0,04	1,66	4,10	0,02	16,71	0,06	0,01	0,57	-	0,02	0,06	0,01	0,02	0,12	93,78	52,57	14,69	0,47	161,51

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY : Germany

YEAR : 1971

COAL-FIELD : Saar

MAN-HOURS WORKED *(1)* : 25 052 272

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	538	355	123	2	1018	219	128	45	1	393	3	9	-	1	13	1	-	-	-	1	7614	92	168	4	1425			
II. TRANSPORT, TOTAL	20	18	5	-	43	71	87	50	4	212	11	10	12	-	33	-	1	-	-	1	1021	16	67	4	289			
a) Continuous Transport	15	14	5	-	34	24	32	13	-	69	2	1	1	-	4	-	1	-	-	1	41	48	19	-	108			
b) Discontinuous Transport	5	4	-	-	9	47	55	37	4	143	9	9	11	-	29	-	-	-	-	-	61	68	48	4	181			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	39	24	4	-	67	145	112	27	-	284	1	1	-	-	2	-	-	-	-	-	185	137	31	-	353			
a) while moving about the mine	12	6	1	-	19	6	3	-	-	9	1	1	-	-	2	-	-	-	-	-	19	10	1	-	30			
b) in the course of other activities	27	18	3	-	48	139	109	27	-	275	-	-	-	-	-	-	-	-	-	-	166	127	30	-	323			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	270	246	63	1	580	174	113	38	1	326	14	4	7	-	25	-	-	-	-	-	458	363	108	2	931			
a) Machines	34	33	5	-	72	37	12	11	-	60	1	1	3	-	5	-	-	-	-	-	72	46	19	-	137			
b) Tools	24	26	5	-	55	48	29	13	1	91	4	3	-	-	7	-	-	-	-	-	76	58	18	1	153			
c) Supports	212	187	53	1	453	89	72	14	-	175	9	-	4	-	13	-	-	-	-	-	310	259	71	1	641			
V. FALLS OF OBJECTS	2	5	3	-	10	6	17	4	-	27	-	1	1	-	2	-	-	-	-	-	8	23	8	-	39			
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES																												
X. INRUSHES																												
XI. ELECTRICITY																												
XII. OTHER CAUSES	134	68	19	-	221	72	37	14	-	123	8	4	1	-	13	-	1	1	-	2	214	110	35	-	359			
TOTAL	1003	716	217	3	1939	687	494	178	6	1365	37	29	21	1	88	1	2	1	-	4	1728	1241	417	10	3396			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY : Germany

COAL-FIELD : Saar

YEAR : 1971

MAN-HOURS WORKED *(1)*: 25 052 272

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	21,47	14,17	4,91	0,08	40,63	8,74	5,11	1,80	0,04	15,69	0,12	0,36	-	0,04	0,52	0,04	-	-	-	0,04	30,38	19,64	6,70	0,16	56,88			
II. TRANSPORT, TOTAL	0,80	0,72	0,20	-	1,72	2,83	3,47	2,00	0,16	8,46	0,44	0,40	0,48	-	1,32	-	0,04	-	-	0,04	4,07	4,63	2,68	0,16	11,54			
a) Continuous Transport	0,60	0,56	0,20	-	1,36	0,96	1,28	0,51	-	2,75	0,08	0,04	0,04	-	0,16	-	0,04	-	-	0,04	1,64	1,91	0,76	-	4,31			
b) Discontinuous Transport	0,20	0,16	-	-	0,36	1,88	2,19	1,48	0,16	5,71	0,36	0,36	0,44	-	1,16	-	-	-	-	-	2,43	2,71	1,92	0,16	7,22			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	1,55	0,96	0,16	-	2,67	5,79	4,47	1,08	-	11,34	0,04	0,04	-	-	0,08	-	-	-	-	-	7,38	5,47	1,24	-	14,09			
a) while moving about the mine	0,48	0,24	0,04	-	0,76	0,24	0,12	-	-	0,36	0,04	0,04	-	-	0,08	-	-	-	-	-	0,76	0,40	0,04	-	1,20			
b) in the course of other activities	1,08	0,72	0,12	-	1,92	5,55	4,35	1,08	-	10,98	-	-	-	-	-	-	-	-	-	-	6,62	5,07	1,20	-	12,89			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	10,78	9,82	2,51	0,04	23,15	6,94	4,51	1,52	0,04	13,01	0,56	0,16	0,28	-	1,00	-	-	-	-	-	18,28	14,49	4,31	0,08	37,16			
a) Machines	1,36	1,31	0,20	-	2,87	1,47	0,48	0,44	-	2,39	0,04	0,04	0,12	-	0,20	-	-	-	-	-	2,87	1,84	0,76	-	5,47			
b) Tools	0,96	1,04	0,20	-	2,20	1,91	1,16	0,52	0,04	3,63	0,16	0,12	-	-	0,28	-	-	-	-	-	3,03	2,32	0,72	0,04	6,11			
c) Supports	8,46	7,46	2,12	0,04	18,08	3,56	2,87	0,56	-	6,99	0,36	-	0,16	-	0,52	-	-	-	-	-	12,38	10,34	2,83	0,04	25,59			
V. FALLS OF OBJECTS	0,08	0,20	0,12	-	0,40	0,24	0,68	0,16	-	1,08	-	0,04	0,04	-	0,08	-	-	-	-	-	0,32	0,92	0,32	-	1,56			
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES																												
X. INRUSHES																												
XI. ELECTRICITY																												
XII. OTHER CAUSES	5,35	2,71	0,76	-	8,82	2,87	1,48	0,56	-	4,91	0,32	0,16	0,04	-	0,52	-	0,04	0,04	-	0,08	8,54	4,39	1,40	-	14,33			
TOTAL	40,04	28,58	8,66	0,12	77,40	27,42	19,73	7,11	0,24	54,49	1,47	1,16	0,84	0,04	3,51	0,04	0,08	0,04	-	0,16	68,97	49,54	15,65	0,40	136,56			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY : Germany

COAL-FIELD : Saar

YEAR : 1971

MAN-HOURS WORKED *(1)* : 25 052 272

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	6	5	11	-	-	-	3	-	3	16	-	16	-	-	-				-	-	-	438	114	25	5	582
II. Eyes	-	-	-							2	-	2	-	-	-	-	-	-				1	-	1	57	14	3	-	74
III. Trunk	-	-	-	9	1	10	-	-	-	3	1	4	9	-	9	-	-	-				2	-	2	94	75	23	2	194
IV. Upper limbs (excluding the hands) *(3)*	1	-	1	11	-	11	-	-	-				35	-	35	-	-	-				4	-	4	201	97	51	-	349
V. Hands	11	-	11	30	-	30	-	-	-				87	-	87	-	-	-				1	-	1	380	483	129	-	992
VI. Lower limbs (excluding feet) *(4)*	3	-	3	26	1	27	6	-	6				66	1	67	-	-	-				10	-	10	222	181	111	2	516
VII. Feet	2	-	2	10	-	10	-	-	-				39	-	39	-	-	-				-	-	-	130	123	51	-	304
VIII. Multiple locations	-	-	-	-	1	1	-	-	-	-	-	-	22	-	22	-	-	-				2	-	2	205	152	24	1	382
IX. Not specified																-	-	-	-	-	-	-	-	-	1	2	-	-	3
TOTAL	17	-	17	92	8	100	6	-	6	8	1	9	274	1	275							20	-	20	1728	1241	417	10	3396

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY : Germany

COAL-FIELD : Saar

YEAR : 1971

MAN-HOURS WORKED *(1)* : 25 0 52 272

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	0,24	0,20	0,44	-	-	-	0,12	-	0,12	0,64	-	0,64	-	-	-				-	-	-	17,48	4,55	1,00	0,20	23,23
II. Eyes	-	-	-							0,08	-	0,08	-	-	-	-	-	-				0,04	-	0,04	2,27	0,56	0,12	-	2,95
III. Trunk	-	-	-	0,36	0,04	0,40	-	-	-	0,12	0,40	0,16	0,36	-	0,36	-	-	-				0,08	-	0,08	3,75	2,99	0,92	0,08	7,74
IV. Upper limbs (excluding the hands) *(3)*	0,04	-	0,04	0,44	-	0,44	-	-	-				1,40	-	1,40	-	-	-				0,16	-	0,16	8,02	3,87	2,04	-	13,93
V. Hands	0,44	-	0,44	1,20	-	1,20	-	-	-				3,47	-	3,47	-	-	-				0,04	-	0,04	15,17	19,28	5,15	-	39,60
VI. Lower limbs (excluding feet) *(4)*	0,12	-	0,12	1,04	0,04	1,08	0,24	-	0,24				2,63	0,04	2,67	-	-	-				0,40	-	0,40	8,86	7,23	4,43	0,08	20,60
VII. Feet	0,08	-	0,08	0,40	-	0,40	-	-	-				1,55	-	1,55	-	-	-				-	-	-	5,19	4,91	2,03	-	12,13
VIII. Multiple locations	-	-	-	-	0,04	0,04	-	-	-	-	-	-	0,88	-	0,88	-	-	-				0,08	-	0,08	8,18	6,07	0,96	0,04	15,25
IX. Not specified																-	-	-	-	-	-	-	-	-	0,04	0,08	-	-	0,12
TOTAL	0,68	-	0,68	3,67	0,32	3,99	0,24	-	0,24	0,32	0,04	0,36	10,94	0,04	10,98	-	-	-	-	-	-	0,80	-	0,80	68,97	49,54	16,65	0,40	136,56

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY : Germany

YEAR: 1971

COAL-FIELD : Total

MAN-HOURS WORKED *(1)* : 251 731 579

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	5200	2680	768	21	8669	2572	1089	314	14	3989	41	28	12	1	82	27	20	2	1	50	7840	3817	1096	37	12790	-	-	-
II. TRANSPORT, TOTAL	64	68	46	5	183	589	578	325	18	1510	90	85	57	3	235	9	3	6	-	18	752	734	434	26	1946	-	-	-
a) Continuous Transport	46	53	43	5	147	197	177	65	1	440	4	5	3	-	12	4	3	6	-	13	251	238	117	6	612	-	-	-
b) Discontinuous Transport	18	15	3	-	36	392	401	260	17	1070	86	80	54	3	223	5	-	-	-	5	501	496	317	20	1334	-	-	-
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	1280	853	182	5	2320	3991	2463	532	2	6988	362	263	85	1	711	156	98	18	-	272	5789	3677	817	8	10291	-	-	-
a) while moving about the mine	91	49	12	-	152	724	379	103	-	1206	57	45	11	1	114	12	7	3	-	22	884	480	129	1	1494	-	-	-
b) in the course of other activities	1189	804	170	5	2168	3267	2084	429	2	5782	305	218	74	-	597	144	91	15	-	250	4905	3197	688	7	8797	-	-	-
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	1636	1106	275	4	3021	783	421	111	4	1319	47	21	9	-	77	40	20	7	-	67	2506	1568	402	8	4484	-	-	-
a) Machines	104	87	39	2	232	100	44	37	2	183	1	1	3	-	5	2	2	-	-	4	207	134	79	4	424	-	-	-
b) Tools	408	257	53	-	718	594	304	60	2	960	37	20	2	-	59	38	18	7	-	63	1077	599	122	2	1800	-	-	-
c) Supports	1124	762	183	2	2071	89	73	14	-	176	9	-	4	-	13	-	-	-	-	-	1222	835	201	2	2260	-	-	-
V. FALLS OF OBJECTS	2627	1502	421	5	4555	2558	1333	365	6	4262	147	87	33	1	268	114	58	15	-	187	5446	2980	834	12	9272	-	-	-
VI. EXPLOSIVES	-	2	-	-	2	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	2	-	-	3	-	-	-
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	3	2	5	-	-	-
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-
IX. HEATINGS OR FIRES	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-
X. INRUSHES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
XI. ELECTRICITY	-	-	-	-	-	6	12	1	-	19	-	-	-	-	-	-	1	1	-	2	6	13	2	-	21	-	-	-
XII. OTHER CAUSES	244	126	48	6	424	352	208	89	14	663	33	24	11	1	69	18	9	11	-	38	647	367	159	21	1194	-	13	13
TOTAL	11051	6338	1740	46	19175	10852	6104	1740	62	18758	720	508	207	7	1442	364	209	60	1	634	22987	13159	3747	116	40009	-	13	13

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

Year: 1971
Country: Belgium
Coal-field: South

COMMON STATISTICAL SUMMARY OF UNDERGROUND ACCIDENTS AT MINES IN THE E.C.S.C. COUNTRIES

CAUSE	Number of casualties		Man-hours worked	Number of disablements as under (a) per million man-hours (to third decimal place)	Number of fatalities as under (b) per million man-hours (to third decimal place	Group accidents as under (c) below		
	Disablements as under (a) below	Fatalities as under (b) below				Number of accidents	Number of disablements as under (a)	Number of fatalities as under (b)
1) Falls of ground	124	2		7,665	0,124			
2) Haulage and transport	71	3		4,389	0,185			
3) Movement of personnel	44	1		2,720	0,062			
4) Machinery, handling of tools and supports	69	0		4,265				
5) Falling objects	39	0		2,411				
6) Explosives and fumes	1	0		0,062				
7) Explosions of firedamp or coal dust	0	0		-				
8) Sudden outbursts of firedamp, suffocation by natural gases	0	1		-	0,062			
9) Underground combustion and fires	0	0		-				
10) Inrushes of water	1	0		0,062				
11) Electricity	0	0		0				
12) Other causes	11	0		0,680				
TOTAL	360	7	16.176.328	22,254	0,433			

(a) Casualties were unable to resume work below ground for at least eight weeks.
(b) Casualties died within eight weeks.
(c) Accidents involving more than five casualties of types (a) and/or (b).

COMMON STATISTICAL SUMMARY OF UNDERGROUND ACCIDENTS
AT MINES IN THE E.C.S.C. COUNTRIES

Year: 1971
Country: Belgium
Coal-field: Hainaut

CAUSE	Number of casualties		Man-hours worked	Number of disablements as under (a) per million man-hours (to third decimal place)	Number of fatalities as under (b) per million man-hours (to third decimal place	Group accidents as under (c) below		
	Disablements as under (a) below	Fatalities as under (b) below				Number of accidents	Number of disablements as under (a)	Number of fatalities as under (b)
1) Falls of ground	84	2		7,637	0,182			
2) Haulage and transport	48	-		4,364	-			
3) Movement of personnel	27	1		2,455	0,091			
4) Machinery, handling of tools and supports	53	0		4,819				
5) Falling objects	26	0		2,364				
6) Explosives and fumes	1	0		0,091				
7) Explosions of firedamp or coal dust	0	0		-				
8) Sudden outbursts of firedamp, suffocation by natural gases	0	0		-				
9) Underground combustion and fires	0	0		-				
10) Inrushes of water	0	0		-				
11) Electricity	0	0		-				
12) Other causes	10	0		0,909				
TOTAL	249	3	10.998.696	22,639	0,273			

(a) Casualties were unable to resume work below ground for at least eight weeks.
(b) Casualties died within eight weeks.
(c) Accidents involving more than five casualties of types (a) and/or (b).

COMMON STATISTICAL SUMMARY OF UNDERGROUND ACCIDENTS
AT MINES IN THE E.C.S.C. COUNTRIES

Year: 1971
Country: Belgium
Coal-field: Liege

CAUSE	Number of casualties		Man-hours worked	Number of disablements as under (a) per million man-hours (to third decimal place)	Number of fatalities as under (b) per million man-hours (to third decimal place	Group accidents as under (c) below		
	Disablements as under (a) below	Fatalities as under (b) below				Number of accidents	Number of disablements as under (a)	Number of fatalities as under (b)
1) Falls of ground	40	0		6,797	-			
2) Haulage and transport	23	3		3,908	0,579			
3) Movement of personnel	17	0		2,880				
4) Machinery, handling of tools and supports	16	0		2,718				
5) Falling objects	13	0		2,209				
6) Explosives and fumes	0	0		-				
7) Explosions of firedamp or coal dust	0	0		-				
8) Sudden outbursts of firedamp, suffocation by natural gases	0	1		-	0,193			
9) Underground combustion and fires	0	0		-				
10) Inrushes of water	1	0		0,170				
11) Electricity	0	0						
12) Other causes	1	0		0,170				
TOTAL	111	4	5.885.208	18,860	0,772			

(a) Casualties were unable to resume work below ground for at least eight weeks.
(b) Casualties died within eight weeks.
(c) Accidents involving more than five casualties of types (a) and/or (b).

COMMON STATISTICAL SUMMARY OF UNDERGROUND ACCIDENTS
AT MINES IN THE E.C.S.C. COUNTRIES

Year: 1971
Country: Belgium
Coal-field: Campine

CAUSE	Number of casualties		Man-hours worked	Number of disablements as under (a) per million man-hours (to third decimal place)	Number of fatalities as under (b) per million man-hours (to third decimal place	Group accidents as under (c) below		
	Disablements as under (a) below	Fatalities as under (b) below				Number of accidents	Number of disablements as under (a)	Number of fatalities as under (b)
1) Falls of ground	36	2		1,504	0,084			
2) Haulage and transport	64	2		2,674	0,o84			
3) Movement of personnel	16	1		0,669	0,042			
4) Machinery, handling of tools and supports	30	1		1,253	0,042			
5) Falling objects	36	0		1,504				
6) Explosives and fumes	0	0		-	-			
7) Explosions of firedamp or coal dust	0	0		-	-			
8) Sudden outbursts of firedamp, suffocation by natural gases	0	0		-	-			
9) Underground combustion and fires	0	0		-	-			
10) Inrushes of water	0	0		-	-			
11) Electricity	0	0		-	-			
12) Other causes	2	0		0,084	-			
TOTAL	184	6	23.932.498	7,688	0,252			

(a) Casualties were unable to resume work below ground for at least eight weeks.
(b) Casualties died within eight weeks.
(c) Accidents involving more than five casualties of types (a) and/or (b).

COMMON STATISTICAL SUMMARY OF UNDERGROUND ACCIDENTS
AT MINES IN THE E.C.S.C. COUNTRIES

Year: 1971
Country: Belgium
Coal-field: the Kingdom

CAUSE	Number of casualties		Man-hours worked	Number of disablements as under (a) per million man-hours (to third decimal place)	Number of fatalities as under (b) per million man-hours (to third decimal place	Group accidents as under (c) below		
	Disablements as under (a) below	Fatalities as under (b) below				Number of accidents	Number of disablements as under (a)	Number of fatalities as under (b)
1) Falls of ground	160	4		3,989	0,100			
2) Haulage and transport	135	5		3,365	0,125			
3) Movement of personnel	60	2		1,496	0,049			
4) Machinery, handling of tools and supports	99	1		2,469	0,025			
5) Falling objects	75	0		1,870				
6) Explosives and fumes	1	0		0,025				
7) Explosions of firedamp or coal dust	0	0		-				
8) Sudden outbursts of firedamp, suffocation by natural gases	0	1		-	0,025			
9) Underground combustion and fires	0	0		-				
10) Inrushes of water	1	0		0,025				
11) Electricity	0	0		-				
12) Other causes	13	0		0,324				
TOTAL	544	13	40.108.826	13,563	0,324			

(a) Casualties were unable to resume work below ground for at least eight weeks.
(b) Casualties died within eight weeks.
(c) Accidents involving more than five casualties of types (a) and/or (b).

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY : Belgium

COAL-FIELD

YEAR: 1971

MAN-HOURS WORKED *(1)*: 40 126 690

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	4342	654	147	4	5147	335	42	12	-	389	59	10	1	-	70	-	-	-	-	-	4736	706	160	4	5606	-	-	-
II. TRANSPORT, TOTAL	-	-	-	-	-	-	-	-	-	-	5	2	1	-	8	-	-	-	-	-	985	266	135	5	1391	-	-	-
a) Continuous Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	429	121	57	2	609	-	-	-
b) Discontinuous Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	556	145	78	3	782	-	-	-
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	330	51	17	-	398	-	-	-	-	-	12	-	2	2	16	-	-	-	-	-	1115	171	60	2	1348	-	-	-
a) while moving about the mine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b) in the course of other activities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1974	395	78	1	2448	-	-	-
a) Machines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	228	77	19	1	325	-	-	-
b) Tools	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	698	94	10	-	802	-	-	-
c) Supports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1048	224	49	-	1326	-	-	-
V. FALLS OF OBJECTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2073	401	96	-	2570	-	-	-
VI. EXPLOSIVES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	2	-	-	-
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IX. HEATINGS OR FIRES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X. INRUSHES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	1	-	5	-	-	-
XI. ELECTRICITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	3	-	-	-
XII. OTHER CAUSES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	385	52	14	-	451	-	-	-
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11374	1993	545	13	13825	-	-	-

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY : Belgium

YEAR : 1971

COAL-FIELD

MAN-HOURS WORKED *(1)* : 40 126 640

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	56 days *(3)*	Fatal acci-dents	total
I. FALLS OF GROUNDS AND ROCKS	108,2	16,3	3,7	0,1	128,3	8,3	1,0	0,3	-	9,6	1,5	0,2	0,0	-	1,7						118,0	17,6	4,0	0,1	139,7			
II. TRANSPORT, TOTAL	-	-	-	-	-	-	-	-	-	-	0,1	0,0	0,0	-	0,2						24,5	6,6	3,4	0,1	34,6			
a) Continuous Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						10,7	3,0	1,4	0,0	15,1			
b) Discontinuous Transport	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						13,8	3,6	2,0	0,1	19,5			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	8,2	1,3	0,4	-	9,9	-	-	-	-	-	0,3	-	0,0	0,0	0,4						27,8	4,3	1,5	0,0	33,6			
a) while moving about the mine																												
b) in the course of other activities																												
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						49,2	9,8	2,0	0,0	61,0			
a) Machines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						5,7	1,9	0,5	0,0	8,1			
b) Tools	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						17,4	2,3	0,2	-	19,9			
c) Supports	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						26,1	5,6	1,3	0,0	33,0			
V. FALLS OF OBJECTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						51,7	10,0	2,4	-	64,1			
VI. EXPLOSIVES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						0,0	-	0,0	-	0,0			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	-	-	-	-			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	-	-	0,0	0,0			
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	-	-	-	-			
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	-	-	-	-			
IX. HEATINGS OR FIRES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						-	-	-	-	-			
X. INRUSHES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						0,0	0,0	0,0	-	0,1			
XI. ELECTRICITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						0,0	0,0	-	-	0,0			
XII. OTHER CAUSES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						9,6	1,3	0,3	-	11,2			
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						281,0	49,7	13,6	0,3	344,6			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY : Belgium

COAL-FIELD

YEAR : 1971

MAN-HOURS WORKED *(1)*: 40 126 640

NATURE OF THE INJURY	Amputations and enucleations (1)			Fractures with or without dislocation (2)			Luxations, twists and sprains (3)			Concussion and internal injury (4)			Open wounds contusions and muscular abrasions (5)			Burns and harmful effects of electricity and radiation (6)			Poisoning and suffocation (7)			Multiple injuries of those not specified *(2)* (8)			TOTAL (9)				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	20	4	24	1	-	1	1	-	1	22	2	24	-	-	-				1	-	1			45	6	51
II. Eyes	-	-	-							-	-	-	3	-	3	-	-	-				11	-	11			14	-	14
III. Trunk	-	-	-	37	-	37	-	-	-	-	-	-	20	2	22	-	-	-				8	1	9			65	3	68
IV. Upper limbs (excluding the hands) *(3)*	1	-	1	38	-	38	-	-	-				26	-	26	1	-	1				7	-	7			72	-	72
V. Hands	15	-	15	136	-	136	2	-	2				62	-	62	-	-	-				11	-	11			226	-	215
VI. Lower limbs (excluding feet) *(4)*	3	-	3	68	-	68	5	-	5				64	-	64	1	-	1				19	1	20			160	1	161
VII. Feet	2	-	2	68	-	68	2	-	2				24	-	24	-	-	-				5	-	5			101	-	101
VIII. Multiple locations	1	1	2	-	1	1	-	-	-	-	-	-	1	-	1	-	-	-				-	-	-			2	2	4
IX. Not specified																-	-	-	-	1	1	-	-	-			-	1	1
TOTAL	22	1	23	367	5	372	10	-	10	1	-	1	222	4	226	2	-	2	-	1	1	62	2	64			685	13	698

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY : Belgium

COAL-FIELD

YEAR : 1971

MAN-HOURS WORKED *(1)*: 40 126 640

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	0,5	0,1	0,6	0,0	-	0,0	0,0	-	0,0	0,5	0,0	0,6	-	-	-				0,0	-	0,0			1,1	0,2	1,3
II. Eyes	-	-	-							-	-	-	0,0	-	0,0	-	-	-				0,3	-	0,3			0,3	-	0,3
III. Trunk	-	-	-	0,9	-	0,9	-	-	-	-	-	-	0,5	0,0	0,5	-	-	-				0,2	0,0	0,2			1,6	0,1	1,7
IV. Upper limbs (excluding the hands) *(3)*	0,0	-	0,0	0,9	-	0,9	-	-	-				0,6	-	0,6	0,0	-	0,0				0,2	-	0,2			1,8	-	1,8
V. Hands	0,4	-	0,4	3,4	-	3,4	0,0	-	0,0				1,5	-	1,5	-	-	-				0,3	-	0,3			5,6	-	5,6
VI. Lower limbs (excluding feet) *(4)*	0,1	-	0,1	1,7	-	1,7	0,1	-	0,1				1,6	-	1,6	0,0	-	0,0				0,5	0,0	0,5			4,0	0,0	4,0
VII. Feet	0,0	-	0,0	1,7	-	1,7	0,0	-	0,0				0,6	-	0,6	-	-	-				0,1	-	0,1			2,5	-	2,5
VIII. Multiple locations	0,0	0,0	0,0	-	0,0	0,0	-	-	-	-	-	-	0,0	-	0,0	-	-	-				-	-	-			0,0	0,0	0,0
IX. Not specified																			-	0,0	0,0	-	-	-			-	0,0	0,1
TOTAL	0,5	0,0	0,6	9,1	0,1	9,3	0,2	-	0,2	0,0	-	0,0	5,5	0,1	5,6	0,0	-	0,0	-	0,0	0,0	1,6	0,0	1,6			17,0	0,3	17,3

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) Including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY : FRANCE

COAL-FIELD : NORD/PAS-DE-CALAIS

YEAR: 1971

MAN-HOURS WORKED *(1)*: 64 242 008

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	1568	471	165	7	2211	542	179	52	1	774	5	1	2	-	8	226	69	12	1	308	2341	720	231	9	3301			
II. TRANSPORT, TOTAL	33	25	11	2	71	89	56	23	-	168	23	10	6	-	39	142	93	37	7	279	287	184	77	9	557			
a) Continuous Transport	13	15	8	1	37	14	12	-	-	26	-	-	-	-	-	10	7	6	1	24	37	34	14	2	87			
b) Discontinuous Transport	20	10	3	1	34	75	44	23	-	142	23	10	6	-	39	132	86	31	6	255	250	150	63	7	470			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	248	107	37	-	392	281	131	35	-	447	33	23	3	4	63	379	164	64	1	608	941	425	139	5	1510			
a) while moving about the mine	204	83	34	-	321	223	91	27	-	341	30	18	1	-	49	297	118	47	1	463	754	310	109	1	1174			
b) in the course of other activities	44	24	3	-	71	58	40	8	-	106	3	5	2	4	14	82	46	17	-	145	187	115	30	4	336			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	756	241	60	2	1059	337	117	27	-	481	6	5	3	-	14	276	116	23	-	415	1375	479	113	2	1969			
a) Machines	52	27	10	-	89	49	18	10	-	77	-	2	1	-	3	23	12	7	-	42	124	59	28		211			
b) Tools	219	84	10	-	313	146	47	8	-	201	4	1	-	-	5	107	36	2	-	145	476	168	20	-	664			
c) Supports	485	130	40	2	657	142	52	9	-	203	2	2	2	-	6	146	68	14	-	228	775	252	65	2	1094			
V. FALLS OF OBJECTS	960	420	107	-	1487	535	195	61	1	792	24	15	8	-	47	574	280	75	3	932	2093	910	251	4	3258			
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	1				1	1				1											2				2			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	1				1											8				8	9				9			
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases	1				1											8				8	9				9			
IX. HEATINGS OR FIRES																												
X. INRUSHES	1	1			2	1				1						3	1			4	5	2			7			
XI. ELECTRICITY	3				3	1				1	3				3	1	1			2	8	1			9			
XII. OTHER CAUSES	176	18	7		201	114	17	10		141	13	7	1		21	88	27	3		118	391	69	21		481			
TOTAL	3747	1283	387	11	5428	1901	695	208	2	2806	107	61	23	4	195	1697	751	214	12	2674	7452	2790	832	29	11103			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY : FRANCE

COAL-FIELD : NORD / PAS-DE-CALAIS

YEAR : 1971

MAN-HOURS WORKED *(1)*: 64 242 008

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	24,408	7,332	2,568	0,109	34,417	8,437	2,786	0,809	0,016	12,048	0,078	0,016	0,031	-	0,125	3,518	1,074	0,186	0,016	4,794	36,441	11,208	3,594	0,141	51,384			
II. TRANSPORT, TOTAL	0,514	0,389	0,171	0,031	1,105	1,385	0,872	0,358	-	2,615	0,358	0,156	0,093	-	0,607	2,210	1,448	0,576	0,109	4,343	4,467	2,865	1,198	0,140	8,670			
a) Continuous Transport	0,202	0,233	0,125	0,016	0,576	0,218	0,187	-	-	0,405	-	-	-	-	-	0,156	0,109	0,093	0,016	0,374	0,576	0,529	0,218	0,032	1,355			
b) Discontinuous Transport	0,312	0,156	0,046	0,015	0,529	1,167	0,685	0,358	-	2,210	0,358	0,156	0,093	-	0,607	2,054	1,339	0,483	0,093	3,969	3,891	2,336	0,980	0,108	7,315			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	3,860	1,666	0,576	-	6,102	4,374	2,039	0,545	-	6,958	0,514	0,358	0,047	0,062	0,981	5,899	2,553	0,996	0,016	9,464	14,647	6,616	2,164	0,078	23,505			
a) while moving about the mine	3,176	1,292	0,529	-	4,997	3,471	1,417	0,420	-	5,308	0,467	0,280	0,016	-	0,763	4,623	1,836	0,732	0,016	7,207	11,737	4,825	1,697	0,016	18,275			
b) in the course of other activities	0,684	0,374	0,047	-	1,105	0,903	0,622	0,125	-	1,650	0,047	0,078	0,031	0,062	0,218	1,276	0,717	0,264	-	2,257	2,910	1,791	0,467	0,062	5,230			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	11,768	3,752	0,934	0,031	16,485	5,246	1,821	0,420	-	7,487	0,093	0,078	0,047	-	0,218	4,296	1,806	0,358	-	6,460	21,403	7,457	1,759	0,031	30,650			
a) Machines	0,809	0,420	0,156	-	1,385	0,763	0,280	0,156	-	1,199	-	0,031	0,015	-	0,046	0,358	0,188	0,109	-	0,655	1,930	0,919	0,436	-	3,285			
b) Tools	3,409	1,308	0,156	-	4,873	2,273	0,732	0,124	-	3,129	0,062	0,016	-	-	0,078	1,665	0,560	0,031	-	2,256	7,409	2,616	0,311	-	10,336			
c) Supports	7,550	2,024	0,622	0,031	10,227	2,210	0,809	0,140	-	3,159	0,031	0,031	0,032	-	0,094	2,273	1,058	0,218	-	3,549	12,064	3,922	1,012	0,031	17,029			
V. FALLS OF OBJECTS	14,943	6,538	1,666	-	23,147	8,328	3,035	0,949	0,016	12,328	0,374	0,233	0,125	-	0,732	8,935	4,359	1,167	0,046	14,507	32,580	14,165	3,907	0,062	50,714			
VI. EXPLOSIVES																					-	-	-	-	-			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	0,016	-	-	-	0,016	0,015	-	-	-	0,015											0,031	-	-	-	0,031			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	0,016	-	-	-	0,016											0,124	-	-	-	0,124	0,140	-	-	-	0,140			
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases	0,016	-	-	-	0,016											0,124	-	-	-	0,124	0,140	-	-	-	0,140			
IX. HEATINGS OR FIRES																					-	-	-	-	-			
X. INRUSHES	0,016	0,015	-	-	0,031	0,015	-	-	-	0,015						0,047	0,016	-	-	0,063	0,078	0,031	-	-	0,109			
XI. ELECTRICITY	0,047	-	-	-	0,047	0,016	-	-	-	0,016	0,047	-	-	-	0,047	0,015	0,016	-	-	0,031	0,125	0,016	-	-	0,141			
XII. OTHER CAUSES	2,740	0,280	0,109	-	3,129	1,775	0,265	0,155	-	2,195	0,202	0,109	0,016	-	0,327	1,369	0,420	0,047	-	1,836	6,086	1,074	0,327	-	7,487			
TOTAL	58,328	19,972	6,024	0,171	84,495	29,591	10,818	3,236	0,032	43,677	1,666	0,950	0,359	0,062	3,037	26,413	11,692	3,330	0,187	41,622	115,998	43,432	12,949	0,452	172,831			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY : FRANCE

COAL-FIELD : NORD/PAS-DE-CALAIS

YEAR : 1971

MAN-HOURS WORKED *(1)* : 64 242 008

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	10	4	14	-	-	-	-	-	-	13	1	14	-	-	-				3	-	3	510	93	26	5	634
II. Eyes	-	-	-							-	-	-	10	-	10	1	-	1				2	-	2	529	15	13	-	557
III. Trunk	-	-	-	39	2	41	11	-	11	4	6	10	12	-	12	-	-	-				15	3	18	822	323	81	11	1237
IV. Upper limbs (excluding the hands) *(3)*	1	-	1	56	-	56	5	-	5				34	-	34	1	-	1				10	-	10	987	196	107	-	1290
V. Hands	37	-	37	143	-	143	1	-	1				77	1	78	1	-	1				3	-	3	2588	1268	262	1	4119
VI. Lower limbs (excluding feet) *(4)*	1	-	1	101	-	101	29	-	29				80	-	80	-	-	-				23	-	23	1127	500	234	-	1861
VII. Feet	1	-	1	51	-	51	4	-	4				16	-	16	-	-	-				-	-	-	609	305	72	-	986
VIII. Multiple locations	-	-	-	12	3	15	-	-	-	-	-	-	10	-	10	-	-	-				15	7	22	279	90	37	10	416
IX. Not specified																-	-	-	-	2	2	-	-	-	1	-	-	2	3
TOTAL	40	-	40	412	9	421	50	-	50	4	6	10	252	2	254	3	-	3	-	2	2	71	10	81	7452	2790	832	29	11103

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY : FRANCE

COAL-FIELD : NORD/PAS-DE-CALAIS

YEAR: 1971

MAN-HOURS WORKED *(1)*: 64 242 008

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	0,156	0,062	0,218	-	-	-	-	-	-	0,202	0,016	0,218	-	-	-				0,046	-	0,046	7,939	1,448	0,404	0,078	0,869
II. Eyes	-	-	-							-	-	-	0,156	-	0,156	0,015	-	0,015				0,031	-	0,031	8,234	0,234	0,202	-	8,670
III. Trunk				0,607	0,031	0,638	0,171	-	0,171	0,062	0,093	0,155	0,187	-	0,187							0,234	0,047	0,281	12,795	5,028	1,261	0,171	19,255
IV. Upper limbs (excluding the hands) *(3)*	0,015	-	0,015	0,871	-	0,871	0,078	-	0,078				0,529	-	0,529	0,016	-	0,016				0,156	-	0,156	15,364	3,051	1,665	-	20,080
V. Hands	0,576	-	0,576	2,227	-	2,227	0,015	-	0,015				1,198	0,016	1,214	0,015	-	0,015				0,047	-	0,047	40,284	19,739	4,078	0,016	64,117
VI. Lower limbs (excluding feet) *(4)*	0,016	-	0,016	1,572	-	1,572	0,451	-	0,451				1,245	-	1,245	-	-	-				0,358	-	0,358	17,543	7,783	3,642	-	28,968
VII. Feet	0,016	-	0,016	0,794	-	0,794	0,062	-	0,062				0,249	-	0,249	-	-	-				-	-	-	9,480	4,748	1,121	-	15,349
VIII. Multiple locations	-	-	-	0,187	0,047	0,234	-	-	-	-	-	-	0,156	-	0,156	-	-	-				0,233	0,109	0,342	4,343	1,401	0,576	0,156	6,476
IX. Not specified																-	-	-	-	0,031	0,031	-	-	-	0,016	-	-	0,031	0,047
TOTAL	0,623	-	0,623	6,414	0,140	6,554	0,777	-	0,777	0,062	0,093	0,155	3,922	0,032	3,954	0,046	-	0,046	-	0,031	0,031	1,105	0,156	1,261	115,998	43,432	12,949	0,452	172,831

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY: FRANCE

COAL-FIELD : LORRAINE

YEAR: 1971

MAN-HOURS WORKED *(1)*: 24 173 728

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	349	293	103	2	747	81	67	20	-	168	1	-	-	-	1	7	3	1	1	12	438	363	124	3	928			
II. TRANSPORT, TOTAL	39	34	29	-	102	7	3	5	-	15	6	8	5	-	19	22	42	23	1	88	74	87	62	1	224			
a) Continuous Transport	23	26	20	-	69	1	1	2	-	4	-	-	-	-	-	4	11	9		24	28	38	31	-	97			
b) Discontinuous Transport	16	8	9	-	33	6	2	3	-	11	6	8	5	-	19	18	31	14	1	64	46	49	31	1	127			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	445	374	84	1	904	79	81	16	2	178	7	12	6	-	25	182	172	68	-	422	713	639	174	3	1529			
a) while moving about the mine	391	332	72	-	795	68	73	13	-	154	5	10	6	-	21	158	148	54	-	360	622	563	145	-	1330			
b) in the course of other activities	54	42	12	1	109	11	8	3	2	24	2	2	-	-	4	24	24	14	-	62	91	76	29	3	199			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	195	93	33	-	321	51	15	7	-	73	2	-	1	-	3	41	23	4	1	69	289	131	45	1	466			
a) Machines	29	24	16	-	69	13	5	5	-	23	1	-	-	-	1	8	5	1	1	15	51	34	22	1	108			
b) Tools	155	56	15	-	226	34	10	2	-	46	1	-	1	-	2	33	13	3	-	49	223	79	21	-	323			
c) Supports	11	13	2	-	26	4	-	-	-	4	-	-	-	-	-	-	5	-	-	5	15	18	2	-	35			
V. FALLS OF OBJECTS	255	195	68	1	519	34	36	6	-	76	3	2	1	-	6	72	69	31	-	172	364	302	106	1	773			
VI. EXPLOSIVES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	1			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES	1	1	-	-	2											8	-	-	-	8	9	1	-	-	10			
X. INRUSHES																												
XI. ELECTRICITY																												
XII. OTHER CAUSES	16	12	2	-	30	5	2	-	-	7	2	1	1	-	4	12	3	3	-	18	35	18	6	-	59			
TOTAL	1300	1002	319	4	2625	257	204	54	2	517	21	23	14	-	58	344	312	130	4	790	1922	1541	517	10	3990			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY : FRANCE

COAL-FIELD : LORRAINE

YEAR: 1971

MAN-HOURS WORKED *(1)*: 24 173 728

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal acci-dents	total	56 days *(3)*	Fatal acci-dents	total
I. FALLS OF GROUNDS AND ROCKS	14,437	12,120	4,261	0,083	30,901	3,351	2,772	0,827	-	6,950	0,041	-	-	-	0,041	0,290	0,123	0,041	0,042	0,496	18,119	15,015	5,129	0,125	38,388			
II. TRANSPORT, TOTAL	1,613	1,407	1,199	-	4,219	0,290	0,124	0,207	-	0,621	0,248	0,331	0,207	-	0,786	0,910	1,738	0,951	0,041	3,640	3,061	3,600	2,564	0,041	9,266			
a) Continuous Transport	0,951	1,076	0,827	-	2,854	0,041	0,042	0,083	-	0,166	-	-	-	-	-	0,166	0,454	0,372	-	0,992	1,158	1,572	1,282	-	4,012			
b) Discontinuous Transport	0,662	0,331	0,372	-	1,365	0,249	0,082	0,124	-	0,455	0,248	0,331	0,207	-	0,786	0,744	1,284	0,579	0,041	2,648	1,903	2,028	1,282	0,041	5,254			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	18,408	15,471	3,475	0,042	37,396	3,268	3,350	0,662	0,083	7,363	0,290	0,496	0,248	-	1,034	7,529	7,115	2,813	-	17,457	29,495	26,432	7,198	0,125	63,250			
a) while moving about the mine	16,174	13,735	2,978	-	32,887	2,813	3,019	0,538	-	6,370	0,207	0,414	0,248	-	0,869	6,536	6,122	2,234	-	14,892	25,730	23,290	5,998	-	55,018			
b) in the course of other activities	2,234	1,736	0,497	0,042	4,509	0,455	0,331	0,124	0,083	0,993	0,083	0,082	-	-	0,165	0,993	0,993	0,579	-	2,565	3,765	3,142	1,200	0,125	8,232			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	8,067	3,847	1,365	-	13,279	2,110	0,620	0,290	-	3,020	0,082	-	0,042	-	0,124	1,696	0,951	0,166	0,041	2,854	11,955	5,418	1,863	0,041	19,277			
a) Machines	1,200	0,992	0,662	-	2,854	0,538	0,207	0,207	-	0,952	0,041	-	-	-	0,041	0,331	0,207	0,042	0,041	0,621	2,110	1,406	0,911	0,041	4,468			
b) Tools	6,412	2,317	0,620	-	9,349	1,407	0,413	0,083	-	1,903	0,041	-	0,042	-	0,083	1,365	0,537	0,124	-	2,026	9,225	3,267	0,869	-	13,361			
c) Supports	0,455	0,538	0,083	-	1,076	0,465	-	-	-	0,165	-	-	-	-	-	-	0,207	-	-	0,207	0,620	0,745	0,083	-	1,448			
V. FALLS OF OBJECTS	10,549	8,067	2,813	0,041	21,470	1,406	1,490	0,248	-	3,144	0,124	0,083	0,041	-	0,248	2,978	2,855	1,282	-	7,115	15,057	12,495	4,384	0,041	31,977			
VI. EXPLOSIVES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,041	0,041	-	-	-	0,041	0,041			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES	0,041	0,042	-	-	0,083											0,331				0,331	0,372	0,042			0,414			
X. INRUSHES																												
XI. ELECTRICITY																												
XII. OTHER CAUSES	0,662	0,496	0,083	-	1,241	0,207	0,082	-	-	0,289	0,083	0,041	0,041	-	0,165	0,496	0,125	0,124	-	0,745	1,448	0,744	0,248	-	2,440			
TOTAL	53,777	41,450	13,196	0,166	108,589	10,632	8,438	2,234	0,083	21,387	0,868	0,951	0,579	-	2,398	14,230	12,907	5,377	0,165	32,679	79,507	63,746	21,386	0,414	165,053			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY : France

COAL-FIELD: Lorraine

YEAR: 1971

MAN-HOURS WORKED *(1)* : 24 173 728

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck				7	4	11				2		2	23		23							1	2	3	203	133	33	6	375
II. Eyes													4		4							2		2	192	44	6		242
III. Trunk				15		15	12		12				14		14							2	1	3	278	290	43	1	612
IV. Upper limbs (excluding the hands) *(3)*	1		1	23		23	5		5				11		11							4		4	261	150	44		455
V. Hands	14		14	111		111	5		5				45		45							9		9	412	441	184		1037
VI. Lower limbs (excluding feet) *(4)*	1		1	56		56	18		18				39		39							12		12	303	257	126		686
VII. Feet	3		3	37		37	1		1				9		9							1		1	180	142	51		373
VIII. Multiple locations		1	1	8	2	10	3		3				19		19										71	73	30	3	177
IX. Not specified																									22	11			33
TOTAL	19	1	20	257	6	263	44	-	44	2	-	2	164	-	164	-	-	-	-	-	-	31	3	34	1922	1541	517	10	3990

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) Including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY : FRANCE

COAL-FIELD : LORRAINE

YEAR : 1971

MAN-HOURS WORKED *(1)*: 24 173 728

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	0,290	0,166	0,456	-	-	-	0,083	-	0,083	0,952	-	0,952	-	-	-				0,041	0,083	0,124	8,397	5,502	1,366	0,249	15,514
II. Eyes	-	-	-							-	-	-	0,165	-	0,165	-	-	-				0,083	-	0,083	7,943	1,820	0,248	-	10,011
III. Trunk	-	-	-	0,620	-	0,620	0,496	-	0,496	-	-	-	0,580	-	0,580	-	-	-				0,083	0,041	0,124	11,500	11,996	1,779	0,041	25,316
IV. Upper limbs (excluding the hands) *(3)*	0,041	-	0,041	0,952	-	0,952	0,207	-	0,207				0,455	-	0,455	-	-	-				0,165	-	0,165	10,797	6,205	1,820	-	18,822
V. Hands	0,580	-	0,580	4,591	-	4,591	0,207	-	0,207				1,861	-	1,861	-	-	-				0,372	-	0,372	17,043	18,243	7,611	-	42,897
VI. Lower limbs (excluding feet) *(4)*	0,041	-	0,041	2,316	-	2,316	0,745	-	0,745				1,613	-	1,613	-	-	-				0,497	-	0,497	12,534	10,631	5,212	-	28,377
VII. Feet	0,124	-	0,124	1,531	-	1,531	0,041	-	0,041				0,372	-	0,372	-	-	-				0,041	-	0,041	7,446	5,874	2,109	-	15,429
VIII. Multiple locations	-	0,041	0,041	0,331	0,083	0,414	0,124	-	0,124	-	-	-	0,786	-	0,786	-	-	-				-	-	-	2,937	3,020	1,241	0,124	7,322
IX. Not specified																-	-	-	-	-	-	-	-	-	0,910	0,455	-	-	1,365
TOTAL	0,786	0,041	0,827	10,631	0,249	10,880	1,820	-	1,820	0,083	-	0,083	6,784	-	6,784	-	-	-	-	-	-	1,282	0,124	1,406	79,507	63,746	21,386	0,414	165053

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY: FRANCE

COAL-FIELD: CENTRE-MIDI

YEAR: 1971

MAN-HOURS WORKED *(1)*: 22 845 488

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	151	92	38	1	282	65	55	9	-	129	1	-	-	-	1	51	45	12	-	108	268	192	59	1	520			
II. TRANSPORT, TOTAL	26	24	23	-	73	4	7	3	1	15	2	8	3	-	13	66	64	50	1	181	98	103	79	2	282			
a) Continuous Transport	20	18	19	-	57	3	3	1	-	7	-	-	-	-	-	26	17	16	-	59	49	38	36	-	123			
b) Discontinuous Transport	6	6	4	-	16	1	4	2	1	8	2	8	3	-	13	40	47	34	1	122	49	65	43	2	159			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	62	42	16	-	120	33	23	14	-	70	9	3	2	-	14	234	172	63	-	469	338	240	95	-	673			
a) while moving about the mine	39	30	12	-	81	25	10	11	-	46	6	1	2	-	9	151	107	39	-	297	221	148	64	-	433			
b) in the course of other activities	23	12	4	-	39	8	13	3	-	24	3	2	-	-	5	83	65	24	-	172	117	92	31	-	240			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	165	113	47	-	325	53	43	12	-	108	5	2	-	-	7	171	148	47	-	366	394	306	106	-	806			
a) Machines	11	9	8	-	28	5	7	2	-	14	1	-	-	-	1	18	13	13	-	44	35	29	23	-	87			
b) Tools	46	27	8	-	81	21	19	3	-	43	2	1	-	-	3	93	62	14	-	169	162	109	25	-	296			
c) Supports	108	77	31	-	216	27	17	7	-	51	2	1	-	-	3	60	73	20	-	153	197	168	58	-	423			
V. FALLS OF OBJECTS	181	124	45	-	350	77	43	26	-	146	14	8	-	-	22	267	207	80	-	554	539	382	151	-	1072			
VI. EXPLOSIVES	-	1	-	-	1	-	2	-	1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	1	4			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	-	5	-	8	13	-	-	-	-	-	-	-	-	-	-	-	5	-	8	13	-	8	8
a) Outbursts of Gas	-	-	-	-	-	-	5	-	8	13	-	-	-	-	-	-	-	-	-	-	-	5	-	8	13	-	8	8
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
IX. HEATINGS OR FIRES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
X. INRUSHES	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1			
XI. ELECTRICITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	3	1	1	1	-	3			
XII. OTHER CAUSES	33	10	3	-	46	19	2	-	-	21	4	2	1	-	7	57	11	4	1	73	113	25	8	1	147			
TOTAL	618	407	172	1	1198	251	180	64	10	505	35	23	6	-	64	847	648	257	2	1754	1751	1258	499	13	3521	-	8	8

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY : FRANCE

COAL-FIELD : CENTRE-MIDI

YEAR : 1971

MAN-HOURS WORKED *(1)*: 22 845 488

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	6,610	4,027	1,663	0,044	12,344	2,845	2,407	0,394	-	5,646	0,044	-	-	-	0,044	2,232	1,970	0,525	-	4,727	11,731	8,404	2,582	0,044	22,761			
II. TRANSPORT, TOTAL	1,138	1,051	1,007	-	3,196	0,175	0,306	0,131	0,044	0,656	0,088	0,350	0,131	-	0,569	2,889	2,801	2,189	0,044	7,923	4,290	4,508	3,458	0,088	12,344			
a) Continuous Transport	0,875	0,788	0,832	-	2,495	0,131	0,131	0,044	-	0,306	-	-	-	-	-	1,138	0,744	0,700	-	2,582	2,145	1,663	1,576	-	5,384			
b) Discontinuous Transport	0,263	0,263	0,175	-	0,701	0,044	0,175	0,088	0,044	0,350	0,088	0,350	0,131	-	0,569	1,751	2,057	1,488	0,044	5,340	2,145	2,845	1,882	0,088	6,960			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	2,714	1,838	0,700	-	5,252	1,446	1,006	0,613	-	3,064	0,394	0,131	0,088	-	0,613	10,243	7,529	2,757	-	20,529	14,795	10,505	4,158	-	29,458			
a) while moving about the mine	1,707	1,331	0,525	-	3,545	1,094	0,438	0,481	-	2,013	0,263	0,044	0,088	-	0,394	6,609	4,684	1,707	-	13,000	9,673	6,478	2,801	-	18,953			
b) in the course of other activities	1,007	0,525	0,175	-	1,707	0,350	0,569	0,131	-	1,050	0,131	0,088	-	-	0,219	3,633	2,845	1,050	-	7,528	5,121	4,027	1,357	-	10,505			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	7,222	4,946	2,057	-	14,226	2,320	1,882	0,525	-	4,727	0,219	0,088	-	-	0,306	7,485	6,478	2,057	-	16,020	17,246	13,394	4,640	-	35,280			
a) Machines	0,481	0,394	0,350	-	1,225	0,219	0,306	0,088	-	0,613	0,044	-	-	-	0,044	0,788	0,569	0,569	-	1,926	1,532	1,269	1,006	-	3,808			
b) Tools	2,013	1,182	0,350	-	3,545	0,919	0,832	0,131	-	1,882	0,088	0,044	-	-	0,131	4,071	2,714	0,613	-	7,398	7,091	4,771	1,094	-	12,956			
c) Supports	4,727	3,370	1,357	-	9,454	1,182	0,744	0,306	-	2,232	0,088	0,044	-	-	0,131	2,626	3,195	0,875	-	6,697	8,623	7,354	2,539	-	18,516			
V. FALLS OF OBJECTS	7,923	5,428	1,970	-	15,321	3,370	1,882	1,138	-	6,390	0,613	0,350	-	-	0,963	11,687	9,061	3,502	-	22,250	23,593	16,721	6,610	-	46,923			
VI. EXPLOSIVES	-	0,044	-	-	0,044	-	0,088	-	0,044	0,131	-	-	-	-	-	-	-	-	-	-	-	0,131	-	0,044	0,175			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	-	0,219	-	0,350	0,569	-	-	-	-	-	-	-	-	-	-	-	0,219	-	0,350	0,569	-	0,350	0,350
a) Outbursts of Gas	-	-	-	-	-	-	0,219	-	0,350	0,569	-	-	-	-	-	-	-	-	-	-	-	0,219	-	0,350	0,569	-	0,350	0,350
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
IX. HEATINGS OR FIRES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
X. INRUSHES	-	0,044	-	-	0,044	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,044	-	-	0,044			
XI. ELECTRICITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,044	0,044	0,044	-	0,131	0,044	0,044	0,044	-	0,131			
XII. OTHER CAUSES	1,444	0,438	0,131	-	2,013	0,832	0,088	-	-	0,919	0,175	0,088	0,044	-	0,306	2,495	0,481	0,175	0,044	3,195	4,946	1,094	0,350	0,044	6,434			
TOTAL	27,051	17,815	7,529	0,044	52,439	10,987	7,879	2,801	0,438	22,105	1,532	1,007	0,263	-	2,801	37,075	28,364	11,249	0,088	76,776	76,645	55,065	21,842	0,569	154,122	-	0,350	0,350

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY : FRANCE

COAL-FIELD : CENTRE-MIDI

YEAR: 1971

MAN-HOURS WORKED *(1)* : 22 845 488

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	3	-	3	1	-	1	-	1	1	6	-	6	-	-	-				-	-	-	117	44	10	1	172
II. Eyes	-	-	-							-	-	-	3	-	3	-	-	-				2	-	2	156	13	5	-	174
III. Trunk	-	-	-	16	-	16	45	-	45	4	1	5	16	-	16	-	-	-				1	-	1	270	221	82	1	574
IV. Upper limbs (excluding the hands) *(3)*	-	-	-	14	-	14	3	-	3				8	-	8	-	-	-				2	-	2	150	96	27	-	273
V. Hands	14	-	14	93	-	93	3	-	3				35	-	35	1	-	1				12	-	12	424	427	158	-	1009
VI. Lower limbs (excluding feet) *(4)*	1	-	1	32	-	32	32	-	32				48	-	48	-	-	-				6	-	6	318	246	119	-	683
VII. Feet	3	-	3	36	-	36	1	-	1				20	-	20	-	-	-				3	-	3	187	136	63	-	386
VIII. Multiple locations	-	-	-	13	-	13	5	-	5	1	3	4	11	-	11	-	-	-				2	-	2	112	64	32	3	211
IX. Not specified																-	-	-	-	8	8	3	-	3	17	11	3	8	39
TOTAL	18	-	18	207	-	207	90	-	90	5	5	10	147	-	147	1	-	1	-	8	8	31	-	31	1751	1258	499	13	3521

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY: FRANCE

COAL-FIELD: CENTRE-MIDI

YEAR: 1971

MAN-HOURS WORKED *(1)*: 22 845 488

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)*, 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	0,131	-	0,131	0,044	-	0,044	-	0,044	0,044	0,263	-	0,263	-	-	-				-	-	-	5,121	1,926	0,438	0,044	7,529
II. Eyes	-	-	-							-	-	-	0,131	-	0,131	-	-	-				0,088	-	0,088	6,828	0,569	0,219	-	7,616
III. Trunk	-	-	-	0,700	-	0,700	1,970	-	1,970	0,175	0,044	0,219	0,700	-	0,700	-	-	-				0,044	-	0,044	11,818	9,674	3,589	0,044	25,125
IV. Upper limbs (excluding the hands) *(3)*	-	-	-	0,613	-	0,613	0,131	-	0,131				0,350	-	0,350	-	-	-				0,088	-	0,088	6,566	4,202	1,182	-	11,950
V. Hands	0,613	-	0,613	4,071	-	4,071	0,131	-	0,131				1,532	-	1,532	0,044	-	0,044				0,525	-	0,525	18,559	18,691	6,916	-	44,166
VI. Lower limbs (excluding feet) *(4)*	0,044	-	0,044	1,401	-	1,401	1,401	-	1,401				2,101	-	2,101	-	-	-				0,263	-	0,263	13,919	10,768	5,209	-	29,896
VII. Feet	0,131	-	0,131	1,576	-	1,576	0,044	-	0,044				0,875	-	0,875	-	-	-				0,131	-	0,131	8,185	5,953	2,758	-	16,896
VIII. Multiple locations	-	-	-	0,569	-	0,569	0,219	-	0,219	0,044	0,131	0,175	0,481	-	0,481	-	-	-				0,088	-	0,088	4,902	2,801	1,401	0,131	9,236
IX. Not specified																-	-	-	-	0,350	0,350	0,131	-	0,131	0,744	0,481	0,131	0,350	1,707
TOTAL	0,788	-	0,788	9,061	-	9,061	3,939	-	3,939	0,219	0,219	0,438	6,434	-	6,434	0,044	-	0,044	-	0,350	0,350	1,357	-	1,357	76,645	55,065	21,842	0,569	154,122

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY : France

COAL-FIELD :

YEAR : 1971

MAN-HOURS WORKED *(1)* : 111 261 224

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	> 56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	> 56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	> 56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	> 56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	> 56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	2068	856	306	10	3240	688	301	81	1	1071	7	1	2	-	10	284	117	25	2	428	3047	1275	414	13	4749			
II. TRANSPORT, TOTAL	98	83	63	2	246	100	66	31	1	198	31	26	14	-	71	230	199	110	9	548	459	374	218	12	1063			
a) Continuous Transport	56	59	47	1	163	18	16	3	-	37	-	-	-	-	-	40	35	31	1	107	114	110	81	2	307			
b) Discontinuous Transport	42	24	16	1	83	82	50	28	1	161	31	26	14	-	71	190	164	79	8	441	345	264	137	10	756			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	755	523	137	1	1416	393	235	65	2	695	49	38	11	4	102	795	508	195	1	1499	1992	1304	408	8	3712			
a) while moving about the mine	634	445	118	-	1197	316	174	51	-	541	41	29	9	-	79	606	373	140	1	1120	1597	1021	318	1	2937			
b) in the course of other activities	121	78	19	1	219	77	61	14	2	154	8	9	2	4	23	189	135	55	-	379	395	283	90	7	775			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	1116	447	140	2	1705	441	175	46	-	662	13	7	4	-	24	488	287	74	1	850	2058	916	264	3	3241			
a) Machines	92	60	34	-	186	67	30	17	-	114	2	2	1	-	5	49	30	21	1	101	210	122	73	1	406			
b) Tools	420	218	32	-	620	201	76	13	-	290	7	2	1	-	10	233	111	19	-	363	861	356	66	-	1283			
c) Supports	604	220	73	2	899	173	69	16	-	258	4	3	2	-	9	206	146	34	-	386	987	438	125	2	1552			
V. FALLS OF OBJECTS	1396	739	220	1	2356	646	274	93	1	1014	41	25	9	-	75	913	556	186	3	1658	2996	1594	508	5	5103			
VI. EXPLOSIVES	-	1	-	-	1	-	2	-	1	3	-	-	-	-	-	-	-	-	1	1	-	3	-	2	5			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	1	-	-	-	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	1	-	-	-	1	-	5	-	8	13	-	-	-	-	-	8	-	-	-	8	9	5	-	8	22	-	8	8
a) Outbursts of Gas	-	-	-	-	-	-	5	-	8	13	-	-	-	-	-	-	-	-	-	-	-	5	-	8	13	-	8	8
b) De-oxygenation and Poisoning by natural Gases	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	8	-	-	-	8	9	-	-	-	9			
IX. HEATINGS OR FIRES	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-	8	-	-	-	8	9	1	-	-	10			
X. INRUSHES	1	2	-	-	3	1	-	-	-	1	-	-	-	-	-	3	1	-	-	4	5	3	-	-	8			
XI. ELECTRICITY	3	-	-	-	3	1	-	-	-	1	3	-	-	-	3	2	2	1	-	5	9	2	1	-	12			
XII. OTHER CAUSES	225	40	12	-	277	138	21	10	-	169	19	10	3	-	32	157	41	10	1	209	539	112	35	1	687			
TOTAL	5665	2692	878	16	9251	2409	1079	326	14	3828	163	107	43	4	317	2888	1711	601	18	5218	11125	5589	1848	52	18614	-	8	8

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY: FRANCE

COAL-FIELD

YEAR: 1971

MAN-HOURS WORKED *(1)*: 111 261 224

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	18,586	7,694	2,750	0,090	29,120	6,184	2,705	0,728	0,009	9,625	0,063	0,009	0,018	-	0,090	2,552	1,051	0,225	0,018	3,847	27,386	11,459	3,721	0,117	42,683			
II. TRANSPORT, TOTAL	0,881	0,746	0,566	0,018	2,211	0,899	0,593	0,279	0,009	1,779	0,279	0,234	0,126	-	0,638	2,067	1,788	0,989	0,081	4,925	4,125	3,361	1,959	0,108	9,554			
a) Continuous Transport	0,503	0,530	0,422	0,009	1,465	0,162	0,144	0,027	-	0,333	-	-	-	-	-	0,360	0,314	0,279	0,009	0,962	1,025	0,989	0,728	0,018	2,759			
b) Discontinuous Transport	0,377	0,216	0,144	0,009	0,746	0,737	0,449	0,252	0,009	1,447	0,279	0,234	0,126	-	0,638	1,708	1,474	0,710	0,072	3,964	3,101	2,373	1,231	0,090	6,795			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	6,786	4,701	1,231	0,009	12,726	3,532	2,112	0,584	0,018	6,246	0,440	0,342	0,099	0,036	0,917	7,145	4,566	1,753	0,009	13,472	17,903	11,720	3,667	0,072	33,362			
a) while moving about the mine	5,698	3,999	1,060	-	10,758	2,840	1,564	0,458	-	4,862	0,368	0,261	0,081	-	0,710	5,447	3,352	1,258	0,009	10,066	14,353	9,176	2,858	0,009	26,397			
b) in the course of other activities	1,087	0,701	0,171	0,009	1,968	0,692	0,548	0,126	0,018	1,384	0,072	0,081	0,018	0,036	0,207	1,699	1,213	0,494		3,406	3,550	2,543	0,809	0,063	6,965			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	10,030	4,017	1,258	0,018	15;324	3,964	1,573	0,413	-	5,950	0,117	0,063	0,036	-	0,216	4,386	2,579	0,665	0,009	7,640	18,497	8,233	2,373	0,027	29,129			
a) Machines	0,827	0,539	0,306	-	1,672	0,602	0,270	0,153	-	1,025	0,018	0,018	0,009	-	0,045	0,440	0,270	0,189	0,009	0,908	1,887	1,096	0,656	0,009	3,649			
b) Tools	3,775	1,959	0,288	-	5,572	1,805	0,683	0,117	-	2,606	0,063	0,018	0,009	-	0,090	2,094	0,998	0,171	-	3,262	7,738	3,200	0,593	-	11,531			
c) Supports	5,429	1,977	0,656	0,018	8,080	1,555	0,620	0,144	-	2,319	0,036	0,027	0,018	-	0,081	1,851	1,312	0,306	-	3,469	8,871	3,937	1,123	0,018	13,949			
V. FALLS OF OBJECTS	12,547	6,642	1,977	0,009	21,175	5,806	2,463	0,836	0,009	9,113	0,368	0,225	0,081	-	0,674	8,205	4,997	1,672	0,027	14,901	26,927	14,326	4,565	0,045	45,865			
VI. EXPLOSIVES	-	0,009	-	-	0,009	-	0,018	-	0,009	0,027	-	-	-	-	-	-	-	-	0,009	0,009	-	0,027	-	0,018	0,045			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	0,009	-	-	-	0,009	0,009	-	-	-	0,009	-	-	-	-	-	-	-	-	-	-	0,018	-	-	-	0,018			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	0,009	-	-	-	0,009	-	0,045	-	0,072	0,117	-	-	-	-	-	0,072	-	-	-	0,072	0,081	0,045	-	0,072	0,198	-	0,072	0,072
a) Outbursts of Gas	-	-	-	-	-	-	0,045	-	0,072	0,117	-	-	-	-	-	-	-	-	-	-	-	0,045	-	0,072	0,117	-	0,072	0,072
b) De-oxygenation and Poisoning by natural Gases	0,009	-	-	-	0,009	-	-	-	-	-	-	-	-	-	-	0,072	-	-	-	0,072	0,081	-	-	-	0,081			
IX. HEATINGS OR FIRES	0,009	0,009	-	-	0,018	-	-	-	-	-	-	-	-	-	-	0,072	-	-	-	0,072	0,081	0,009	-	-	0,090			
X. INRUSHES	0,009	0,018	-	-	0,027	0,009	-	-	-	0,009	-	-	-	-	-	0,027	0,009	-	-	0,036	0,045	0,027	-	-	0,072			
XI. ELECTRICITY	0,027	-	-	-	0,027	0,009	-	-	-	0,009	0,027	-	-	-	0,027	0,018	0,018	0,009	-	0,045	0,081	0,018	0,009	-	0,108			
XII. OTHER CAUSES	2,022	0,359	0,108	-	2,490	1,240	0,189	0,090	-	1,519	0,171	0,090	0,027	-	0,288	1,411	0,368	0,090	0,009	1,878	4,844	1,007	0,314	0,009	6,175			
TOTAL	50,916	24,195	7,891	0,144	83,146	21,651	9,697	2,930	0,126	34,405	1,465	0,962	0,386	0,036	2,849	25,956	15,378	5,402	0,162	46,898	99,980	50,233	16,609	0,467	167,290	-	0,072	0,072

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY : FRANCE

COAL-FIELD

YEAR : 1971

MAN-HOURS WORKED *(1)* : 111 261 224

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	20	8	28	1	-	1	2	1	3	42	1	43	-	-	-				4	2	6	830	270	69	12	1181
II. Eyes	-	-	-							-	-	-	17	-	17	1	-	1				6	-	6	877	72	24	-	973
III. Trunk	-	-	-	70	2	72	68	-	68	8	7	15	42	-	42	-	-	-				18	4	22	1370	834	206	13	2423
IV. Upper limbs (excluding the hands) *(3)*	2	-	2	93	-	93	13	-	13				53	-	53	1	-	1				16	-	16	1398	442	178	-	2018
V. Hands	65	-	65	347	-	347	9	-	9				157	1	158	2	-	2				24	-	24	3424	2136	604	1	6165
VI. Lower limbs (excluding feet) *(4)*	3	-	3	189	-	189	79	-	79				167	-	167	-	-	-				41	-	41	1748	1003	479	-	3230
VII. Feet	7	-	7	124	-	124	6	-	6				45	-	45	-	-	-				4	-	4	976	583	186	-	1745
VIII. Multiple locations	-	-	-	33	5	38	8	-	8	1	3	4	40	-	40	-	-	-				17	7	24	462	227	99	16	804
IX. Not specified																-	-	-	-	10	10	3	-	3	40	22	3	10	75
TOTAL	77	-	77	876	15	891	184	-	184	11	11	22	563	2	565	4	-	4	-	10	10	133	13	146	11125	5589	1848	52	18614

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY : FRANCE

COAL-FIELD

YEAR : 1971

MAN-HOURS WORKED *(1)*: 111 261 224

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	0,180	0,072	0,252	0,009		0,009	0,018	0,009	0,027	0,377	0,009	0,386	-	-	-				0,036	0,018	0,054	7,460	2,427	0,620	0,108	10,614
II. Eyes	-	-	-							-	-	-	0,153	-	0,153	0,009	-	0,009				0,054	-	0,054	7,882	0,647	0,216	-	8,745
III. Trunk	-	-	-	0,629	0,018	0,647	0,611	-	0,611	0,072	0,063	0,135	0,377	-	0,377	-	-	-				0,162	0,036	0,198	12,313	7,496	1,851	0,117	21,777
IV. Upper limbs (excluding the hands) *(3)*	0,018	-	0,018	0,836	-	0,836	0,117	-	0,117				0,476	-	0,476	0,009	-	0,009				0,144	-	0,144	12,565	3,972	1,600	-	18,137
V. Hands	0,584	-	0,584	3,119	-	3,119	0,081	-	0,081				1,411	0,009	1,420	0,018	-	0,018				0,216	-	0,216	30,774	19,198	5,428	0,009	55,410
VI. Lower limbs (excluding feet) *(4)*	0,027	-	0,027	1,699	-	1,699	0,710	-	0,710				1,501	-	1,501	-	-	-				0,368	-	0,368	15,710	9,014	4,305	-	29,030
VII. Feet	0,063	-	0,063	1,114	-	1,114	0,054	-	0,054				0,404	-	0,404	-	-	-				0,036	-	0,036	8,772	5,240	1,672	-	15,683
VIII. Multiple locations	-	-	-	0,296	0,045	0,341	0,072	-	0,072	0,009	0,027	0,036	0,359	-	0,359	-	-	-				0,453	0,063	0,216	4,152	2,040	0,889	0,144	7,226
IX. Not specified																-	-	-	-	0,090	0,090	0,027	-	0,027	0,359	0,198	0,027	0,090	0,674
TOTAL	0,692	-	0,692	7,873	0,135	8,008	1,654	-	1,654	0,099	0,099	0,198	5,060	0,018	5,078	0,036	-	0,036	-	0,090	0,090	1,195	0,117	1,312	99,980	50,233	16,609	0,467	167,290

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY : Italy

COAL-FIELD : Sulcis

YEAR : 1971

MAN-HOURS WORKED *(1)*: 1 174 922

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	71	23	7	-	101	16	1	-	-	17	-	-	-	-	-	11	2	-	-	13	98	26	7	-	131			
II. TRANSPORT, TOTAL																												
a) Continuous Transport	-	2	1	-	3	7	2	-	-	9	-	-	-	-	-	1	1	1	-	3	8	5	2	-	15			
b) Discontinuous Transport	4	2	-	-	6	1	-	1	-	2	-	-	-	-	-	2	-	1	-	3	7	2	2	-	11			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL																												
a) while moving about the mine	2	-	-	-	2	6	2	-	-	8	-	-	-	-	-	2	2	-	-	4	10	4	-	-	14			
b) in the course of other activities	11	5	-	-	16	20	4	2	-	26	-	-	-	-	-	10	3	-	-	13	41	12	2	-	55			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL																												
a) Machines	6	3	-	-	9	3	2	-	-	5	-	-	-	-	-	6	2	-	-	8	15	7	-	-	22			
b) Tools	6	2	-	-	8	3	-	-	-	3	-	-	-	-	-	4	-	-	-	4	13	2	-	-	15			
c) Supports	33	14	2	-	49	9	-	1	-	10	-	-	-	-	-	5	1	-	-	6	47	15	3	-	65			
V. FALLS OF OBJECTS	8	2	2	-	12	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-	11	2	2	-	15			
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES																												
X. INRUSHES																												
XI. ELECTRICITY																												
XII. OTHER CAUSES	23	6	1	-	30	18	4	-	-	22	-	-	-	-	-	20	1	-	-	21	61	11	1	-	73			
TOTAL	164	59	13	-	236	86	15	4	-	105	-	-	-	-	-	61	12	2	-	75	311	86	19	-	416			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY : Italy

COAL-FIELD : Sulcis

YEAR : 1971

MAN-HOURS WORKED *(1)* : 1 174 922

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	60	19	6	-	85	14	1	-	-	15	-	-	-	-	-	9	2	-	-	11	83	22	6	-	111			
II. TRANSPORT, TOTAL																							3					
a) Continuous Transport	-	2	1	-	3	6	1	-	-	7	-	-	-	-	-	1	1	1	-	3	7	4	2	-	13			
b) Discontinuous Transport	3	2	-	-	5	1	-	1	-	2	-	-	-	-	-	2	-	-	-	2	6	2	1	-	9			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL																							2					
a) while moving about the mine	2	-	-	-	2	5	1	-	-	6	-	-	-	-	-	2	2	-	-	4	9	3	-	-	12			
b) in the course of other activities	9	4	-	-	13	17	3	2	-	22	-	-	-	-	-	9	3	-	-	12	35	10	2	-	47			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL																							2					
a) Machines	5	2	-	-	7	3	2	-	-	5	-	-	-	-	-	5	2	-	-	7	13	6	-	-	19			
b) Tools	5	2	-	-	7	3	-	-	-	3	-	-	-	-	-	3	-	-	-	3	11	2	-	-	13			
c) Supports	28	12	1	-	41	8	1	1	-	9	-	-	-	-	-	4	1	-	-	5	40	13	2	-	55			
V. FALLS OF OBJECTS	7	2	2	-	11	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	9	2	2	-	13			
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES																												
X. INRUSHES																												
XI. ELECTRICITY																												
XII. OTHER CAUSES	20	5	1	-	26	15	3	-	-	18	-	-	-	-	-	17	1	-	-	18	52	9	1	-	62			
TOTAL	139	50	11	-	200	74	11	4	-	89	-	-	-	-	-	52	12	1	-	65	265	73	16	-	354			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY : Italy

COAL-FIELD : Sulcis

YEAR : 1971

MAN-HOURS WORKED *(1)* : 1 174 922

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck													3		3										9	3	3	-	15
II. Eyes																									30	1	-	-	31
III. Trunk																									32	12	-	-	44
IV. Upper limbs (excluding the hands) *(3)*													1		1										33	4	1	-	38
V. Hands				1		1	2		2				4		4										110	33	7	-	150
VI. Lower limbs (excluding feet) *(4)*													5		5										57	16	5	-	78
VII. Feet																									30	15	-	-	45
VIII. Multiple locations													2		2							1		1	10	2	3	-	15
IX. Not specified																													
TOTAL				1		1	2		2				15		15							1		1	311	86	19	-	416

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY : Italy

COAL-FIELD : Sulcis

YEAR : 1971

MAN-HOURS WORKED *(1)*: 1 174 922

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck													3		3										8	3	3		14
II. Eyes																									25	1	-	-	26
III. Trunk																									27	10	-	-	37
IV. Upper limbs (excluding the hands) *(3)*													1		1										28	3	1	-	32
V. Hands				1		1	2		2				3		3										94	28	6	-	128
VI. Lower limbs (excluding feet) *(4)*													4		4										49	13	4	-	66
VII. Feet																									25	13	-	-	38
VIII. Multiple locations													1		1							1		1	9	2	2		13
IX. Not specified																													
TOTAL				1		1	2		2				12		12							1		1	265	73	16	-	354

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY Netherlands

COAL-FIELD South-Limbourg

YEAR: 1971

MAN-HOURS WORKED *(1)* : 9 890 552

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	323	44	23	1	391	32	5	1	-	38	-	-	-	-	-	34	7	1	-	42	389	56	25	1	471			
II. TRANSPORT, TOTAL	10	3	2	-	15	1	-	1	-	2	4	1	-	-	5	72	25	15	-	112	87	29	18	-	134			
a) Continuous Transport	9	3	1	-	13	1	-	-	-	1	-	-	-	-	-	37	8	5	-	50	47	11	6	-	64			
b) Discontinuous Transport	1	-	1	-	2	--	-	1	-	1	4	1	-	-	5	35	17	10	-	62	40	18	12	-	70			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	25	2	-	-	27	16	1	1	-	18	1	-	-	-	1	102	23	3	-	128	144	26	4	-	174			
a) while moving about the mine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39	10	1	-	50	39	10	1	-	50			
b) in the course of other activities	25	2	-	-	27	16	1	1	-	18	1	-	-	-	1	63	13	2	-	78	105	16	3	-	124			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	320	69	23	-	412	24	9	-	-	33	3	-	-	-	3	108	26	7	-	141	455	104	30	-	589			
a) Machines	8	4	4	-	16	-	-	-	-	-	-	-	-	-	-	9	-	2	-	11	17	4	6	-	27			
b) Tools	61	7	3	-	71	16	9	-	-	25	3	-	-	-	3	85	22	2	-	109	165	38	5	-	208			
c) Supports	251	58	16	-	325	8	-	-	-	8	-	-	-	-	-	14	4	3	-	21	273	62	19	-	354			
V. FALLS OF OBJECTS	49	11	1	-	61	9	2	1	-	12	2	1	-	-	3	84	34	10	-	128	144	48	12	-	204			
VI. EXPLOSIVES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
IX. HEATINGS OR FIRES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
X. INRUSHES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
XI. ELECTRICITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
XII. OTHER CAUSES	67	13	-	-	80	14	2	-	-	16	8	-	-	-	8	98	11	2	-	111	187	26	2	-	215			
TOTAL	794	142	49	1	986	96	19	4	-	119	18	2	-	-	20	498	126	38	-	662	1406	289	91	1	1787			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY Netherlands

COAL-FIELD South-Limbourg

YEAR : 1971

MAN-HOURS WORKED *(1)* : 9.890 552

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	32,657	4,449	2,325	0,101	39,533	3,235	0,506	0,101	-	3,842	-	-	-	-	-	3,438	0,708	0,101	-	4,246	39,330	5,662	2,528	0,101	47,621			
II. TRANSPORT, TOTAL	1,011	0,303	0,202	-	1,517	0,101	-	0,101	-	0,202	0,404	0,101	-	-	0,506	7,280	2,528	1,517	-	11,324	8,796	2,932	1,820	-	13,548			
a) Continuous Transport	0,910	0,303	0,101	-	1,314	0,101	-	-	-	0,101	-	-	-	-	-	3,741	0,809	0,506	-	5,055	4,752	1,112	0,607	-	6,471			
b) Discontinuous Transport	0,101	-	0,101	-	0,202	-	-	0,101	-	0,101	0,404	0,101	-	-	0,506	3,539	1,719	1,011	-	6,269	4,044	1,820	1,213	-	7,077			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	2,528	0,202	-	-	2,730	1,618	0,101	0,101	-	1,820	0,101	-	-	-	0,101	10,313	2,325	0,303	-	12,942	14,559	2,629	0,404	-	17,593			
a) while moving about the mine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,943	1,011	0,101	-	5,055	3,943	1,011	0,101	-	5,055			
b) in the course of other activities	2,528	0,202	-	-	2,730	1,618	0,101	0,101	-	1,820	0,101	-	-	-	0,101	6,370	1,314	0,202	-	7,886	10,616	1,618	0,303	-	12,537			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	32,355	6,976	2,325	-	41,656	2,427	0,910	-	-	3,337	0,303	-	-	-	0,303	10,920	2,629	0,708	-	14,256	46,003	10,515	3,033	-	59,552			
a) Machines	0,809	0,404	0,404	-	1,618	-	-	-	-	-	-	-	-	-	-	0,910	-	0,202	-	1,112	1,719	0,404	0,607	-	2,730			
b) Tools	6,168	0,708	0,303	-	7,179	1,618	0,910	-	-	2,528	0,303	-	-	-	0,303	8,594	2,224	0,202	-	11,021	16,683	3,842	0,506	-	21,030			
c) Supports	25,378	5,864	1,618	-	32,860	0,809	-	-	-	0,809	-	-	-	-	-	1,415	0,404	0,303	-	2,123	27,602	6,269	1,921	-	35,792			
V. FALLS OF OBJECTS	4,954	1,112	0,101	-	6,168	0,910	0,202	0,101	-	1,213	0,202	0,101	-	-	0,303	8,493	3,438	1,011	-	12,942	14,559	4,853	1,213	-	20,626			
VI. EXPLOSIVES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
IX. HEATINGS OR FIRES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
X. INRUSHES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
XI. ELECTRICITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
XII. OTHER CAUSES	6,774	1,314	-	-	8,089	1,415	0,202	-	-	1,618	0,809	-	-	-	0,809	0,908	1,112	0,202	-	11,223	18,907	2,629	0,202	-	21,738			
TOTAL	80,279	14,357	4,954	0,101	99,691	9,706	1,921	0,404	-	12,032	1,820	0,202	-	-	2,022	50,351	12,739	3,842	-	66,933	142,156	29,220	9,201	0,101	180,677			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY Netherlands

COAL-FIELD South-Limbourg

YEAR : 1971

MAN-HOURS WORKED *(1)*: 9 890 552

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	4	-	4	-	-	-	3	-	3	4	-	4	-	-	-				-	-	-	141	14	11	-	166
II. Eyes	-	-	-							-	-	-	1	-	1	-	-	-				-	-	-	90	1	1	-	92
III. Trunk	-	-	-	1	-	1	-	-	-	-	-	-	1	-	1	-	-	-				-	-	-	68	8	2	-	78
IV. Upper limbs (excluding the hands) *(3)*	-	-	-	5	-	5	-	-	-				1	-	1	-	-	-				-	-	-	120	13	6	-	139
V. Hands	2	-	2	21	-	21	-	-	-				13	-	13	-	-	-				-	-	-	596	152	36	-	784
VI. Lower limbs (excluding feet) *(4)*	-	-	-	14	-	14	1	-	1				6	-	6	-	-	-				-	-	-	246	36	21	-	303
VII. Feet	-	-	-	12	-	12	-	-	-				-	-	-	-	-	-				-	-	-	134	63	12	-	209
VIII. Multiple locations	-	-	-	1	-	1	-	-	-	-	-	-	1	-	1	-	-	-				-	-	-	11	2	2	-	15
IX. Not specified																-	-	-	-	1	1	-	-	-	-	-	-	1	1
TOTAL	2	-	2	58	-	58	1	-	1	3	-	3	27	-	27	-	-	-	-	1	1	-	-	-	1406	289	91	1	1787

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY Netherlands

COAL-FIELD South Limbourg

YEAR : 1971

MAN-HOURS WORKED *(1)* : 9 890 552

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	-	-	-	0,404	-	0,404	-	-	-	0,303	-	0,303	0,404	-	0,404	-	-	-				-	-	-	14,256	1,415	1,112	-	16,784
II. Eyes	-	-	-							-	-	-	0,101	-	0,101	-	-	-				-	-	-	9,100	0,101	0,101	-	9,302
III. Trunk	-	-	-	0,101	-	0,101	-	-	-	-	-	-	0,101	-	0,101	-	-	-				-	-	-	6,875	0,809	0,202	-	7,886
IV. Upper limbs (excluding the hands) *(3)*	-	-	-	0,506	-	0,506	-	-	-				0,101	-	0,101	-	-	-				-	-	-	12,133	1,315	0,607	-	14,054
V. Hands	0,202	-	0,202	2,123	-	2,123	-	-	-				1,315	-	1,315	-	-	-				-	-	-	60,260	15,368	3,640	-	79,267
VI. Lower limbs (excluding feet) *(4)*	-	-	-	1,416	-	1,416	0,101	-	0,101				0,607	-	0,607	-	-	-				-	-	-	24,872	3,640	2,123	-	30,635
VII. Feet	-	-	-	1,213	-	1,213	-	-	-				-	-	-	-	-	-				-	-	-	13,548	6,370	1,213	-	21,131
VIII. Multiple locations	-	-	-	0,101	-	0,101	-	-	-	-	-	-	0,101	-	0,101	-	-	-				-	-	-	1,112	0,202	0,202	-	1,517
IX. Not specified																-	-	-	-	0,101	0,101	-	-	-	-	-	-	0,101	0,101
TOTAL	0,202	-	0,202	5,864	-	5,864	0,101	-	0,101	0,303	-	0,303	2,730	-	2,730	-	-	-	-	0,101	0,101	-	-	-	142,156	29,220	9,200	0,101	180,677

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

ANNEX II

DECISION *(1)*
OF 9 JULY, 1957
CONCERNING THE TERMS OF REFERENCE AND RULES OF PROCEDURE OF THE MINES SAFETY COMMISSION

(1) See "Journal officiel de la Communauté européenne du charbon et de l'acier" no. 28 of the 31st August 1957.

COUNCIL OF MINISTERS

DECISION

of 9 July 1957

concerning the terms of reference and rules of procedure of the Mines Safety Commission

Having taken note of the Recommendations adopted by the Conference on Safety in Coalmines and of the proposals submitted by the High Authority in connection with the Conference's final Report, which afford a working basis for the improvement of safety in coalmines, and

having regard to their Decisions at the Council's 36th and 42th sessions on September 6, 1956 and on May 9 and 10, 1957, setting up the Mines Safety Commission,

THE REPRESENTATIVES OF THE GOVERNMENTS OF THE MEMBER STATES MEETING AT THE SPECIAL COUNCIL OF MINISTERS,

- hereby lay down that the terms of reference of the aforesaid Commission shall be as follows:

1. The Commission shall follow developments regarding safety in coalmines, including those regarding the safety regulations instituted by the public authorities, and assemble the necessary information concerning progress and practical results obtained, more especially in the matter of accident prevention.

   To secure the necessary information, the Commission shall apply to the Governments concerned.

   The Commission shall evaluate the information in its possession and submit to the Governments proposals for the improvement of safety in coalmines.

2. The Commission shall help the High Authority to work out a method of compiling intercomparable accident statistics.

3. The Commission shall ensure the prompt forwarding to the quarters directly concerned (including in particular mines inspectorates and employers' and workers' associations) of relevant information assembled by it.

4. The Commission shall ascertain, by regular contact with the Governments, what action is being taken to implement the proposals of the Conference on Safety in Coalmines, and such proposals as it may itself draw up.

5. The Commission shall propose such study and research as it deems most indicated for the improvement of safety, with notes as to the way in which these can best be effected.

6. The Commission shall facilitate the exchange of information and experience among persons responsible for safety matters, and propose appropriate measures for this purpose (e.g. organization of study sessions, establishment of documentation services).

7. The Commission shall propose appropriate measures for ensuring the necessary liaison among the rescue services of the Community countries.

8. The Commission shall submit annually to the Council of Ministers and the High Authority a Report on its activities and on developments regarding safety in coalmines in the different member States. In this connection, il shall in particular examine the statistics compiled on accidents and incidents in coalmines.

- The Representatives of the Governments further lay down that the rules of procedure of the Commission shall be those set forth in the Annex to the present Decision.

- The Representatives of the Governments trust that the High Authority will arrange for the Commission to start work at the earliest possible moment.

This Decision was adopted by the Council at its forty-fourth session, on July 9, 1957.

For the Council,

(sgd.) J. REY

President.

ANNEX

RULES OF PROCEDURE
of the Mines Safety Commission

CHAIRMAN

Article 1

The Chairman of the Mines Safety Commission shall be a Member of the High Authority of the European Coal and Steel Community.

Article 2

The Chairman shall conduct the work of the Commission in accordance with these Rules of Procedure.

MEMBERS

Article 3

The Commission shall consist of 24 members appointed by the Governments; each country shall have four members, of whom two shall be representatives of that country's Governments, one of the employers and one of the workers.

Each Government shall send in writing to the Chairman a nominal roll of the members appointed by it. It shall notify the Chairman of all changes in this.

Each Government may appoint for any particular meeting of the Commission one or two advisers, whose names it shall send to the Chairman.

I.L.O. PARTICIPATION

Article 4

Representatives of the International Labour Organization shall be invited to attend the proceedings of the Commission in a consultative capacity.

U.K. PARTICIPATION

Article 5

Delegates appointed by the Government of the United Kingdom may attend the proceedings of the Commission as observers.

ORGANIZATION

(a) Restricted Committee

Article 6

A Restricted Committee shall be set up, to consist of Governments representatives on the Commission.

Article 7

The Chairman of the Commission shall act as Chairman of the Restricted Committee.

Article 8

The function of the Restricted Committee shall be to ensure permanent liaison among the Governments of the member States and between them and the Commission, more especially for the purpose of exchanging relevant information. The Restricted Committee shall see to the preparation of the Commission's activities.

Article 9

The Restricted Committee shall be convened by the Chairman.

The Chairman shall be required to convene it when asked to do so by the representatives of three or more Governments.

(b) Working Parties

Article 10

The Commission of the Restricted Committee may set up Working Parties of experts to consider specific technical matters.

Article 11

The Working Parties shall decide their own modus operandi.

Article 12

The Restricted Committee shall be given reports by the Working Parties on the results of their proceedings, which it shall submit to the Commission with the comments of its members.

In the event of differences of opinion within the Working Parties, the views expressed shall be given, together with the names of those expressing them.

SECRETARIAT

Article 13

The High Authority shall be responsible for the secretarial arrangements in connection with the work of the Commission, the Restricted Committee and the Working Parties.

These arrangements shall be under the charge of a High Authority staff member appointed to act as Secretary.

All documents shall be in the four official languages of the Community.

WORKING PROCEDURE

Article 14

The Chairman shall fix the agenda and the dates of meetings after consultation with the members of the Restricted Committee.

Article 15

The Chairman shall allow to speak any member of the Commission, representative of the International Labour Organization or United Kingdom observer asking to do so.

The Chairman may allow advisers to speak.

Article 16

The members of the High Authority shall have the right to attend meetings of the Commission and of the Restricted Committee, and to speak there.

The Chairman may bring with him advisers, whom he may allow to speak.

Article 17

Where the Commission or the Restricted Committee deems it desirable to obtain information concerning the various aspects of safety in coalmines, it shall request this from the Governments of the member States.

Article 18

Sixteen members shall constitute a quorum. Conclusions shall be adopted by majority of the members present.

Proposals by the Commission under 1,3 of its terms of reference shall, however, require a vote in favour by two-thirds of the members present, and by not less than thirteen members in all.

Any dissenting opinions shall be brought to the attention of the Governments should the members expressing them so request.

THE COUNCIL

DECISION *(1)*

of March 11, 1965

of the Representatives of the Governments of the Member States assembled in the Special Council of Ministers to modify the decision of July 9, 1957

concerning the terms of reference and rules of procedure of the Mines Safety Commission

THE REPRESENTATIVES OF THE GOVERNMENTS OF THE MEMBER STATES ASSEMBLED IN THE SPECIAL COUNCIL OF MINISTERS -

having regard to the decision of July 9, 1957 regarding the terms of reference and rules of procedure of the Mines Safety Commission, and

having regard to the High Authority's proposal of January 7, 1964, and

seeing that this decision in no way affects Article 118 of the Treaty setting up the European Economic Commununity,

DECIDE:

Article 1

The terms of reference of the Mines Safety Commission laid down by the decision of July 9, 1957 are replaced by the provisions in the annex.

Article 2

The provisions of Article 17 of the rules of procedure annexed to the Decision of July 9, 1957 are replaced by the following provisions:

"Should the Mines Safety Commission or the Restricted Committee consider it desirable to receive information regarding the various fields for which it is responsible, it shall apply to the Governments of the member States."

This decision was adopted by the Council at its one-hundredth session, on March 11, 1965.

For the Council

(sgd.) M. MAURICE-BOKANOWSKI

President

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(1) See "Journal officiel de la Communauté européenne du charbon et de l'acier" no. 46 of 22nd March 1965.

ANNEX

TERMS OF REFERENCE FOR THE MINES SAFETY COMMISSION

1. The Commission shall follow developments regarding safety and measures to avoid at working-points conditions which represent a danger to health in coalmines, including to this end the safety regulations instituted by the public authorities and assemble the necessary information concerning progress and practical results obtained.

   To secure the necessary information, the Commission shall apply to the Governments concerned.

   The Commission shall evaluate the information in its possession and submit to the Governments proposals for the improvement of safety and healthy conditions in coalmines.

2. The Commission shall help the High Authority to work out a method of compiling intercomparable statistics on accidents and damage to health attributable to vocational activities in coalmines.

3. The Commission shall ensure the prompt forwarding to the quarters directly concerned (including in particular mines inspectorates and employers' and workers' associations) of relevant information assembled by it.

4. The Commission shall ascertain, by regular contact with the Governments, what action is being taken to implement the proposals of the Conference on Safety in Coalmines, and such proposals as it may itself draw up.

5. The Commission shall propose such study and research as it deems most indicated for the improvement of safety, and of healthy working conditions in coalmines, with notes as to the way in which these can be effected.

6. The Commission shall facilitate the exchange of information and experience among persons responsible for safety matters and the maintenance of healthy working conditions, and propose appropriate measures for this purpose (e.g. organization of study sessions, establishment of documentation services).

7. The Commission shall propose appropriate measures for ensuring the necessary liaison among the rescue services of the Community countries.

8. The Commission shall submit annually to the Council of Ministers and the High Autority a Report on its activities and on developments regarding safety and protection of health in coalmines in the different member States. In this connection, it shall in particular examine the statistics compiled in these fields.

Annex III

TERMS OF REFERENCE OF THE VARIOUS WORKING PARTIES OF THE MINES SAFETY AND HEALTH COMMISSION

I - Working Party on Electrification - Chairman Mr Logelain

Terms of reference

1. Comparing adopted safety and accident prevention provisions relating to:
   (a) electric shock,
   (b) fire hazard,
   (c) explosion hazard.

2. Ascertaining the present position in Community countries with regard to safety regulations on underground electrical networks of low and medium voltage (up to 1 100 V) and feeder cables for movable equipment, with due regard to the specifications for the said cables.

3. Reporting on steps to be taken when work has to be carried out on electrical equipment under voltage.

4. Studying the construction of high-tension cables (of up to 6 000 V) used underground, and protective equipment.

5. Study of the problem of stray currents.

6. Periodic reports on oil-powered contactors used in gassy environments.

7. To follow the development of techniques designed to eliminate entirely the production of sparks on electrical contact lines (battery motors excluded) and in particular to take note of the new technique of traction by linear motors.

8. Investigation of the use of remote-control circuits in automated mining operations.

II - Working Party on Rescue Arrangements, Fires and Underground Combustion - Chairman Mr Coenders

A. General terms of reference

(Art. 7 of the Terms of Reference of the Mines Safety and Health Commission)

Exchange of experience between the Community countries and the United Kingdom on:

1. Rescue operations and action against spontaneous combustion, heatings and fires on the occasion of accidents or other events underground requiring the assistence of rescue teams, from which useful lessons have been learned;

2. Organization of rescue operations underground and the presentation of reports every two years;

3. The prevention of spontaneous combustion, heatings and fire outbreaks underground, the fighting and control of spontaneous combustion, heatings and fires, and reopening sealed-off workings.

B. Special terms of reference

1. Comparison of practical arrangements of rescue operations existing in the Community countries and the United Kingdom and possibly the drafting of a standard plan of procedure for the Community as a whole.

2. Exchange of experience and practical knowledge in the following fields:

   (a) methods and apparatus for the early detection of combustion, heatings and pit fires,
   (b) CO self-rescuers,
   (c) Oxygen deficiency warning devices,
   (d) Fires in long plant,
   (e) Sealing off abandoned workings,
   (f) Specifications and testing conditions for fire-resistant fluids for mechanical power transmission.

3. Condensed comparative survey of new regulations and guidelines promulgated by the mining authorities of member countries and the United Kingdom on rescue arrangements, first aid and fire fighting and prevention.

C. Analysis of results (partial or overall) of research projects at present in progress so as to:

1. Improve borehole rescue techniques,

2. Define the standards to which flameproof clothing should conform.

D. Studies to be completed by the Groupe of Experts on Budryk's theory on the following subjects:

1. Extent of instability of diagonal ventilation roadways,

2. Effects of a fire on workings with descensional ventilation,

3. Resources to be applied to combat the danger of explosion during firefighting.

III - Working Party on Winding Ropes and Shaft Guides: Chairman Mr Martens

Terms of reference

1. Follow-up of progress made in the testing of winding ropes by means of appropriate instruments in order to obtain information concerning its application in the mines of the Community and the United Kingdom.

2. Testing of couplings for circular and flattened winding ropes.

3. Arrangements for the installation and inspection of capels.

4. Testing of guides for winding cages in drafts and guide mechanismus for cable haulage in roadways.

5. Maintenance required to ensure safe operation of winding ropes and balance ropes.

6. Use of studies on the dynamic behaviour of shaft and roadway ropes.

7. Exchange of views on the properties operating conditions and strength of winding ropes of particular interest.

8. Discussion on accidents involving winding and hauling ropes and their couplings, which could provide new information.

IV - Working Party on Mining Accident Statistics: Chairman Mr Koch

Terms of reference

In order to enable the Mines Safety and Health Commission to draw conclusions on accident prevention, the frequency or underground accidents in the Community coal mines should be examined, with the following objectives:

1. To decide on suitable mathematical statistical system,
2. To evaluate, with their aid, chronological differences in frequency together with differences from country to country or coalfield to coalfield.

V - Working Party on Combustible Dusts: Chairman Mr Cheradame

Terms of reference

Taking into account the mechanism of dust combustion and of flame propagation and the various factors which may influence this, including the fact that methane is frequently involved in this phenomenon, the working party is instructed to carry out a study of precautions against dust combustion, in particular:

a) dust neutralisation (dust control in situ, stone dusting, spraying, dust fixation by means of spreading salts and coagulating pastes, etc.), this study to include the comparative analysis of the regulations and instructions applied in the Community countries and the United Kingdom, along with the methods of application of the different processes,

b) dust barriers of various types to halt dust explosions, mixed dust-methane explosions and pure methane explosions.

The working party may make any suggestions for research work considered necessary to advance the knowledge of the phenomena studied and to promote safety in these fields.

VI - Working Party on Health in Coal Mines: Chairman Mr Vandenheuvel

Studying, from the standpoint of technical prevention and industrial medicine, the prevention of environmental risks to the health of workers in coal mines.

1. General directives concerning dust control methods where coal cutting and getting and roadway drivage machinery is used.

2. Dust measurement (methods, frequency, measuring points, conclusions to be drawn etc.) and where necessary establishing a scale of comparison of the various methods employed.

3. Establishment of dustiness thresholds. Definition of categories of permissible dustiness. Steps to be taken when faced with various categories of dustiness.

4. Medical problems:

   (a) Among the medical problems involved in the control of ambient health hazards to coal mine workers, priority must be given to the study of the following factors:
   climate, noise, vibration, lighting, gas, etc.

   (b) The Secretariat is to be instructed:
   (i) to set up a medical consultative committee,
   (ii) comparison of the provisions in force in the various countries concerning the organisation of company medical services: selection and training of doctors, relations between medical services and technical departments and a list of the tasks and functions of industrial medicine,

(iii) a draft scheme to standardise pre-recruitment medical examinations, periodic checks and checks in special instances,

(IV) a draft scheme for a minimum degree of standardisation in the detection of disorders and in the radiological supervision of workers as regards pneumoconiosis prevention,

(V) a draft scheme for standards and criteria in workings in which miners already suffering from a deterioration in pulmonary function do not run the risk of this deterioration progressing further.

VII - Working Party on Effects of Working Time on Safety at Work, especially in Difficult or Unhealthy Conditions: Chairman Mr Van der Hooft

Terms of reference (suspended):

Number of hours worked in wet working points. Determining in what cases a working points is to be considered wet and the precautions to be taken.

VIII - Working Party on Psychological and Sociological Factors affecting Safety: Chairman Mr Schnase

Terms of reference

1. Community safety campaigns.
2. Recommendation on the employment of foreign and young workers.
3. Practical measures for the prevention of accidents, taking into account psychological and sociological factors.

IX - Working Party on Ventilation and Mine Gas - Chairman Mr Knuttel

The Working Party on Ventilation and Mine Gas will examine general problems of ventilation, particularly where prevention of firedamp explosions is concerned and other means or measures showed be applied in order to suppress or control firedamp.

In addition to the study of firedamp explosions occuring in the Community and the United Kingdom, attention will also be devoted to usable results of research in the field of firedamp outbursts, in particular where maximum permissible levels in ventilation air of firedamp and other poisonous gases are concerned, and the advance estimation of firedamp emission before a working is started.

Attention will also be devoted to appropriate speeds for the flow of ventilation air, measures to be taken in the event of deceleration of the flow of air, measures for the stabilization of ventilation and the means and procedures for monitoring ventilation.

Priority will be given to examination of the procedures for a possible raising, either local or general, of the maximum permissble firedamp level in ventilation air streams from 1 to 1,50 or 2%, and measures to be applied in this event to ensure at least equivalent safety.

X - Working Party on "Mechanization" - Chairman Mr Koch

Taking into consideration current techniques in winning and roadway driving, linings and roadway conveyors, the working party is instructed to study partical ways of preventing accidents connected with mechanization.

In particular, it is to:

(a) compile a schedule for machinery manufacturers of the minimum work safety requirements for mechanical protection of machines and equipment;

(b) study safety provisions such as: visual and acoustic signalling, operating controls and in particular the ability to stop machines from any point on the face or roadway, taking account of modern means of telecommunication and remote control, electrical protection of motors in the event of overloading or jamming of equipment, lighting, etc...

XI - Working Party on "Roof controls" - Chairman Mr Hübner

The Working Party is instructed to examine, by exchanging experience and evaluating the results of research, whether it is possible to draw up measures or practical directives for the prevention of falls of ground, taking into account the individual features of coal measures and workings.

1. In particular: In the interest of better roof control, particularly within the context of working schedules, it will study

   (a) general measures to be taken into consideration in avoiding falls of ground, in the light of the type of measure and conditions of working, e.g. sequence of working the seams, features of the working areas (length, speed of advance, etc.), type and characteristics of the lining;

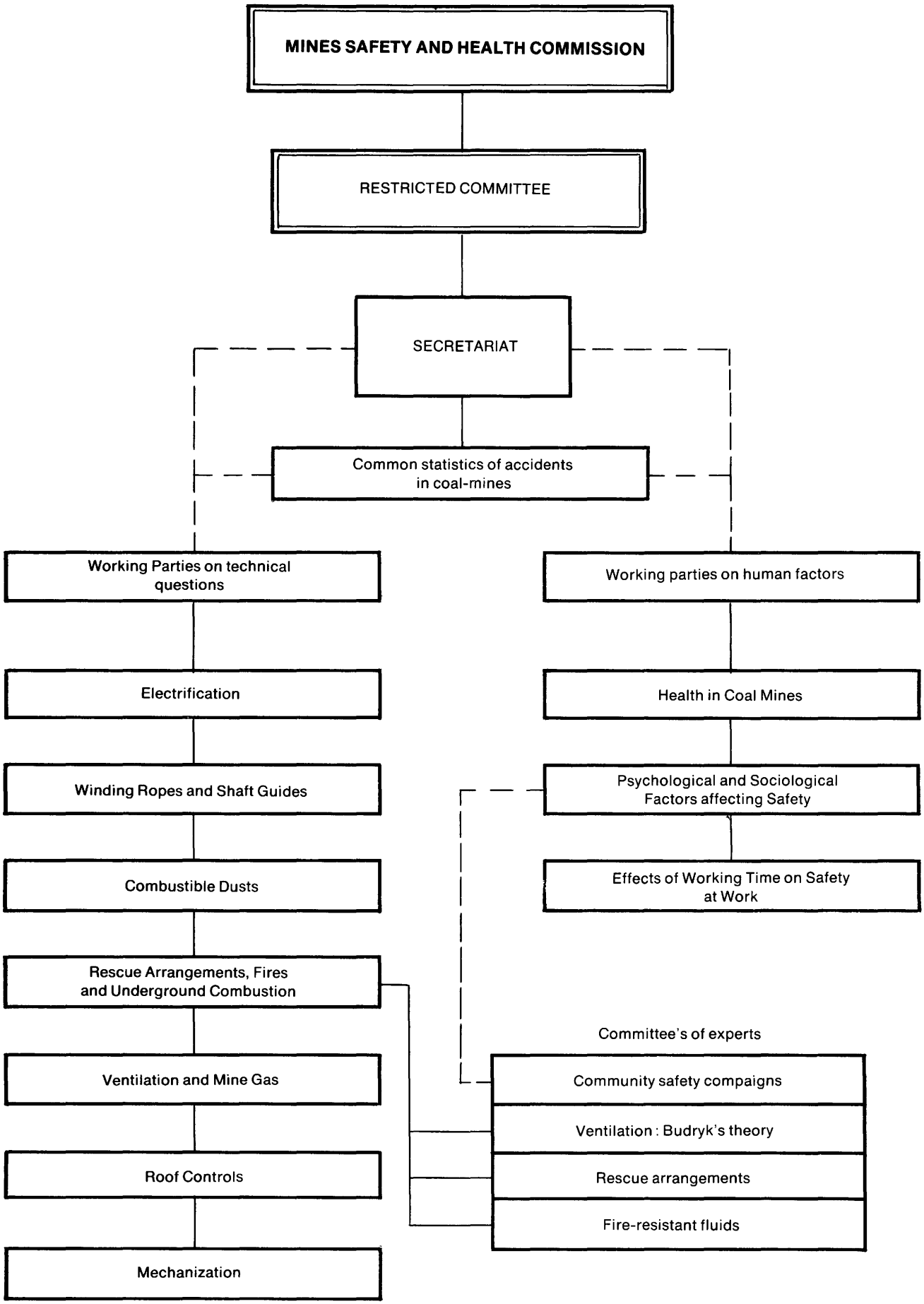
   (b) specific measures to deal with individual difficulties which may or may not foreseeably arise in the long term, such as disturbance zones, protective banks, working of a face at right-angles to the end of an old seam, etc...

   (c) specific measures to be taken when starting off a face in order to prevent abrupt subsidence of the roof.

2. It will also compare mining regulations on linings and draw up minimum roof control requirements, taking into account the characteristics of the various faces (overall seam thickness, dip, dead rock ...).

ANNEX IV

COMPOSITION OF THE MINES SAFETY AND HEALTH COMMISSION AND ITS WORKING PARTIES (AS AT 31.12.1971)


MINES SAFETY AND HEALTH COMMISSION
RESTRICTED COMMITTEE
SECRETARIAT
Common statistics of accidents in coal-mines
Working Parties on technical questions
Electrification
Winding Ropes and Shaft Guides
Combustible Dusts
Rescue Arrangements, Fires and Underground Combustion
Ventilation and Mine Gas
Roof Controls
Mechanization
Working parties on human factors
Health in Coal Mines
Psychological and Sociological Factors affecting Safety
Effects of Working Time on Safety at Work
Committee's of experts
Community safety compaigns
Ventilation : Budryk's theory
Rescue arrangements
Fire-resistant fluids

A.- MINES SAFETY AND HEALTH COMMISSION

FEDERAL REPUBLIC OF GERMANY

Government Representatives

Ministerialrat W. SCHNASE, Referat III A 1, Bundesministerium für Wirtschaft und Finanzen 53 Bonn

Dipl.-Ing. A. COENDERS, Präsident des Landesoberbergamts Nordrhein-Westfalen, 4600 Dortmund, Goebenstrasse 25

Employers' Representative

Bergrat a.D. H. ERNST, Geschäftsführer des Steinkohlenbergbauvereins, 43 Essen, Frillendorfer-Strasse 351

Workers' Representative

E. STEBEL, Leiter des Sachgebiets Arbeitsschutz, IG-Bergbau und Energie, 4630 Bochum, Alte Hattingerstrasse 19

Technical Advisers

H. BERG, Ministerialrat, Ministerium für Wirtschaft, Mittelstand und Verkehr des Landes Nordrhein-Westfalen, 4 Düsseldorf, Haroldstrasse 4

Berghauptmann K. HÜBNER, Leiter des Oberbergamts für das Saarland und das Land Rheinland-Pfalz, 6600 Saarbrücken, Am Staden 17

BELGIUM

Government Representatives

A. VANDENHEUVEL, Directeur-generaal van het Mijnwezen, Ministerie van Economische Zaken en Energie, 24-26, rue J.A.-Demot, Bruxelles 4

G. LOGELAIN, Directeur général des mines, Ministère des affaires économiques, 24-26, rue J.A.-Demot, Bruxelles 4

Employers' Representative

A. HAUSMAN, Directeur du Centre de coordination de sauvetage du bassin de Campine, 555, Kempische Steenweg, Kiewit-Hasselt

Workers' Representative

J. OLYSIAEGERS, Secrétaire national de la Centrale syndicale des travailleurs des mines de Belgique, FGTB, Koolmijnlaan 1, Houthalen

Technical Advisers

L. BOULET, Directeur général du Fonds national de retraite des ouvriers mineurs, Ministère du travail et de la prévoyance sociale, 6, place Stéphanie, Bruxelles

E. VANDENDRIESSCHE, Secrétaire général de la Centrale des francs-mineurs, 26-32, avenue d'Auderghem, Bruxelles 4

FRANCE

Government Representatives

L. KOCH, Ingénieur en chef des mines, direction des mines, Ministère de l'industrie, 99, rue de Grenelle, 75-Paris 7e

D. PETIT, Ingénieur des mines, direction des mines, Arrondissement de Metz, 1, rue Eugène-Schneider, 57-Metz

Employers' Representative

F. POT, Directeur général des services techniques des Charbonnages de France, 9, avenue Percier, 75-Paris 8e

Workers' Representative

L. CHAUVEAU, Fédération nationale des syndicats chrétiens des mineurs, 8, rue de Navarre, 75-Paris 5e

Technical Advisers

St. NOWAK, 4, rue Charcot, 62-Lens

ITALY

Government Representatives

Dott. A. VENTURELLA, Console d'Italia ad Esch/Alzette, Lussemburgo

Dott. ing. M. MARRA, ispettore generale delle miniere, ministero dell'industria e commercio, via Veneto 33, Roma

Employers' Representative

Prof. M. CARTA, Istituto arte mineraria della facoltà d'ingegneria, Piazza d'Armi, Cagliari (Sardegna)

Workers' Representative

Dott. G. CRAVIOTTO, segretario generale della Federestrattive, via Isonzo 42, Roma

Technical Adviser

Dott. C. MICHELAZZI, ispettore generale del ministero del lavoro e della previdenza sociale, via Flavia 6, Roma

LUXEMBOURG

Government Representative

A. SCHUSTER, Ingénieur-directeur du travail et des mines, inspection du travail et des mines, 19, av. Gaston-Diderich, Luxembourg

Employers' Representative

R. MAYER, Ingénieur de sécurité à l'ARBED, 78, rue du Fossé, Esch-sur-Alzette

Workers' Representative

N. PASCOLINI, Président de la délégation ouvrière d'Arbed-Mines, 90, rue des Fleurs, Schifflange

NETHERLANDS

Government Representatives

Ir. A.H.W. MARTENS, inspecteur-generaal der mijnen, Staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

Ir. D.J. KNUTTEL, plaatsvervangend inspecteur-generaal der mijnen, Staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

Employers' Representative

Ir. G.B. DEBETS, directeur, Oranje-Nassau Mijnen, Heerlen (L.)

Workers' Representative

J.M. WEIJERS, Vice-voorzitter van de Nederlandse Katholieke Mijnwerkersbond, Seringenstraat 9, Passart-Zuid

Technical Adviser

H.L. GROND, chef van de veiligheidsdienst, p/a Oranje-Nassau Mijnen, Heerlen (L.)

UNITED KINGDOM

Government Representative

J.W. CALDER O.B.E., H.M., Chief Inspector of Mines and Quarries, Department of Trade and Industry, Thames House South, Millbank, London S.W.1

J.R. WILSON, Assistant Secretary, Department of Trade and Industry, Thames House South, Millbank, London S.W.1

Employers' Representative

Dr. H.L. WILLET, Deputy Director-General of Production, National Coal Board, Hobart House, Grosvenor Place, London S.W.1

Workers' Representative

S. SCHOFIELD, Vice-President of the National Union of Mineworkers, c/o Miners' Offices Barnsley - Yorkshire

INTERNATIONAL LABOUR ORGANISATION, GENEVA

A representative of the International Labour Office sitting as an observer.

B.- RESTRICTED COMMITTEE

The Restricted Committee consists of the Government members of the Mines Safety and Health Commission.

C.- WORKING PARTIES ON TECHNICAL QUESTIONS

I. Working Party on Electrification

- Members of the Working Party

GERMANY

Oberbergamtsdirektor W. SCHÖTTELNDREIER, Landesoberbergamt Nordrhein-Westfalen, 46 Dortmund, Goebenstrasse 25

Dipl.-Ing. L. GEBHARDT, Steinkohlenbergbauverein, 43 Essen, Frillendorfer Strasse 351

BELGIUM

G. LOGELAIN *(1)*, Directeur général des mines, Ministère des affaires économiques, 24-26, rue J.A.-Demot, Bruxelles 4

R. STENUIT, Directeur divisionnaire à l'Administration des mines, 24-26, rue J.A.-Demot, Bruxelles 4

G.J.A. COOLS, Inspecteur général des mines honoraire, Eug. Plasky Laan 75, B-1040 Brussel

FRANCE

N. TRETIAKOW, Ingénieur en chef au service exploitation des Charbonnages de France, 9, avenue Percier, 75-Paris 8e

F. VIN, Ministère de l'industrie, service de l'hygiène et de la sécurité minière, 97, rue de Grenelle, 75-Paris 7e

ITALY

Dott. ing. C. MACCIONI, ENEL, compartimento Cagliari, sett. tecnico, Piazza Deffenu 2, Cagliari

---

(1) Chairman of the Working Party as representative of the Restricted Committee.

LUXEMBOURG

R. MAYER, Ingénieur civil des mines à l'ARBED, 78, rue du Fossé, Esch-sur-Alzette

NETHERLANDS

Ir. E.A. R. HOEFNAGELS, inspecteur der mijnen, Staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

UNITED KINGDOM

S. LUXMORE, H.M. Principal Electrical Inspector of Mines and Quarries, Thames House South, Millbank, London S.W.1

R. Hartill, Chief Electrical Engineer, National Coal Board, The Lodge, South Parade, Doncaster (Yorkshire)

- Experts on cables and leads

Dr. J. UELPENICH, Land- und Seekabelwerke, Niehler Strasse 100, 50 Köln-Nippes

H. GOBBE, Directeur à la division câblerie des ACEC, Charleroi

M. OSTY, Directeur technique à la Société industrielle de liaisons électriques, 64bis, rue de Monceau, 75-Paris 8e

M. PAINDAVOINE, Ingénieur au Cerchar, 60-Verneuil-en-Halatte

Y. EYRAUD, Chef du laboratoire d'études générales des Câbles de Lyon, 170, avenue Jean-Jaurès, 69-Lyon

Ir. F. GOEDBLOED, Nederlandse Kabelfabriek, Delft

Ir. W.L. BAER, N.V. Hollandse Draad- en Kabelfabriek, Amsterdam

II. Working Party on Rescue Arrangements and on Fires and Underground Combustion

- Members of the Working Party

GERMANY

Ministerialdirigent Dr.-Ing. K. HELLER *(1)*, Ministerium für Wirtschaft, Mittelstand und Verkehr, Land Nordrhein-Westfalen, 4 Düsseldorf, Haroldstrasse 4

Dipl.-Ing. E. BREDENBRUCH, Leiter der Hauptstelle für das Grubenrettungswesen des Steinkohlenbergbauvereins, 43 Essen-Kray, Schönscheidtstrasse 28

Dipl.-Ing. A. SCHEWE, Technischer Leiter der Hauptstelle für das Grubenrettungswesen des Steinkohlenbergbauvereins, 43 Essen-Kray, Schönscheidtstrasse 28

K. PALM, Abteilungsdirektor, Landesoberbergamt Nordrhein-Westfalen, 4600 Dortmund, Goebenstrasse 25-27

BELGIUM

A. VANDENHEUVEL, Directeur général des mines, Ministère des affaires économiques, 24-26, rue J.A.-Demot, Bruxelles 4

G. LOGELAIN, Inspecteur général des mines, Ministère des affaires économiques, 24-26, rue J.A.-Demot, Bruxelles 4

R. STENUIT, Directeur divisionnaire à l'Administration des mines, 24-26, rue J.A.-Demot, Bruxelles 4

L. DE CONINCK, Directeur du Centre national belge de coordination des centrales de sauvetage, 17, rue Puissant, Charleroi

A. HAUSMANN, Directeur du Centre de coordination de sauvetage du bassin de Campine, Kempische Steenweg 555, Kiewitt-Hasselt

(1) Chairman of the Working Party as representative of the Restricted Committee.

FRANCE

R. GRISARD, Ingénieur des mines, Charbonnages de France, 9, avenue Percier, 75-Paris 8e

G. ROGEZ, Directeur du poste central de secours des Mines du Nord et du Pas-de-Calais, rue Notre-Dame-de-Lorette, 62-Lens

J. CRETIN, Ingénieur divisionnaire, poste central de secours, Belle-Roche, 57-Merlebach

H. BONARDOT, Ingénieur en chef, Houillères du bassin de la Loire, 9, rue Benoît - Charvet, 42-Saint-Etienne

LUXEMBOURG

R. MAYER, Ingénieur de sécurité à l'ARBED, 78, rue du Fossé, Esch-sur-Alzette

ITALY

Dr. ing. B. ANEDDA, ispettore generale, Pal INA, 09016 Iglesias, Cagliari

Dott. ing. E. ORRU, direttore della miniera di Seruci, casella postale 117, 09013 Carbonia, Cagliari

NETHERLANDS

Ir. D.J. KNUTTEL, plaatsvervangend inspecteur-generaal der mijnen, Staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

Prof. dr. W. MAAS, chef van de veiligheidsdienst, N.V. Nederlandse Staatsmijnen, Postbus 65, Heerlen (L.)

H.L. GROND, chef van de veiligheidsdienst, p/a Oranje-Nassau Mijnen, Heerlen (L.)

UNITED KINGDOM

Dr. H.L. WILLETT, Deputy Director-General of Production, National Coal Board, Hobart House, Grosvenor Place, London S.W.1

G. MILLER, Deputy Chief Inspector of Mines and Quarries, Department of Trade and Industry, Thames House South, Millbank, London S.W.1

- Experts on Aspects of Fires in Deep Shafts

GERMANY

Dipl.-Ing. E. BREDENBRUCH, Leiter der Hauptstelle für das Grubenrettungswesen des Steinkohlenbergbauvereins, 43 Essen-Kray, Schönscheidtstrasse 28

Dr. rer. nat. H.W. THOENES, Direktor, Technischer Überwachungsverein e.V., 43 Essen, Steubenstrasse 53

Dipl.-Ing. K. GRUMBRECHT, Abteilungsleiter, Versuchsgrubengesellschaft mbH, 46 Dortmund, Tremoniastrasse 13

Prof. Dr. med. MALORNY, Direktor des Pharmakologischen Instituts der Universität Hamburg, 2 Hamburg, Martinistrasse 52

Prof. Dr. med. C.A. PRIMAVESI, Hygiene-Institut des Ruhrgebiets, 4650 Gelsenkirchen, Rotthauserstrasse 19

Prof. Dr. med. BENTHE, Pharmakologisches Institut der Universität Hamburg, 2 Hamburg, Martinistrasse 52

BELGIUM

H. CALLUT, Ingénieur en chef - Directeur des mines, Institut national des industries extractives (INIEX), 60, rue Grande, 7260-Pâturages

J. BRACKE, Ingénieur principal divisionnaire, Institut national des industries extractives (INIEX), 60, rue Grande, 7260-Pâturages

Dr J. CRISPOUX, 2, rue Potresse, 7200-Wasmes

FRANCE

G. BLANPAIN, Ingénieur, Centre d'études et de recherches des Charbonnages de France, Verneuil-en-Halatte, BP 27, 60-Creil

R. PLOUCHARD, Ingénieur des mines, chef du laboratoire lubrifiant, 59-Sin-le-Noble

Dr AMOUDRU, Médecin-chef des Charbonnages de France, 9, avenue Percier, 75-Paris 8e

E. QUINOT, Chef de la section physique et recherches mathématiques, Centre d'études médicales minières du Nord/Pas-de-Calais, 129-133, avenue Salengro, 59-Sin-le-Noble

NETHERLANDS

Ir. VAN BLARICUM, staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

- Experts on Ventilation

GERMANY

Dipl.-Ing. W. BOTH, Hauptstelle für das Grubenrettungswesen des Steinkohlenbergbauvereins, 43 Essen-Kray, Schönscheidtstr. 28

Dr. rer. nat. W. SCHMIDT, Prüfstelle für Grubenbewetterung, 4630 Bochum, Herner Strasse 45

BELGIUM

R. STENUIT, Directeur divisionnaire à l'Administration des mines, 24-26, rue J.A.-Demot, Bruxelles 4

J. PATIGNY, Ingénieur divisionnaire, Institut d'hygiène des mines, Havermarkt 22, Hasselt

FRANCE

M. GANIER, Ingénieur principal, Cerchar, 35, rue St-Dominique, 75-Paris 7e

J. CRETIN, Ingénieur divisionnaire, poste central de secours, Belle-Roche, 57-Merlebach

E. SIMODE, Ingénieur divisionnaire, Houillères du bassin de Lorraine, direction des études et des travaux neufs, 57 Petite-Rosselle

NETHERLANDS

Prof. dr. W. MAAS, chef van de veiligheidsdienst, N.V. Nederlandse Staatsmijnen, Postbus 65, Heerlen (L.)

III. Working Party on Winding Ropes and Shaft Guides

- Members of the Working Party

GERMANY

Dr.-Ing. H. ARNOLD, Leiter der Seilprüfstelle der Westfälischen Berggewerkschaftskasse, 4630 Bochum, Dinnendahlstrasse 9

Dipl.-Ing. H. RÖHLINGER, Leiter der Seilprüfstelle der Saarbergwerke AG, 66 Saarbrücken, Trierer Strasse 1

BELGIUM

G. LOGELAIN, Directeur général des mines, Ministère des affaires économiques, 24-26, rue J.A.-Demot, Bruxelles 4

R. STENUIT, Directeur divisionnaire à l'Administration des mines, 24-26, rue J.A.-Demot, Bruxelles 4

M. VERWILST, Association des industriels de Belgique (AIB), 29, avenue A.-Drouart, Auderghem

FRANCE

P. BLOMART, Ingénieur en chef, service exploitation des Charbonnages de France, 9, avenue Percier, 75-Paris 8e

C. ROGEZ, Directeur du poste central de secours des houillères du Nord et du Pas-de-Calais, rue Notre-Dame-de-Lorette, 62-Lens

M. SUEUR, Houillères du bassin de Lorraine, direction des travaux, service électromécanique, 57-Merlebach

ITALY

Prof. dott. ing. C. MORTARINO, Istituto di meccanica applicata del politecnico di Torino, corso Duca degli Abruzzi 24, Torino

Prof. dott. ing. L. STRAGIOTTI, direttore dell'Istituto di arte mineraria del politecnico di Troino, via S. Quintino 42, Torino

LUXEMBOURG

R. MAYER, Ingénieur de sécurité à l'ARBED, 78, rue du Fossé, Esch-sur-Alzette

NETHERLANDS

Ir. A.H.W. MARTENS *(1)*, inspecteur-generaal der mijnen, Staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

Ir. F.H. SMULDERS, Laura en Vereeniging, Eygelshoven (L.)

Ir. VAN BLARICUM, staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

UNITED KINGDOM

G.E. WINDER, Head, Mechanical Engineering Section, Ministry of Power, Safety in Mines Research Establishment, Red Hill, Off Broad Lane, Sheffield 3

J.H. LONGSTAFFE, Esq., H.M. Principal Inspector of Mechanical Engineering, H.M. Mines and Quarries Inspectorate, Ministry of Technology, Thames House South, Millbank, London S.W.1

N. HIGGINSON, Esq., Chief Mechanical Engineer of the National Coal Board, The Lodge, South Parade, Doncaster, Yorkshire

- Experts on Winding Ropes

GERMANY

Dipl.-Ing. H. GRUPE, Seilprüfstelle der Westfälischen Berggewerkschaftskasse, 4630 Bochum, Dinnendahlstrasse 9

Dipl.-Ing. W. GÖTZMANN, Seilprüfstelle der Westfälischen Berggewerkschaftskasse, 4630 Bochum, Dinnendahlstrasse 9

FRANCE

P. BURGUN, Directeur-adjoint principal de l'Association des industriels de France, 10, rue de Calais, 75-Paris 9e

J. HAPCHETTE, Ingénieur à l'Association des industriels de France, 2, passage de Clichy, 75-Paris 9e

---

(1) Chairman of the Working Party as representative of the Restricted Committee.

IV. Working Party on Combustible Dusts

GERMANY

Berghauptmann K. HUEBNER, Leiter des Oberbergamts für das Saarland und das Land Rheinland-Pfalz, 6600 Saarbrücken, Am Staden 17

Dr.-Ing. A. STEFFENHAGEN, Geschäftsführer der Versuchsgrubengesellschaft mbH, 46 Dortmund, Tremoniastrasse 13

E. STEBEL, Leiter des Sachgebiets Arbeitsschutz, IG-Bergbau und Energie, 4630 Bochum, Alte Hattingerstrasse 19

K. RÖSGEN, Erster Bergrat a.D., Steinkohlenbergbauverein, Abteilung Grubensicherheit, 43 Essen-Kray, Frillendorfer Strasse 351

BELGIUM

A. VANDENHEUVEL, Directeur général des mines, Ministère des affaires économiques, 24-26, rue J.A. Demot, Bruxelles 4

H. CALLUT, Directeur des mines, Institut national des industries extractives (INIEX), 60, rue Grande, 7260-Pâturages

A. HAUSMAN, Directeur du Centre de coordination des moyens de sauvetage de Campine, 555, Kempische Steenweg, Kiewitt-Hasselt

FRANCE

R. CHERADAME *(1)*, Directeur général au Cerchar, 35, rue Saint-Dominique, 75-Paris 7e

L. KOCH, Ingénieur en chef, chef du service des techniques minières, direction des mines, Ministère de l'industrie, 99, rue de Grenelle, 75-Paris 7e

DELANNOY, Directeur des groupes de recherches Cerchar, 35, rue Saint-Dominique, 75-Paris 7e

M. SCHWEITZER, Directeur du service technique des Charbonnages de France, 9, avenue Percier, 75-Paris 8e

L. CHAVEAU, Fédération nationale des syndicats chrétiens des mineurs, 8, rue de Navarre, 75-Paris 7e

St. NOWAK, 4, rue Charcot, 62-Lens

NETHERLANDS

Ir. D.J. KNUTTEL, plaatsvervangend inspecteur-generaal der mijnen, Staatstoezicht op de mijnen, Apollolaan 9, Heeren (L.)

UNITED KINGDOM

Dr. H.L. WILLETT, Deputy Director-General of Production, National Coal Board, Hobart House, Grosvenor Place, London S.W.1

Director of Safety in Mines, Research Establishment, Ministry of Technology, Field Laboratories, Harpur Hill, Buxton (Derbyshire)

G. MILLER, Deputy Chief, Inspector of Mines and Quarries, Ministry of Power, Thames House South, Millbank, London S.W.1

J.W. CALDER, Esq., O.B.E., H.M. Chief Inspector of Mines and Quarries, Department of Trade and Industry, Thames House South, Millbank, London S.W.1

V. Working Party on Common Statistics of Accidents in Coal-mines

GERMANY

K. PALM, Abteilungsdirektor, Landesoberbergamt Nordrhein-Westfalen, 4600 Dortmund, Goebenstrasse 25-27

---

(1) Chairman of the Working Party as representative of the Restricted Committee.

K. RÖSGEN, Erster Bergrat a.D., Steinkohlenbergbauverein, 43 Essen, Frillendorfer Strasse 351

FRANCE

L. KOCH *(1)* Ingénieur en chef, service de l'hygiène et de la sécurité minière, direction des mines, Ministère de l'industrie, 99, rue de Grenelle, 75-Paris 7e

R. RIVIERE, Chef de la division des statistiques, bureau de documentation minière, 4, rue Las-Cases, 75-Paris 7e

R. GRISARD, Ingénieur des mines, Charbonnages de France, 9, avenue Percier, 75-Paris 8e

ITALY

Dott. ing. B. ANEDDA, ispettore generale delle miniere, distretto minerario di Iglesias, via Gramsci, Iglesias (Cagliari)

Dott. ing. G. SATTA, ingegnere capo delle miniere, direzione generale delle miniere, ministero dell'industria, via Molise 2, Roma

NETHERLANDS

J. VAN LOO, N.V. Nederlandse Staatsmijnen, Postbus 65, Heerlen (L.)

Ir. Th. M. JANSEN, inspecteur der mijnen, staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

VI. Working Party "Ventilation and Mine Gas"

GERMANY

K. PALM, Ministerialrat, Abteilungsleiter des Landesoberbergamts Nordrhein-Westfalen, 46 Dortmund, Goebenstrasse 25

Dipl.-Ing. H. BUSCHE, Bergwerksdirektor der Bergbau AG Niederrhein, Bergwerksdirektion Friedrich Heinrich, 4132 Kamp-Lintfort, Postfach 88

Dipl.-Ing. E. SCHUBERT, Leiter der Prüfstelle für Grubenbewetterung der Westfälischen Berggewerkschaftskasse, 463 Bochum, Hernerstrasse 43-45

H. ALKER, Hauptverwaltung der Industriegewerkschaft Bergbau und Energie, 463 Bochum, Alte Hattingerstrasse 19

BELGIUM

H. GREGOIRE, Hoofdingenieur-directeur der mijnen, Thonissenlaan 18, 3500 Hasselt

J. PATIGNY, Ingénieur divisionnaire, Havermarkt, 3500 Hasselt

M. COLINET, 33, rue de Monceau-Fontaine, 6031 Monceau-sur-Sambre

E. VANDENDRIESCHE, 113, rue de Trazegnies, 6080 Courcelles

FRANCE

YOLIN, Ingénieur des mines, Arrondissement minéralogique de Douai, 941, rue Ch.-Bourseul, 59-Douai

BELIN, Cerchar, Verneuil-en-Halatte, BP 06, 60-Creil

SIMODE, Ingénieur en chef à la direction de l'économie et de l'informatique, Houillères du bassin de Lorraine, 5, rue Ambroise-Thomas, 57-Freyming

GRISARD, Ingénieur des mines, Charbonnages de France, 9, avenue Percier, 75-Paris 8e

LARREUR, 54, rue Henri-Martin, 62-Liévin

---

(1) Chairman of the Working Party as representative of the Restricted Committee.

LUXEMBOURG

R. MAYER, Ingénieur civil des mines, ARBED, 78, rue du Fossé, Esch-sur-Alzette

ITALY

Dr. ing. R. BONAZZA, capo del distretto minerario, 58100 Grosseto, Via Trieste 1

Prof. dott. ing. G. BULGARELLI, Via Genova 22, 35100 Padova

NETHERLANDS

Ir. D.J. KNUTTEL *(1)*, plaatsvervangend inspecteur-generaal der Mijnen, staatstoezicht op de Mijnen, Appololaan 9, Heerlen (L.)

Prof. dr. MAAS, chef van de veiligheidsdienst, NV NEDERLANDSE STAATSTMIJNEN, Postbus 65, Heerlen (L.)

T.H. OFFERMANS, Staatsmijn Emma-Hendrik, Hoensbroek

UNITED KINGDOM

A. HARLEY H.M. Senior District Inspector of Mines and Quarries, Department of Trade and Industry, Thames House, South Millbank, London S.W.1

P. THORPE, Technical Assistant to Deputy Director-General, National Coal Board, Hobart House, Grosvenor Place, London, S.W.1 x 7 AE

K.H. SAUNDERS, Safety and Engineering Officer, National Union of Mineworkers, 222, Enston Road, London S.W.1. 2BX

VII. Working Party on "Mechanization"

GERMANY

Dipl.-Ing. F.K. BASSIER, Bergwerksdirektor, Bergbau AG Niederrhein, Bergwerksdirektion Walsum, 4132 Kamp-Lintfort, Postfach 88

W. SCHÖNWÄLDER, leitender Bergdirektor, Landesoberbergamt Nordrhein-Westfalen, 46 Dortmund, Goebenstrasse 24

BELGIUM

F. DECKERS, e.a. divisiemijningenieur, Thonissenlaan 18, 3500 Hasselt

M. MAUFORT, Steenweg op Beverlo 49, 3950 Beringen

J. OLYSLAEGERS, FGTB, Statiestraat 78 A, 35, 30 Houthalen

FRANCE

L. KOCH, Ingénieur en chef des mines, direction de la technologie de l'environnement ind. et des mines, Ministère du développement industriel et scientifique, 90, rue de Grenelle, 75-Paris 7e

ADAM, Charbonnages de France, 9, avenue Percier, 75-Paris 8e

VALANTIN, Cerchar, Verneuil-en-Halatte, BP 06, 60-Creil

L. TOURAND, 20, rue Roger-Cadel, 57-Forbach

LUXEMBOURG

R. MAYER, Ingénieur civil des mines, ARBED, 78, rue du Fossé, Esch-sur-Alzette

ITALY

Dr. ing. A. GALATTI, ingegnere capo delle miniere, ministero dell'industria, del commercio e dell'artigianato, 00100 Roma

---

(1) Chairman of the Working Party as representative of the Restricted Committee.

Dr. ing. COPPOLA Enel - Direzione della produzione e trasmissione 0100 Roma Casella postale 386

NETHERLANDS

Ir. E.A.R. HOEFNAGELS, inspecteur der mijnen, staatstoezicht op de Mijnen, Apollolaan 9, Heerlen (L.)

Ir. H.W. KIBBELING, Oranje-Nassaumijnen N.V., Heerlen

T.T.L. WILLEMS, Laura en Vereeniging, Eygelshoven

UNITED KINGDOM

J. CARVER, H.M. Principal Inspector of Mines and Quarries, Department of Trade and Industry, Thames House, South Millbank, London S.W.1

W.J.W. BOURNE, Chief Mechanisation Engineer, National Coal Board, The Lodge, South Parade, Doncaster/Yorkshire

K.H. SAUNDERS, Safety and Engineering Officer, National Union of Mineworkers, 222, Enston Road, London S.W.1 2BX

VIII. Working Party on "Roof controls"

GERMANY

K. HÜBNER *(1)*, Berghauptmann, Leiter des Oberbergamtes für das Saarland und das Land Rheinland-Pfalz, 6600 Saarbrücken, Am Staden 17

U. CROTOWSKY, Dipl.-Ing., Bergwerksdirektor der Bergbau AG Gelsenkirchen, Bergwerksdirektion Hugo, 465 Gelsenkirchen, Postfach 1727

A. KEUSGEN, Dr.-Ing., Regierungsdirektor, Bundesministerium für Wirtschaft und Finanzen, 5300 Bonn-Duisdorf

K. FLECK, Oberbergrat, Oberbergamt für das Saarland und das Land Rheinland-Pfalz, 6600 Saarbrücken, Am Staden 17

BELGIUM

P.J. MAINIL, Administrateur des Mines, Ministère des Affaires économiques, 3, rue Montoyer, 1040 Bruxelles

C. LECLERCQ, Directeur des travaux à la SA des Charbonnages de Roton-Farciennes et Oignies-Aiseau, rue Destrée 20, 6258 Lambusart

J. OOMS, Reinpadstraat 79, 3600 Genk

FRANCE

P. AURIOL, Ingénieur à la direction des services techniques, Charbonnages de France, 9, avenue Percier, 75-Paris 8e

J.-F. RAFFOUX, Dr-Ing., laboratoire de mécanique des terrains du Cerchar, Ecole des mines, Parc du Saurupt, 54-Nancy

LARREUR, 54, rue Henri-Martin, 62-Liévin

ITALY

Prof. dr. ing., D. VITALI, capo del distretto minerario, 40121 Bologna, Via Ugo Bassi 7

Prof. dr. ing., R. COTZA, istituto di arte mineraria dell'Università, 09100 Cagliari

M. Tarabochia, Federestrattive C.I.S.L., (Miniera di Niccioleta-G.R.), Via Isonzo, 42 00918 Roma

---

(1) Chairman of the Working Party as representative of the Restricted Committee.

LUXEMBOURG

A. SCHUSTER, Ingénieur-directeur du travail et des mines, Inspection du travail et des mines, 19, Avenue Gaston-Diderich, Luxembourg

NETHERLANDS

Th.M. JANSEN, ir. Staatstoezicht op de Mijnen te Heerlen, Apollolaan 9, Heerlen (L.)

A.W. SNELL, ir. der Mijnen, N.V. Laura en Vereeniging te Eygelshoven, Eygelshoven

J.J. PEULEN, inspecteur bij de Oranje-Nassau-Mijn I, Kloosterweg 1, Heerlen

UNITED KINGDOM

J. CARVER H.M. Principal Inspector of Mines and Quarries, Department of Trade and Industry, Thames House South, Millbank, London S.W.1

Dr. P.D. BINNS, Chief Strata Control Engineer, National Coal Board, The Lodge, South Parade, Doncaster (Yorkshire)

K.H. SAUNDERS, Safety and Engineering Officer, National Union of Mineworkers, 222, Euston Road, London N.W.1, 2 Bx

D - WORKING PARTIES ON HUMAN FACTORS

I. Working Party on the Effects of Working Hours on Safety, with special reference to uncomfortable and unhealthy workings

GERMANY

Bergwerksdirektor H. MIDDENDORF, Bergassessor a.D., Steinkohlenbergwerke Mathias Stinnes AG, 414 Rheinhausen

E. STEBEL, Leiter des Sachgebiets Arbeitsschutz, IG-Bergbau und Energie, 4630 Bochum, Alte Hattingerstrasse 19

Ministerialrat H. BERG, Ministerium für Wirtschaft, Mittelstand und Verkehr, Land Nordrhein-Westfalen, 4 Düsseldorf, Haroldstrasse 4

BELGIUM

VAN MALDEREN, Divisiedirecteur van het Mijnwezen, Kempens Bekken 18, Thonischen Laan, Hasselt,

M.J. SAUCEZ, Attaché au Centre de formation postuniversitaire de Mons, 11, rue d'Egmont, Mons

FRANCE

M. COLLOMB, Ingénieur des mines, 1, rue Eugène-Schneider, 57-Metz

R. GRISARD, Ingénieur des mines, Charbonnages de France, 9, avenue Percier, 75-Paris 8e

A. AUGARD, Secrétaire général adjoint de la Fédération nationale, force ouvrière des mineurs, 169, avenue de Choissy, 75-Paris 8e

M. BRADEFER, 169, avenue de Choissy, 75-Paris 8e

ITALY

Ing. G. BULGARELLI, capo del distretto di Padova, via Baiamonti 1, Padova

Prof. M. CARTA, istituto di arte mineraria della facoltà di ingegneria, Piazza d'Armi, Cagliari

Dott. L. BACCI, segretario nazionale minatori e cavatori - UIL, via Sicilia 154, Roma

NETHERLANDS

Drs. D.C. VAN DER HOOFT *(1)*, hoofd van de Directie Mijnwezen, Ministerie van Economische Zaken, Bezuidenhoutseweg 30, 's-Gravenhage

Ir. D.J. KNUTTEL, plaatsvervangend inspecteur-generaal, Staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

Ir. F.W. FENNELL, hoofdingenieur van de Staatsmijnen in Limburg, p/a Staatsmijn Wilhelmina, Terwinselen (L.)

H.L. GROND, chef van de veiligheidsdienst, p/a Oranje-Nassau Mijnen, Heerlen (L.)

UNITED KINGDOM

R. BELL, National Coal Board, Production Department, Hobart House, Grosvenor Place, London S.W.1

II. Working Party on Psychological and Sociological Factors in Safety

GERMANY

Ministerialrat W. SCHNASE *(1)*, Bundesministerium für Wirtschaft und Finanzen, Referat III A 1, 53 Bonn

Bergdirektor H. BERG, Ministerium für Wirtschaft, Mittelstand und Verkehr des Landes Nordrhein-Westfalen, 4 Düsseldorf, Haroldstrasse 4

Dr.-Ing. H. SCHRAER, Gesamtverband des deutschen Steinkohlenbergbaus, 43 Essen, Friedrichstrasse 1

H. ALKER, Industriegewerkschaft Bergbau und Energie, 4630 Bochum, Alte Hattingerstrasse 19

BELGIUM

G. LOGELAIN, Directeur général des mines, Ministère des affaires économiques, 24-26, rue J.A.-Demot, Bruxelles 4

G. COOLS, Inspecteur général des mines honoraire, Eug. Plasky Laan 75, 1040-Bruxelles

M. ROYER, Nieuwstraat 100, Genk

E. VANDENDRIESSCHE, Secrétaire général de la Centrale des francs-mineurs, 26-32, avenue d'Auderghem, Bruxelles 4

FRANCE

M. PETIT, Ingénieur des mines à l'Arrondissement minéralogique de Metz (57)

M. VERDET, Ingénieur en chef du service central de sécurité des Houillères du bassin du Nord et du Pas-de-Calais, 20, rue des Minimes, 59-Douai

L.CHAVEAU, Fédération nationale des syndicats chrétiens des mineurs, 8, rue de Navarre, 75-Paris 5e

ITALY

Dott. C. MICHELAZZI, ispettore generale del ministero del lavoro e della previdenza sociale, via Flavia 6, Roma

Avv. U. CUTTICA, dirigente della società nazionale Cogne, via S. Quintino, Torino

Prof. N. DE PAMPHILLIS, CISL, via Isonzo 42, Roma

LUXEMBOURG

A. SCHUSTER, Ingénieur-directeur du travail et des mines, Inspection du travail et des mines, 19, avenue Gaston-Diderich, Luxembourg

(1) Chairman of the Working Party as representative of the Restricted Committee.

R. MAYER, Ingénieur civil des mines à l'ARBED, 78, rue du Fossé, Esch-sur-Alzette

E. SCHMIT, Ingénieur principal pour la sécurité à l'ARBED, Luxembourg

NETHERLANDS

Ir. Th. M. JANSEN, inspecteur der mijnen, Staatstoezicht op de mijnen, Apollolaan 9, Heerlen (L.)

Ir. G.B. DEBETS, directeur Oranje-Nassau Mijnen, Heerlen (L.)

F.S. DOHMEN, Nederlandse Kath. Mijnwerkersbond, Schinkelstraat 13, Heerlen

III. Working Party on Health Protection in Coal-mines

GERMANY

Ministerialrat W. SCHNASE, Referat III A 1, Bundesministerium für Wirtschaft und Finanzen, 53 Bonn

Grubeninspektor A. AUGST, Assessor des Bergfachs, Bergwerksgesellschaft Walsum AG, 4103 Walsum, Dr.-Wilhelm-Roelen-Strasse 129

A. STEBEL, Leiter des Sachgebiets Arbeitsschutz, IG-Bergbau und Energie, 4630 Bochum, Alte Hattingerstrasse 19

BELGIUM

A. VANDENHEUVEL *(1)*, Directeur-generaal van het Mijnwezen, Ministerie van Economische Zaken en Energie, 24-26, rue J.A.-Demot, Bruxelles 4

R. STENUIT, Directeur divisionnaire à l'Administration des mines, 24-26, rue J.A.-Demot, Bruxelles 4

G. DEGUELDRE, Directeur de l'Institut d'hygiène des mines, Havermarkt 22, Hasselt

FRANCE

L. CHAUVEAU, Fédération nationale des syndicats chrétiens des mineurs, 8, rue de Navarre, 75-Paris 5e

B. SCHNELL, Ingénieur général des mines, Ministère de l'industrie, 97, rue de Grenelle, 75-Paris 7e

B. GRISARD, Ingénieur des mines, Charbonnages de France, 9, avenue Percier, 75-Paris 8e

ITALY

R. BONAZZA, ispettore generale del corpo delle miniere, via Trieste 1, Grosseto

F. BIAGIOLI, segretario Federestrattive, via Isonzo 42a, Roma

NETHERLANDS

Ir. D.J. KNUTTEL, plaatsvervangend inspecteur-generaal der mijnen, Staatstoezicht op de Mijnen, Apollolaan 9, Heerlen (L.)

Dr. J. TERPSTRA, chef van het Stofinstituut der Gezamenlijke Steenkolenmijnen in Limburg, Wilhelminaplein 24-26, Postbox 38, Heerlen (L.)

UNITED KINGDOM

Dr. H.L. WILLETT, Deputy Director-General of Production, National Coal Board, Hobart House, Grosvenor Place, London S.W.1

E.J. RAINE, H.M. Senior District Inspector of Mines and Quarries on Special Duties, Ministry of Power, Thames House, Millbank, London S.W.1

H.L. JONES, National Coal Board, Production Department, The Lodge, Doncaster

B. GODDARD, Head of Mining Branch, National Coal Board, The Lodge, South Parade Doncaster, Yorkshire

(1) Chairman of the Working Party as representative of the Restricted Committee.

ANNEX V

REPORT AND RECOMMENDATIONS ON THE PREPARATION OF COMMON STATISTICS ON VICTIMS OF ACCIDENTS UNDERGROUND, IN ACCORDANCE WITH COMMUNITY DEFINITIONS

(Approved by the Mines Safety and Health Commission at its meeting on 29 June 1971)

CONTENTS

A - Report of the Working Party

Background

The problem of statistics in coal mines and the establishment of a method for the preparation of statistics which would be comparable from one Community country to another, had already been considered at some length in 1956 at the Conference held in Luxembourg on safety in coal mines.

While accepting that it would be difficult to evolve a method for the preparation of comparable statistics, the conference insisted that such statistics must be available since they were indispensable for the execution of different items of research. To this end, an Expert Committee was appointed with the following brief : *(1)*

a "Until the statistics in the different countries have been lined up, it would be best for a simplified table to be introduced, to serve as a basis for a uniform statistical system for the whole Community.

In order that as little additional work as possible may be involved, those statistics should be such as can readily be extracted from the more detailed figures currently compiled in the different countries, and should consist only of a summarized breakdown of accidents by technical causes and degree of seriousness.

b "As a second stage, the Expert Committee should produce a harmonized and comparable system of statistics on accidents in coal mines throughout the Community.

In drawing up its tables, the Expert Committee should include those of the following elements which it considers to be most appropriate for use in compiling, analyzing and comparing statistics :

(i) technical and human causes;

(ii) workplaces of casualties;

(iii) consequences (deaths, permanent disablement, temporary disablement);

(iv) classification as to seriousness and frequency.

The I.L.O. will collaborate on this work, and the studies already carried out by this organization will be used as a basis for the Expert Committee's discussions."

At its meeting on 13 December 1957 the Expert Committee considered that it should confine itself to accidents underground and devised a basic common system classifying accidents in accordance with the two following criteria : severity and cause :

- regarding the severity of the accident, this system made a distinction between :
  1. accidents resulting in the death of the victim within eight weeks;
  2. accidents preventing the victim from resuming work underground within eight weeks.
- regarding the classification of accidents listed according to cause, 12 cause categories were adopted.

Moreover, the population to be covered, the concept of a collective accident and the frequency rate were also defined and the basis for a comparative table worked out.

These proposals were subsequently agreed by the Mines Safety and Health Commission and statistics were first published in accordance with the system described for 1958.

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(1) Page 159 of the Report on the Conference on Safety in Coal Mines, Luxembourg, March 1957.

The Safety and Health Commission was thus in favour of adopting a simple basis to start with but agreed that, after this simplified system had been in operation for a certain length of time, the question to what extent it could be extended and completed would need to be studied.

In the course of its annual examination of the common statistics and associated graphs and charts, the Mines Safety and Health Commission noted some extensive deviations in the frequency rates in different countries of the Community and the question repeatedly arose as to whether the figures concerning the various countries were really comparable.

The Commission thus decided to set up a new working party whose task would be to check the procedure for applying the original scheme which dated from 1958, to check on anomalies existing in the statistical data collected in each country, to examine the possibilities of making allowance for them in the comparisons at Community level and, finally, to extend the basic system in order to accommodate sufficient data to facilitate better accident prevention planning.

The Working Party's terms of reference were as follows :

- to examine the methods used in the Community countries for drawing up mining accident statistics. Particular examination of the criteria applied in defining the term "mining accident" and the criteria used in classifying the accidents according to cause, duration of absence from work, and, possibly, position of the injuries.

  With the exact definition of these criteria as a basis, to study the differences between the statistics assembled in each country and the ways of taking these differences into account in comparisons on a Community level.

The tasks entrusted to the Working Party may be summarized as follows:

1. To improve the definitions used in the compilation of statistics so as to eliminate or at least to reduce distortions noted and to secure comparable statistics within feasible limits of reliability.

2. To examine the possibility of collecting more detailed Community statistics by extending the coverage to accidents resulting in a shorter period of incapacity and breaking them down in terms of a certain number of body locations; in accordance with the spirit of its terms of reference, the Working Party also examined the possibility of a breakdown in terms of a certain number of accident sites and types of injury.

The Working Party met on 24 October and 11 December 1968, 12 February, 28-29 April, 7-7 October 1969; 19 February, 12 May and 28 October 1970; 11 March 1971.

WORKING PARTY REPORT

Review of work done

In order to comply with the first part of the terms of reference, which consisted in identifying distortions due to varying interpretations of the definitions from one country to another, the Working Party examined in detail the definitions applied in practice in the compilation of national statistics and drew up a summary table of these definitions (doc. no. 3439/2/68). This summary table was compared with the basis Community system dating from 1958, and certain differences were noted.

In order to avoid perpetuation of these errors or at least to reduce their effect, the Working Party drew up some proposals for common definitions which would be as accurate as possible and acceptable to each delegation *(1)*. An analysis explaining the differences between the Community and national definitions is given below, together with the opinion of the Working Party on the extent of the distortions which may result from them.

With regard to the second part of the terms of reference, four new tables have been devised to take account of the extension of coverage.

These tables have been drawn up with reference to the technical possibilities for coverage in the various countries and have been tested for 1969 without any major difficulties being encountered. *(2)*

Analysis of distortions for the period 1958-1969

The Working Party noted that the distortions due to varying interpretations of the definitions were not very extensive and had existed since the beginnings of common statistical coverage. They are the results of mistaken conceptions in the first order rather than of interpretations which have gradually become less accurate. It is thus a case of systematic errors which involve distortions from one country to another but do not affect the chronological comparability of the statistics of that country and for the Community as a whole.

Errors relating to different definitions of the concepts "accidents", "fatal accidents", "frequency rate" are not of any great significance, as is explained in doc. no. 3270/3/69. Concerning the term "period of incapacity", the most striking difference is in the case of Belgium, where the period of incapacity is determined by the period following which the victim may resume work in whatever capacity, not only underground but also at the surface, for social or medical reasons. Nevertheless, similar practices may also exist in other countries, which would reduce the extent of the distortion.

The Working Party has devoted particular attention to distribution of victims according to "accident causes" and has noted the following differences for the five initial headings, which are the most important ones.

I. Falls of ground

Belgium includes under this heading accidents due to falls of stones from roadway lining or of stowage materials, which in other countries are classified under heading V "falls of objects". Since, however, these accidents are relatively few in number the distortion does not appear to be very significant.

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(1) The common definitions and interpretations of them appear in section B, "Recommendations" below.

(2) See "Recommendations" last page

II. Transport

The frequency rate *(1)* of accidents involving more than 56 days' incapacity is greater in Belgium than in Germany and France. It accounts for 27% of the total of accidents against 16% in Germany and 14% in France.

On the other hand, category V "Falls of objects" accounts for a lower frequency in Belgium : an average of 4% as compared with 20% in Germany and 14% in France *(1)*.

This difference is partly due to the fact that accidents caused by machines and equipment in general during transport are included under category II "Transport" and not in V "Falls of objects".

III. Falls and movement of the victim

The frequency rate *(1)* of accidents involving more than 56 days' incapacity is much the same in Germany (18%) and France (16%). On the other hand, it is much lower in Belgium (9%).

This difference is partly due to the inclusion under II "Transport" of certain accidents listed in France and Germany in category III.

IV. Machines, tools and supports

The frequency rate *(1)* of accidents involving more than 56 days incapacity is higher in France (16%) and Belgium (20%) than in Germany (7%). In France this category is used to list accidents caused by stones and the objects themselves during handling, which are included in V in Germany. This method of classification artificially inflates the frequency rate of this category IV in France and consequently diminishes the frequency rate of category V. In Belgium a fairly high frequency rate is also noted, for category IV is used to list accidents due to the handling of supports, whereas these are classified under V in the other countries.

V. Falls of objects

The frequency rate *(1)* of accidents involving more than 56 days' incapacity is higher in Germany (20%) than in France (14%) and in Belgium (4%), for this category is used to list accidents caused by stones and objects during handling, whereas in France these are listed under category IV. It is also worth pointing out the very low frequency rate in Belgium, where accidents listed under V in Germany and IV in France are included under II "means of transport" and IV "Machines, tools and supports", respectively.

It is to be noted that the total of percentage relating to categories II, III, IV and V is practically the same for all the countries *(2)* : Germany (61 %), Belgium (60%), France (59%), Italy (65%), Netherlands (64%). The disortions thus seem to be due to a certain extent to the classification of the same type of accident under different headings.

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(1) Average frequency rate for the 1958-1969 period.

(2) It cannot, however, be concluded from these percentages that the accident risks are identical in each country.

New proposals by the Working Party

Accident site

It has been found worthwhile to break down accidents in terms of a limited number of sites, in order to draw attention to the areas of the mine presenting the worst hazards.

Four categories have been adopted :

1. Production faces

2. Headings excluding shafts and staple pits

3. Shafts and staple pits

3. Other places *(1)*.

Classification of accidents according to period of incapacity

In accordance with the wish expressed by the Commission of the European Communities, the possibility was also examined of extending coverage to accidents involving absences of less than 56 days.

Taking account of the periods at present in use in the different countries and of the technical possibilities in each country of aligning its practice in order to adopt uniform periods, two subdivisions were proposed :

- from 21 to 56 calender days
- from 4 to 20 calender days *(2)*.

In this way, the period of coverage was defined within fairly close limits, and an adequate volume of information was collected which revealed certain characteristic trends in the field of research already studied or to be studied in the future, particularly, in the field of industrial medicine.

Attention is nevertheless drawn to the dubious comparability of accidents involving incapacity for periods of less than 21 days.

In this case the frequency depends to a considerable extent on factors unrelated to safety and accident prevention. Comparison of the figures is thus unlikely to provide worthwhile information and indeed involves the risk of drawing wrong conclusions.

Cause of accidents

The distribution of accidents in accordance with causes remains the fundamental element in the statistical system and in order not to interfere with comparability *(3)*, the 12 causes adopted in the 1958 system have been maintained with subdivisions only for categories II, III, IV and VIII.

II - Transport

A distinction is made between :

a) continuous transport, and

b) discontinuous transport.

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(1) Belgium will endeavour to align its practice with this procedure as soon as possible

(2) For France, 5 to 20 calendar days, but this will not involve any significant difference

(3) "Comparability between the present statistical system and that which has been devised by the Working Party will, however, be somewhat impaired by the fact that the present definitions are not sufficiently precise".

III - Falls and movement of the victim

A distinction is made between accidents occurring :

a) while the victim is moving about the mine, and

b) in the course of other activities.

IV - Machines, tools and supports

Three subdivisions have been introduced :

a) machines

b) tools

c) supports

VIII - Outbursts of gas - deoxygenation, suffocation and gas poisoning

The subdivision of the former category into two subcategories is suggested in view of the entirely different measures which have to be taken against sudden outbursts of gas on the one hand, and deoxygenation, suffocation and gas poisoning on the other.

Location of the injury

The Working Party has devised the following scheme of subdivision under nine headings :

I. Head and Neck

II. Eyes

III. Trunk

IV. Upper limbs (excluding hands)

V. Hands

VI. Lower limbs (excluding feet)

VII. Feet

VIII. Multiple locations (several parts of the body)

IX. Not specified

Nature of the injury

The Working Party felt it worthwhile to propose concurrently a system of subdivision under eight headings :

1. Amputations and enucleations
2. Fractures with or without injuries to the soft parts of the body
3. Luxations, twists and sprains
4. Concussion and internal injuries
5. Open wounds, concussion and muscular abrasions *(1)*
6. Burns and harmful effects of electricity and radiation
7. Poisoning and suffocation
8. Multiple or non-specified injuries (including complications)

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(1) This should include muscular injuries other than ruptures and torn and lacerated muscles, which should be listed in Category 2.

The system of classification proposed for the location and nature of injuries is in conformity with the classification of the International Labour Organization (ILO) in Geneva, in which the groups have been rearranged so as to reduce the number of locations from 44 to 9 and the number of types of injury from 18 to 8.

Test carried out on the new statistical tables for 1969

The aims in carrying out these tests were :

- to ensure that Member States were in a position to draw from their national statistics all the information envisaged by the Working Party without any great difficulty;
- to check whether the distortions noted from one country to another had been reduced by applying the new definitions.

With regard to the first objective, the reply is positive for all countries except that for Belgium a certain period of transition is required to enable it to align its national regulations.

The second objective has been partially achieved, since the tests carried out have revealed a certain reduction in the distortions for certain causes of accidents, in particular those of categories II, IV and V.

- Category II

The percentages for accidents involving incapacity of more than 56 days, which had been 13.5% for Germany, 24% for Belgium and 10% for France were 16%, 24% and 10% respectively, using the new definitions.

- Category IV

The percentages for accidents involving more than 56 days incapacity which had been 8% for Germany, 18% for Belgium and 20% for France, were 12%, 9% and 13% respectively using the new definitions.

- Category V

The percentages for accidents involving more than 56 days incapacity, which had been 25% for Germany, 9% for Belgium and 18% for France, were 26%, 18% and 25% respectively.

On the other hand, increased distortion is to be noted for Category III, in which the percentages of accidents involving more than 56 days' incapacity, which had been 21% for Germany, 9% for Belgium and 22% for France, were 14%, 9% and 22% respectively.

Finally, it should be pointed out that differences in the interpretation of the definitions are clearly not the only causes of distortions. Other causes - technical, geological and statistical - also play their part.

Research at the "safety level"

The Working Party undertook certain mathematical statistical studies in order to determine to what extent the differences noted in the frequency rates, when compared chronologically or from one country to another, were significant from the statistical point of view.

Experience indeed shows that even for the Community as a whole, and much more for each Member country, the frequency rates were affected from one year to another by apparently random variations, which rendered any interpretation practically impossible.

The Working Party adopted as a first approximation the hypothesis that the frequency rates calculated each year could be based on a random phenomenon in accordance with Poisson's law, which made it possible to determine the confidence limits corresponding to a given probability (for example 95%) *(1)*, and thus to judge the significance of the variations observed between two given units (country or coalfield).

The Working Party is, however, aware that this first examination needs to be extended, in particular with regard to the choice of the statistical law or laws capable of being applied to mining accidents. This study, the scope of which is beyond the present terms of reference, should in the opinion of the Working Party form part of specific terms of reference *(2)*.

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(1) This means that the real rate of frequency has a 95% chance of being within the range of the confidence interval.

(2) These terms of reference are contained in Annex II (List of Terms of reference of the various Working Parties).

B - Recommendation on the preparation of common statistics of victims of accidents underground

In order to improve the comparability of the statistics relating to accidents underground, the Mines Safety and Health Commission has instructed a Working Party :

(i) to review the basic statistical system in operation since 1958;

(ii) to formulate in more precise terms and extend the present definitions.

The Commission has also asked the Working Party to extend the coverage of this statistical system.

As a result of the work done by the Working Party, the Mines Safety and Health Commission recommends that Member States should compile common statistics in accordance with the definitions and criteria explained below.

1. Accident

Bodily injury resulting from a sudden and abnormal external cause in the course of work.

Interpretation of the definition

The Mines Safety and Health Commission's statistics should only cover victims of accidents underground, including accidents which occur when men enter and leave the cages and while the cages are in motion.

The definition of the accident should not be linked with any particular duration of incapacity or take into account any form of compensation.

It has been agreed that the term "industrial accident" will not be strictly adhered to since it may be too restrictive and might imply that only accidents occurring during work as such should be counted, whereas the statistics with which we are dealing here are intended to cover all accidents occurring underground wherever the victim may happen to be in connection with his work.

2. Fatal accident

An accident resulting in the death of the victim within 56 days following the accident.

Interpretation of the definition

The statistics of the Mines Safety and Health Commission are only covered victims who die within 56 days following the accident.

Victims dying after the period of 56 days following the accident should not be included in the "fatal accident" category but in that of accidents involving incapacity of more than 56 days.

3. Persons covered by the statistics

Pit staff and employees of contractor firms who belong to a miners, social security scheme.

Interpretation of the definition

The statistics count victims and not accidents; everyone who is the victim of an accident while actually underground as well as during descent and ascent should be included. Victims can, therefore, only be miners, supervisors, engineers or staff belonging to contractor firms.

4. Shifts and number of hours worked

Shifts and number of hours worked by the persons on the books of the mine and other staff belonging to the miners' social insurance scheme; account should be taken of extra shifts and overtime.

Interpretation of the definition

The period of reference adopted is the actual period of exposure to risk; shifts and overtime must therefore be counted in terms of time actually worked and not the number of hours paid.

5. Accident rates

Number of accidents per million hours worked.

The frequency rates are arrived at by dividing the number of accidents of a given category by the total number of hours spent on all types of work underground.

Interpretation of the definition

Accident frequency is calculated by the following formula :

$$T_f = \frac{A \times 10^6}{n}$$

- A = total number of accidents involving absence from work

- n = total number of hours actually worked.

6. Classification of accidents according to periods of incapacity involving absence of the victim from work underground

- Fatal accidents
- Accidents involving an absence of more than 56 calendar days
- Accidents involving an absence of between 21 and 56 calendar days
- Accidents involving an absence of between 4 and 20 calendar days.

Interpretation of the definition

A point to be noted is that the day on which the accident occurred should not be counted.

The number of days of incapacity to be taken into consideration is defined by the effective absence of the miner from work.

The period of incapacity is not defined by the period following which the victim is able to resume the work he was doing prior to the accident, but by the period following which the victim is able to resume any work of whatever kind.

7. Site of the accident

1. Production faces

This comprises the working face including the part between the face or stable hole and the stowed or caved waste but does not include roads of any kind except dummy roads.

2. Headings excluding shafts and staple pits

This also covers the area where loading, timbering and steel work are carried out immediately behind the face.

In the case of slusher packing the cutter area extends up to and including the line of props.

Development headings should be considered as drifts.

3. Shafts and staple pits

This also covers the immediate approach to insets especially where mine cars and stores are loaded and unloaded from the cages.

4. Other places

This heading covers all victims of accidents not included under the three preceding headings.

Interpretation of the definitions

The intention is to define "sites" of work and not "operations" since, although desirable, it is too early at this stage to aim at statistical coverage in terms of operational activities.

The accident frequency rate for the different accident sites is obtained by dividing the number of accidents by the total of hours worked underground and not by the subtotals of hours worked at each accident site.

8. Causes of accidents

I. Falls of ground and rocks

This category of accidents covers falls of stone or coal from its natural situation.

It does not cover accidents caused by falls of ground resulting from one of the factors included under another category, for example the use of explosives, explosion of firedamp or dust, or an outburst. Accidents caused by falls of stone in a caved waste should be included in this category; on the other hand, accidents due to slippage of stone during the stowing of waste should be classed in category V : "Falls of objects".

Interpretation of the definition

Accidents caused by materials continuing to move after falling from their natural position are included under category I "Falls of ground and rocks", except where it is a case of materials set in motion by some external cause after first coming to rest.

II. Transport

Accidents caused by any means of transport whether stationary or in motion, used to carry men or objects at the face, in other workings, in roadways, in shafts,

staple pits, etc., including accidents caused by the engines providing motive power for transport. This category includes, for example, accidents caused by lumps of coal falling from a conveyor belt or blocks of wood from a tub loaded with timber, and even those caused when lumps of coal are projected during their descent down a fixed chute. An accident caused by the gear wheels or the driving mechanism of a transport system should also be included in category II "Transport".

Electrocution caused by a trolley wire should be included in category XI "Electricity".

a) Continuous transport

Transport equipment which can receive products along the whole of its length and maintain a continuous flow.

Interpretation of the definition

This sub-category should include accidents caused in particular by scraper chain conveyors, plate and belt conveyors, retarding conveyors, fixed chutes, pan and shaker conveyors, etc.

b) Discontinuous transport

All other means of transport.

Interpretation of the definition

This category should include accidents caused in particular by skips, cages and kibbles, as well as accidents involving falls of objects from these cages, skips or kibbles; rope haulages, locomotives, mono-rails, decking rams and other similar devices.

III. Falls and movement of the victim

a) While moving about the mine

Falls of men into a shaft or staple pit, falls in general, stumbles, slips, knocks and bumps, sprains of limbs, etc., whatever the cause, should be included, as long as the basic cause of the accident is the victim's movement through the mine in the course of or at the place of work and where no means of transport is involved; the latter should be included in category II "Transport" or III b "Falls of victims in the course of other activities" respectively.

Interpretation of the definition

This category should only include accidents strictly connected with the movement of personnel about the mine.

b) In the course of other activities

Falls of men into a shaft or staple pit, falls in general, stumbles, slips, knocks and bumps, sprains, etc., as long as the fall was caused basically by some particular activity and not by the movement of the victim about the mine, which is covered in IIIa.

Interpretation of the definition

This sub-category should only include accidents due to falls etc. of the victim in the course of his work as such and not during movement about the mine, which is covered by category IIIa "Falls while moving about the mine".

IV. Machines, tools and supports

a) Machines

Accidents caused by engines powering a means of transport should be included in category II "Transport". Category IV covers accidents occurring during the starting up and running of other machines.

Accidents caused by machines falling while being moved will be included in category V "Falls of objects".

b) Tools

Category IV covers accidents caused by the use of tools such as portable drills, drills on stands, hand saws, pneumatic picks, lifting gear, pushers, etc.

Accidents caused by falling tools should be included in category V "Falls of objects".

c) Supports

With regard to accidents occurring during the handling of supports, only those involving the setting up or removal of this equipment should be included in category IV.

If a support or one of its components falls during transport, the accident should be included in category V "Falls of objects".

Interpretation of the definitions

Category IV only covers accidents arising from the use and movement of machines, tools and equipment; it is emphasized in the case of supports that only accidents occurring during the setting up and removal of this equipment should be included in this category.

V. Falls of objects

Accidents involving the falling or dislodging of excavated material and of objects such as frames, timber, tools, props, pipes, materials, etc.

Interpretation of the definition

This category includes not only accidents caused by falls of excavated materials or objects, but also those caused by objects falling while being handled.

VI. Explosives

Accidents occurring during the transport or handling of explosives, the charging of shotholes, due to accidental or premature firing of the shots, to inadequate protection of personnel, unfired explosives being hit by picks or drills, misfires, long fires, residues and poisoning by fumes from explosives.

Where the use of explosives sets off an explosion of firedamp or dust or even a heating or a fire, the accident should be included in category VII or IX respectively.

Accidental firing of explosives caused by the use of electricity should be included in category VI "Explosives".

VII. Ignition or explosions of firedamp and coal dust

This includes poisoning or suffocation by the gases so produced. An explosion of firedamp or coal dust brought about by the use of electricity should be included in category VII. As a generale rule, if the causes of an accident include the ignition or explosion of firedamp or dust, it should always be included in category VII.

VIII. Outbursts of gas - Deoxygenation, suffocation or poisoning by natural gases

(CO_2, CH_4, CO, H_2S)

a) Outbursts of gas

Accidents caused by ejected materials or roof falls caused by sudden outbursts of gas. In accordance with the rule set out for category VII, if the outburst is followed by an explosion of firedamp, any accidents caused should be included in category VII "Ignition or explosions of firedamp or explosions of coal dust".

b) Deoxygenation and poisoning by natural gases (CO_2, CH_4, CO, H_2S).

This includes accidents caused by lack of oxygen, by suffocation (CH_4, CO_2) and by poisoning (CO, H_2S). If suffocation or poisoning is brought about by gas produced by explosives, or by an explosion of firedamp or coal dust, or even by a heating or fire, the accident should be classified under those headings. If suffocation or poisoning is caused by exhaust fumes from diesel engines, the accident should be included in category IV "Explosives".

IX. Heatings or fires

This includes poisoning or suffocation by the gases produced and injuries from burns, roof falls, falls of objects, etc. following a heating or fire in the mine.

A fire following an explosion of firedamp or coal dust should be included in category VII.

A fire caused by the use of electricity should be included in this category.

In general, if the accident is due to several combined causes including a heating or fire, it should always be included in category IX "Heatings and fires", unless one of these causes is the ignition or explosion of firedamp or coal dust; in this last case the accident would be included in category VII.

X. Inrushes

Accidents occurring when old workings are broken into or when dead ground is encountered. Injuries from projected material, falls of objects, falls of ground, drowning, etc.

XI. Electricity

Accidents caused by electricity: burns, shocks, electrocution.

If electricity causes the accidental firing of explosives, an explosion of firedamp or coal dust or a heating or fire, the resulting accident should be included in those categories in the following order of priority:

1. explosion of firedamp or dust
2. a heating or fire
3. explosives

XII. Other causes

This category covers accidents which cannot be classified under headings I to XI, that is to say, accidents of which it is not possible to establish the exact cause.

This category may also be used to record accidents caused by compressed air; it has not been felt necessary to set aside a special category, since accidents due to this cause are relatively rare.

9. Location of the injury

When an accident has resulted in multiple injuries to different parts of the body and one of the injuries is clearly more serious than the others, this accident should be classified in the group relating to the part of the body most seriously injured. For example, a fracture of the leg, together with grazing of a hand should be classified in category VI "Lower limbs" and not in category V "Hands".

I. Head and neck

Covers in particular the skull, the scalp, brain injuries, the ears, the mouth (including the lips, teeth and tongue), the nose, the face, the neck, but not the eyes, which are included in category II.

II. Eyes

Also covers the eye socket and the optic nerve.

III. Trunk

Covers the back (vertebrae and adjacent muscles, the spinal marrow), the thorax, (ribs, sternum, bronchi, lungs), the abdomen (including internal organs, kidneys, liver, spleen), the pelvis and the genital organs.

The shoulders and wrists are regarded as part of the upper limbs (category IV) and not as part of the trunk or hands (category V).

The hips and ankles are regarded as part of the lower limbs (category VI) and not as part of the trunk or feet (category VII).

IV. Upper limbs (excluding hands)

This includes injuries to the shoulders including the collar bone and shoulder blades, injuries to arms, elbows, forearms and wrists.

V. Hands

The wrists are not regarded as part of the hands but of the limbs (category IV).

VI. Lower limbs (excluding feet)

This includes hips, thighs, knees, legs and ankles.

VII. Feet

The ankles are not regarded as part of the feet but of the lower limbs (category VI).

VIII. Multiple locations

This group, covering multiple injuries, should only be used when the victim has suffered several injuries to different parts of his body, none of which is clearly more serious than the others.

The category may cover injuries to the head and trunk, the head and one or more limbs, the trunk and one or more limbs, or an upper and a lower limbs.

IX. Not specified

This group should only be used when there is no evidence of the exact location of the injury.

X. Nature of the injury

When an accident has resulted in several injuries to different parts of the body and one of them is clearly more serious than the others, the accident should be classified in the group relating to the most serious injury.

1. Amputations and enucleations

Including traumatic avulsion of the eye.

2. Fractures with or without dislocation

This includes simple fractures; fractures with injuries to the soft parts of the body (closed or compound fractures); fractures with internal or nerve damage, fractures with luxations, contusions and crushings.

3. Luxations, twists and sprains

Luxations

This covers minor luxations and dislocations, traumatic lumbago, lumbago sciatica caused by strain; it does not include luxations with fractures covered by category 2.

Twists and sprains

This covers ruptures, torn and lacerated muscles, tendons, ligaments and joints as well as hernia due to strain and slipped discs, except where they are associated with open wounds.

4. Concussion and internal injury

This category includes internal bruising, internal bleeding, internal lacerations and ruptures, except where associated with fractures.

It does not include internal injuries accompanied by fractures which are covered by category 2.

5. Open wounds, contusions and muscular abrasions

Includes lacerations, flesh wounds, cuts, contusions, scalp wounds, loss of a nail or an ear, wounds with nerve injuries, haemarthrosis, haematoma and bruises; contusions and bruising with superficial wounds.

It does not include : traumatic amputation, enucleations, avulsion of an eye, which are covered by category I; Compound fractures, contusions and crushings accompanying a fracture, which are covered by category 2; concussion covered by 4; burns with wounds covered by 6.

6. Burns and harmful effects of electricity and radiation

Covers burns from fire, boiling liquid, friction, chemical substances (external burns only), burns with wounds, electrocution, electric shock and burns caused by electricity, the effect of X-rays, radioactive substances, ultra-violet rays and ionizing radiation.

It does not cover burns caused by the absorption of a corrosive or caustic substance, which are classified in category 7.

7. Poisoning and suffocation

This category covers the effects of the injection, ingestion, absorption, or inhalation of toxic, corrosive or caustic substances.

Asphyxiation or suffocation by compression or roof falls; asphyxiation due to the suppression or reduction of oxygen in the atmosphere, the entry of foreign bodies into the respiratory system, to carbon monoxide or other toxic gases.

8. Multiple or non-specified injuries (including complications)

This category includes those cases in which the victim has suffered several injuries of different types, none of which is clearly more serious than the others, and those which are not covered in any other category.

It also covers the various early complications of injuries and pathological reactions, which, however, should only be classified in this group when the nature of the original injury is not known.

The system of classification proposed for the location and nature of injuries is that of the International Labour Organisation (ILO) in Geneva, in which the groups have been rearranged so as to reduce the number of locations from 44 to 9 and the number of types of injury from 18 to 8.

The Mines Safety and Health Commission recommends that figures for accident victims should be recorded by coalfields in accordance with the following tables, starting with 1971:

Table 1a: Breakdown of accident victims in terms of cause, site and period of incapacity (absolute figures)

Table 1b: Breakdown of accident victims in terms of cause, site and period of incapacity (frequency rate)

Table 2a: Breakdown of accident victims in terms of location, nature and period of incapacity (absolute figures)

Table 2b: Breakdown of accident victims in terms of location, nature and period of incapacity (frequency rate).

C - New statistical questionnaire 1a - 1b - 2a - 2b

ANNEX

Explanatory notes - Tables 1

GENERAL DEFINITIONS

1. Accident

Bodily injury resulting from a sudden and abnormal external cause in the course of work.

The Mines Safety and Health Commission's statistics should only cover victims of accidents underground, including accidents which occur when men enter and leave the cages and while the cages are in motion.

2. Fatal accident

An accident causing the death of the victim within 56 days following the accident. Victims dying more than 56 after the day of the accident should not be included in the fatal accident category but in that of accidents resulting in incapacity involving an absence from work of more than 56 days.

3. Persons covered by the statistics

Pit staff and employees of contractor firms who belong to a miners' social security scheme.

The statistics count victims and not accidents, everyone who is the victim of an accident while actually underground as well as during descent and ascent should be included. Victims can therefore only be miners, supervisors, engineers or staff belonging to contractor firms.

4. Shifts and number of hours worked

Shifts and number of hours worked by the persons on the books of the mine and other staff belonging to a miners' social insurance scheme; account should be taken both of extra shifts and overtime.

The period of reference adopted is the period of actual exposure to risk; one therefore counts extra shifts and overtime in terms of time actually worked and not of number of hours paid.

5. Accidents rates

Number of accidents per million hours worked.

The frequency rates are arrived at by dividing the number of accidents of a given category by the total number of hours spent on all types of work underground.

CAUSES OF ACCIDENTS

I. Falls of Ground and Rocks

This category of accidents covers falls of stone or coal from its natural situation .

It does not cover accidents caused by falls of ground resulting from one of the factors included under another category, for example the use of explosives, explosion of firedamp or dust, or an outburst. Accidents caused by falls of stone in a caved waste should be included in this category; on the other hand, accidents during the stowing of waste should be classed in category 5 "Falls of Objects". Accidents caused by materials continuing to move after falling from their natural position are included under category I "Falls of ground and rocks", except where it is a case of materials set in motion by some external cause after first coming to rest.

II. Transport

Accidents caused by any means of transport whether stationary or in motion, used to carry men or objects at the face, in other workings, in roadways, in shafts, staple pits, etc., including accidents caused by the engines providing motive power for transport. This category includes, for example, accidents caused by lumps of coal falling from a conveyor belt or blocks of wood from a tub loaded with timber, and even those caused when lumps of coal are projected during their descent down a fixed chute. An accident caused by the gear wheels or the driving mechanism of a transport system should also be included in category II "Transport".

Electrocution caused by a trolley wire should be included in category XI "Electricity".

a) Continuous Transport

Transport equipment which can receive products along the whole of its length and maintain a continuous flow.

b) Discontinuous transport

All other means of transport.

This category should include accidents caused particularly by skips, cages, kibbles, as well as accidents involving men or objects falling from these cages, skips or kibbles, rope haulages, locomotives, monorails, decking rams and other similar devices.

III. Falls and movement of the victim

a) While moving about the mine

Falls of men into a shaft or staple pit, falls in general, stumbles, slips, knocks and bumps, sprains of limbs, etc., whatever the cause, should be included, as long as the basic cause of the accident is the victim's movement through the mine in the course of or at the place of work and no means of transport is involved; the latter should be included in category II "Transport" or III b "Falls of victim during other activities" respectively.

b) In the course of other activities

Falls of men into a shaft or staple pit, falls in general, stumbles, slips, knocks and bumps, sprains of limbs, etc., as long as the fall was caused basically by some particular activity and not by the movement of the victim about the mine, which is covered in III a.

This category should only include accidents caused by the victim falling during his actual work and not during the course of moving about the mine as under category III a "Falls of victim while moving about the mine".

IV. Machines, tools and supports

a) Machines

Accidents caused by engines powering a means of transport should be included in category II "Transport". Category IV covers accidents occurring during the starting up and running of other machines.

Accidents caused by machines falling while being moved will be included in category V "Falls of objects".

b) Tools

Category IV covers accidents caused by the use of tools such as portable drills, drills on stands, hand saws, pneumatic picks, lifting gear, pushers, etc. Accidents caused by falling tools should be put into category V "Falls of objects".

c) Supports

With regard to accidents occurring during the handling of supports only those involving the setting up or removal of this equipment should be included in category IV. If a suport or one of its components falls during transport, the accident should be included in category V "Falls of objects".

Category IV only covers accidents arising from the use and movement of machines, tools and equipment; it is emphasized in the case of supports that only accidents occurring during the setting up and removal of this equipment should be included in this category.

V. Falls of objects

Accidents involving the falling or dislodging of excavated material, and of objects such as frams, timber, tools, props, pipes, materials, etc.

This category includes not only accidents caused directly by falls of excavating material or objects, but also those caused by objects falling while being handled.

VI. Explosives

Accidents occurring during the transport or handling of explosives, the charging of shotholes, accidental or premature firing of shots, inadequate protection of personnel, unfired explosives being hit by picks or drills, mis-fires, long fires, residues and poisoning by fumes from explosives.

Where the use of explosives sets off an explosion of fire-damp or dust or even a heating or a fire, the accident should be included in category VII or IX respectively.

VII. Ignitions or explosions of firedamp and coal dust

This includes poisoning or suffocation by the gases so produced. An explosion of firedamp or coal dust brought about by the use of electricity should be classified under category VII. As a general rule, if the causes of an accident include the ignition or explosion or firedamp or dust, it should always be included in category VII.

VIII. Outbursts of gas - Deoxygenation, suffocation or poisoning by natural gases (CO_2, CH_4, CO, H_2S)

a) Outbursts of gas

Accidents caused by ejected materials of roof falls caused by sudden outbursts of gas. In accordance with the rule set out for category VII, if the outburst is followed by an explosion of firedamp, any accidents caused thereby should be included in category VII "Ignitions or explosions of firedamp or explosions of coal dust".

b) Deoxygenation and poisoning by natural gases (CO_2, CH_4 ,CO, H_2S)

This includes accidents caused by lack of oxygen, by suffocation (CH_4, CO_2) and by poisoning (CO, H_2S). If suffocation or poisoning is brought about by gas produced by explosives or by an explosion of firedamp or coal dust, or even by a heating or fire, the accident should be classified under those categories. If suffocation or poisoning is caused by exhaust fumes from diesel engines, the accidents should be included in category IV, "Explosives".

IX. Heatings or fires

This includes poisoning or suffocation by the gases produced, injuries from burns, roof falls, falls of objects, etc. following a heating or fire in the mine. A fire following an explosion of firedamp or coal dust should be this category.

In general, if the accident is due to several combined causes including a heating or a fire, it should always be included in category IX "Heatings or fires" unless one of the causes is the ignition or explosion of firedamp or coal dust; in this last case the accident would be included in category VII.

X. Inrushes

Accidents occurring when old workings are broken into or when dead ground is encountered. Injuries from projected material, falls of objects, falls of ground drowning, etc.

XI. Electricity

Accidents caused by electricity - burns, shocks, electrocution. If electricity causes the accidental firing of explosives, an explosion of firedamp or coal dust or a heating or a fire, the resulting accident should be included in those categories in the following order of priority :

1. Explosion of firedamp or dust
2. A heating or fire
3. Explosives

XII. Other causes

This category covers accidents which cannot be classified under categories I to XI, that is to say, accidents of which it is not possibile to establish the exact cause. This category may also be used to record accidents covered by compressed air.

SITE OF THE ACCIDENT

This means the place where the victim was at the time of the accident, which may be different from the victim's normal place of work.

1. Production faces

This comprises the working face including the part between the face or staple hole and the stowed or caved waste but does not include roads of any kind except dummy roads.

2. Headings excluding shafts and staple pits

This also covers the area where loading, timbering and steelwork are carried out immediately behind the face. In the case of slusher packing the curring area extends up to and including the line of props.

Development headings should be considered as drifts.

3. Shafts and staple pits

This also covers the immediate approach to insets especially where mine cars and stores are loaded and unloaded from the cages.

4. Other places

This heading covers all the victims of accidents not included under the three preceding headings.

PERIOD OF INCAPACITY

Accidents should be broken down as follows according to periods of incapacity :

- Accidents involving an absence of between 4 and 20 calendar days
- Accidents involving an absence of between 21 and 56 calendar days
- Accidents involving an absence of more than 56 calendar days
- Fatal accidents.

The day of the accident does not count. The number of days of incapacity to be taken into consideration is defined by the effective absence of the miner from work.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(absolute figures)

Table 1a

COUNTRY

COAL-FIELD

YEAR

MAN-HOURS WORKED *(1)*

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS																												
II. TRANSPORT, TOTAL																												
a) Continuous Transport																												
b) Discontinuous Transport																												
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL																												
a) while moving about the mine																												
b) in the course of other activities																												
IV. MACHINES, TOOLS AND SUPPORTS TOTAL																												
a) Machines																												
b) Tools																												
c) Supports																												
V. FALLS OF OBJECTS																												
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES																												
X. INRUSHES																												
XI. ELECTRICITY																												
XII. OTHER CAUSES																												
TOTAL																												

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

ANNEX

Explanatory notes - Tables 1

GENERAL DEFINITIONS

1. Accident

Bodily injury resulting from a sudden and abnormal external cause in the course of work.

The Mines Safety and Health Commission's statistics should only cover victims of accidents underground, including accidents which occur when men enter and leave the cages and while the cages are in motion.

2. Fatal accident

An accident causing the death of the victim within 56 days following the accident. Victims dying more than 56 after the day of the accident should not be included in the fatal accident category but in that of accidents resulting in incapacity involving an absence from work of more than 56 days.

3. Persons covered by the statistics

Pit staff and employees of contractor firms who belong to a miners' social security scheme.

The statistics count victims and not accidents, everyone who is the victim of an accident while actually underground as well as during descent and ascent should be included. Victims can therefore only be miners, supervisors, engineers or staff belonging to contractor firms.

4. Shifts and number of hours worked

Shifts and number of hours worked by the persons on the books of the mine and other staff belonging to a miners' social insurance scheme; account should be taken both of extra shifts and overtime.

The period of reference adopted is the period of actual exposure to risk; one therefore counts extra shifts and overtime in terms of time actually worked and not of number of hours paid.

5. Accidents rates

Number of accidents per million hours worked.

The frequency rates are arrived at by dividing the number of accidents of a given category by the total number of hours spent on all types of work underground.

CAUSES OF ACCIDENTS

I. Falls of Ground and Rocks

This category of accidents covers falls of stone or coal from its natural situation .

It does not cover accidents caused by falls of ground resulting from one of the factors included under another category, for example the use of explosives, explosion of firedamp or dust, or an outburst. Accidents caused by falls of stone in a caved waste should be included in this category; on the other hand, accidents during the stowing of waste should be classed in category 5 "Falls of Objects". Accidents caused by materials continuing to move after falling from their natural position are included under category I "Falls of ground and rocks", except where it is a case of materials set in motion by some external cause after first coming to rest.

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Accidents caused by any means of transport whether stationary or in motion, used to carry men or objects at the face, in other workings, in roadways, in shafts, staple pits, etc., including accidents caused by the engines providing motive power for transport. This category includes, for example, accidents caused by lumps of coal falling from a conveyor belt or blocks of wood from a tub loaded with timber, and even those caused when lumps of coal are projected during their descent down a fixed chute. An accident caused by the gear wheels or the driving mechanism of a transport system should also be included in category II "Transport".

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Accidents occurring when old workings are broken into or when dead ground is encountered. Injuries from projected material, falls of objects, falls of ground drowning, etc.

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Accidents caused by electricity - burns, shocks, electrocution. If electricity causes the accidental firing of explosives, an explosion of firedamp or coal dust or a heating or a fire, the resulting accident should be included in those categories in the following order of priority :

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This category covers accidents which cannot be classified under categories I to XI, that is to say, accidents of which it is not possibile to establish the exact cause. This category may also be used to record accidents covered by compressed air.

SITE OF THE ACCIDENT

This means the place where the victim was at the time of the accident, which may be different from the victim's normal place of work.

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2. Headings excluding shafts and staple pits

This also covers the area where loading, timbering and steelwork are carried out immediately behind the face. In the case of slusher packing the curring area extends up to and including the line of props.

Development headings should be considered as drifts.

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This also covers the immediate approach to insets especially where mine cars and stores are loaded and unloaded from the cages.

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This heading covers all the victims of accidents not included under the three preceding headings.

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Accidents should be broken down as follows according to periods of incapacity :

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The day of the accident does not count. The number of days of incapacity to be taken into consideration is defined by the effective absence of the miner from work.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE OF ACCIDENT AND PERIOD OF INCAPACITY

(frequency rates)

Table 1b

COUNTRY

COAL-FIELD

YEAR

MAN-HOURS WORKED *(1)*

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents *(2)* 6		
Period of incapacity / CAUSES OF ACCIDENTS	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	4 to 20 days *(3)*	21 to 56 days *(3)*	>56 days *(3)*	Fatal accidents	total	56 days *(3)*	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS																												
II. TRANSPORT, TOTAL																												
a) Continuous Transport																												
b) Discontinuous Transport																												
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL																												
a) while moving about the mine																												
b) in the course of other activities																												
IV. MACHINES, TOOLS AND SUPPORTS TOTAL																												
a) Machines																												
b) Tools																												
c) Supports																												
V. FALLS OF OBJECTS																												
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES																												
X. INRUSHES																												
XI. ELECTRICITY																												
XII. OTHER CAUSES																												
TOTAL																												

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.
(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).
(3) Calender days.

ANNEX

Explanatory notes - Tables 2

GENERAL DEFINITIONS

1. Accident

Bodily injury resulting from a sudden and abnormal external cause in the course of work.

The Mine Safety and Health Commission's statistics should only cover victims of accidents underground, including accidents which occur when men enter and leave the cages and while the cages are in motion.

2. Fatal accident

An accident causing the death of the victim within 56 days following the accident. Victims dying more than 56 days after the day of the accident should not be included in the fatal accidents category but in that of accidents resulting in incapacity involving an absence from work of more than 56 days.

3. Persons covered by the statistics

Pit staff and employees of contractor firms who belong to a miner's social security scheme.

The statistics count victims and not accidents; everyone who is the victim of an accident while actually underground as well as during descent and ascent should be included. Victims can therefore only be miners, supervisors, engineers or staff belonging to contractor firms.

4. Shifts and number of hours worked

Shifts and number of hours worked by the persons on the books of the mine and other staff belonging to a miners' social insurance scheme; account should be taken both of extra shifts and overtime.

The period of reference adopted is the period of actual exposure to risk; extra shifts and overtime must therefor be counted in terms of time actually worked and not of number of hours paid.

5. Accident rates

Number of accidents per million hours worked.

The frequency rates are arrived at by dividing the number of accidents of a given category by the total number of hours spent on all types of work underground.

9. Location of the injury

When an accident has resulted in multiple injuries to different parts of the body and one of the injuries is clearly more serious than the others, this accident should be classified in the group relating to the part of the body most seriously injured; for example, a fracture of the leg, together with grazing of a hand, should be classified in category VI "Lower limbs" and not in category V "Hands".

I. Head and neck

Covers in particular the skull, the scalp, brain injuries, the ears, the mouth (including the lips, teeth and tongue), the nose, the face, the neck but not the eyes which are included in category II.

II. Eyes

Also covers the eye socket and the optic nerve.

III. Trunk

Covers the back (vertebrae and adjacent muscles, the spinal marrow), the thorax (ribs, sternum, bronchi, lungs), the abdomen (including internal organs, kidneys, liver, spleen), the abdomen and the genital organs.

The shoulders and wrists are regarded as part of the upper limbs (category IV) and not of the trunk or hands (category V).

The hips and the ankles are regarded as part of the lower limbs (category VI) and not as part of the trunk or feet (category VII).

IV. Upper limbs (excluding the hands)

This includes injuries to the shoulders, including the collar bone and shoulder blades, injuries to the arms, elbows, forearms and wrists.

V. Hands

The wrists are not regarded as part of the hands but of the upper limbs (category IV).

VI. Lower limbs (excluding feet)

This includes the hips, thighs, knees, legs and ankles.

VII. Feet

The ankles are not regarded as part of the feet but of the lower limbs (category VI).

VIII. Multiple locations

This group, covering multiple locations, should only be used when the victim has suffered several injuries to different parts of his body, none of which is clearly more serious than the others.

The category may cover injuries to the head and trunk, the head and one or more limbs, the trunk and one or more limbs or an upper and a lower limb.

IX. Not specified

This group should only be used when there is no evidence of the exact location of the injury.

10. Nature of the injury

When an accident has resulted in several injuries to different parts of the body and one of them is clearly more serious than the others, the accident should be classified in the group relating to the most serious injury.

1. Amputations and enucleations

This includes traumatic avulsion of the eye.

2. Fractures with or without dislocation

This includes simple fractures; fractures with injuries to the soft parts of the body, closed or compound fractures; fractures with internal or nerve damage, fractures with luxations, contusions and crushings.

3. Luxations, twists and sprains

LUXATIONS

This covers minor luxations and dislocations, traumatic lumbago, lumbago sciatica caused by strain; it does not include luxations with fracture covered by category 2.

TWISTS AND SPRAINS

This covers ruptures, torn and lacerated muscles, tendons, ligaments and joints as well as hernia due to strain and slipped discs, except when they are associated with open wounds.

4. Concussion and internal injury

This category includes internal bruising, internal bleeding, internal lacerations and ruptures except where associated with fractures.

It does not include internal injuries accompanied by fractures which are covered by category 2.

5. Open wounds, contusions and muscular abrasions

This covers lacerations, flesh wounds, cuts, contusions, scalp wounds, loss of a nail or an ear, wounds with nerve injuries, haemarthosis, haematoma and bruises, contusions and bruises with superficial wounds. It does not include traumatic amputation, enucleations or avulsion of an eye, which are covered by category 1, compound fractures, contusions and crushings accompanying a fracture which are covered by category 2, concussion covered by 4, burns with wounds covered by 6.

6. Burns and harmful effects of electricity and radiation

Covers burns from fire, boiling liquid, friction, chemical substances (external burns only), burns with wounds, electrocution, electric shock and burns caused by electricity, the effect of X-rays, radioactive substances, ultra violet rays and ionizing radiation.

It does not cover burns caused by the absorption of a corrosive or caustic substance which are classified in category 7.

7. Poisoning and suffocation

This category covers the effects of the injection, ingestion, absorption or inhalation of toxic, corrosive or caustic substances.

Asphyxiation or suffocation by compression or roof fall; asphyxiation due to the suppression or reduction of oxygen in the atmosphere, the entry of a foreign bodies into the respiratory system, to carbon monoxide or other toxic gases.

8. Multiple injuries or those not specified (including complications)

This category includes those cases in which the victim has suffered several injuries of different types, none of which is clearly more serious than the others, and those which are not covered in any other category.

It also covers the various early complications of injuries and pathological reactions, which, however, should only be classified in this group when the nature of the original injury is not known.

PERIOD OF INCAPACITY

Accidents should be broken down according to two periods of incapacity :

- accidents involving an absence of more than 56 calendar days

- fatal accidents.

The day of the accident does not count. The number of days of incapacity to be taken into consideration is defined by the effective absence of the miner from work.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(absolute figures)

Table 2a

COUNTRY

COAL-FIELD

YEAR

MAN-HOURS WORKED *(1)*

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck																													
II. Eyes																													
III. Trunk																													
IV. Upper limbs (excluding the hands) *(3)*																													
V. Hands																													
VI. Lower limbs (excluding feet) *(4)*																													
VII. Feet																													
VIII. Multiple locations																													
IX. Not specified																													
TOTAL																													

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

ANNEX

Explanatory notes - Tables 2

GENERAL DEFINITIONS

1. Accident

Bodily injury resulting from a sudden and abnormal external cause in the course of work.

The Mine Safety and Health Commission's statistics should only cover victims of accidents underground, including accidents which occur when men enter and leave the cages and while the cages are in motion.

2. Fatal accident

An accident causing the death of the victim within 56 days following the accident. Victims dying more than 56 days after the day of the accident should not be included in the fatal accidents category but in that of accidents resulting in incapacity involving an absence from work of more than 56 days.

3. Persons covered by the statistics

Pit staff and employees of contractor firms who belong to a miner's social security scheme.

The statistics count victims and not accidents; everyone who is the victim of an accident while actually underground as well as during descent and ascent should be included. Victims can therefore only be miners, supervisors, engineers or staff belonging to contractor firms.

4. Shifts and number of hours worked

Shifts and number of hours worked by the persons on the books of the mine and other staff belonging to a miners' social insurance scheme; account should be taken both of extra shifts and overtime.

The period of reference adopted is the period of actual exposure to risk; extra shifts and overtime must therefor be counted in terms of time actually worked and not of number of hours paid.

5. Accident rates

Number of accidents per million hours worked.

The frequency rates are arrived at by dividing the number of accidents of a given category by the total number of hours spent on all types of work underground.

9. Location of the injury

When an accident has resulted in multiple injuries to different parts of the body and one of the injuries is clearly more serious than the others, this accident should be classified in the group relating to the part of the body most seriously injured; for example, a fracture of the leg, together with grazing of a hand, should be classified in category VI "Lower limbs" and not in category V "Hands".

I. Head and neck

Covers in particular the skull, the scalp, brain injuries, the ears, the mouth (including the lips, teeth and tongue), the nose, the face, the neck but not the eyes which are included in category II.

II. Eyes

Also covers the eye socket and the optic nerve.

III. Trunk

Covers the back (vertebrae and adjacent muscles, the spinal marrow), the thorax (ribs, sternum, bronchi, lungs), the abdomen (including internal organs, kidneys, liver, spleen), the abdomen and the genital organs.

The shoulders and wrists are regarded as part of the upper limbs (category IV) and not of the trunk or hands (category V).

The hips and the ankles are regarded as part of the lower limbs (category VI) and not as part of the trunk or feet (category VII).

IV. Upper limbs (excluding the hands)

This includes injuries to the shoulders, including the collar bone and shoulder blades, injuries to the arms, elbows, forearms and wrists.

V. Hands

The wrists are not regarded as part of the hands but of the upper limbs (category IV).

VI. Lower limbs (excluding feet)

This includes the hips, thighs, knees, legs and ankles.

VII. Feet

The ankles are not regarded as part of the feet but of the lower limbs (category VI).

VIII. Multiple locations

This group, covering multiple locations, should only be used when the victim has suffered several injuries to different parts of his body, none of which is clearly more serious than the others.

The category may cover injuries to the head and trunk, the head and one or more limbs, the trunk and one or more limbs or an upper and a lower limb.

IX. Not specified

This group should only be used when there is no evidence of the exact location of the injury.

10. Nature of the injury

When an accident has resulted in several injuries to different parts of the body and one of them is clearly more serious than the others, the accident should be classified in the group relating to the most serious injury.

1. Amputations and enucleations

This includes traumatic avulsion of the eye.

2. Fractures with or without dislocation

This includes simple fractures; fractures with injuries to the soft parts of the body, closed or compound fractures; fractures with internal or nerve damage, fractures with luxations, contusions and crushings.

3. Luxations, twists and sprains

LUXATIONS

This covers minor luxations and dislocations, traumatic lumbago, lumbago sciatica caused by strain; it does not include luxations with fracture covered by category 2.

TWISTS AND SPRAINS

This covers ruptures, torn and lacerated muscles, tendons, ligaments and joints as well as hernia due to strain and slipped discs, except when they are associated with open wounds.

4. Concussion and internal injury

This category includes internal bruising, internal bleeding, internal lacerations and ruptures except where associated with fractures.

It does not include internal injuries accompanied by fractures which are covered by category 2.

5. Open wounds, contusions and muscular abrasions

This covers lacerations, flesh wounds, cuts, contusions, scalp wounds, loss of a nail or an ear, wounds with nerve injuries, haemarthosis, haematoma and bruises, contusions and bruises with superficial wounds. It does not include traumatic amputation, enucleations or avulsion of an eye, which are covered by category 1, compound fractures, contusions and crushings accompanying a fracture which are covered by category 2, concussion covered by 4, burns with wounds covered by 6.

6. Burns and harmful effects of electricity and radiation

Covers burns from fire, boiling liquid, friction, chemical substances (external burns only), burns with wounds, electrocution, electric shock and burns caused by electricity, the effect of X-rays, radioactive substances, ultra violet rays and ionizing radiation.

It does not cover burns caused by the absorption of a corrosive or caustic substance which are classified in category 7.

7. Poisoning and suffocation

This category covers the effects of the injection, ingestion, absorption or inhalation of toxic, corrosive or caustic substances.

Asphyxiation or suffocation by compression or roof fall; asphyxiation due to the suppression or reduction of oxygen in the atmosphere, the entry of a foreign bodies into the respiratory system, to carbon monoxide or other toxic gases.

8. Multiple injuries or those not specified (including complications)

This category includes those cases in which the victim has suffered several injuries of different types, none of which is clearly more serious than the others, and those which are not covered in any other category.

It also covers the various early complications of injuries and pathological reactions, which, however, should only be classified in this group when the nature of the original injury is not known.

PERIOD OF INCAPACITY

Accidents should be broken down according to two periods of incapacity :

- accidents involving an absence of more than 56 calendar days

- fatal accidents.

The day of the accident does not count. The number of days of incapacity to be taken into consideration is defined by the effective absence of the miner from work.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

DETAILED BREAKDOWN OF VICTIMS ACCORDING TO LOCATION AND NATURE OF INJURY AND PERIOD OF INCAPACITY

(Frequency rates)

Table 2b

COUNTRY

COAL-FIELD

YEAR

MAN-HOURS WORKED *(1)*

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twists and sprains 3			Concussion and internal injury 4			Open wounds contusions and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified *(2)* 8			TOTAL 9					
PERIOD OF INCAPACITY	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	> 56 days *(5)*	Fatal accidents	total	4 to 20 days *(5)*	21 to 56 days *(5)*	> 56 days *(5)*	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck																													
II. Eyes																													
III. Trunk																													
IV. Upper limbs (excluding the hands) *(3)*																													
V. Hands																													
VI. Lower limbs (excluding feet) *(4)*																													
VII. Feet																													
VIII. Multiple locations																													
IX. Not specified																													
TOTAL																													

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
(2) including complications.
(3) The shoulders and the wrists are included under "upper limbs".
(4) The hips and the ankles are included under "Lower limbs".
(5) Calender days.

ANNEX VI

SUMMARY TABLE OF REGULATIONS AND DIRECTIVES REGARDING RESCUE OPERATIONS IN MINES

(approved by the Mines Safety Commission at its Plenary Session of 26.3.1971)

CONTENTS

Summary table of regulations and directives regarding rescue operations in mines

I. Following the examination of the final report concerning the fire-damp explosion which occurred on 22/7/1965 in the Mont Cenis mine, at its meeting held on 24 and 25 April 1967, the Permanent Authority asked the Working Party "rescue operations and fires in mines" to make a summary comparison of the regulations and directives regarding rescue operations drawn up by the mining authorities in the member-countries and in the United Kingdom.

In order to facilitate the study of the current regulations, the work was to be limited to the preparation of a summary table giving the basic conditions in force in the various countries.

In addition, an appendix gives the complete text of the principle conditions of implementation, circulars, regulations, principles or directives applicable in the various countries. In the case of those which do not appear in the summary table or in the appended regulations, only their title is mentioned for information purposes.

The basic conditions have been exploited and compared taking into account the following questions :

(i) rescue service

(ii) rescue stations

(iii) breathing apparatus

(iv) training premises

(v) principles for the training, forming, equipping, supervision and intervention of rescue teams

(vi) common rescue stations and mutual assistance

Although in certain countries the mining administrations apply more detailed regulations for the implementation of these basic conditions, in other countries the competent departments merely regard this implementation as being covered by the mining regulations, this being the case in Belgium, Italy and the United Kingdom.

For this reason, the mining regulations of these countries are quoted in full both in the summary and in the appendix.

II. The following basic mining regulations are given in the summary table :

(1) Germany

(a) Mining regulations dated 18/12/1964 for coal mines in the district of the Oberbergamt of Dortmund (Bonn), chapter 6 : "Rescue operations and anti-gas protection in mines".

The articles given in the table do not include the wording concerning protection against gases.

(b) Police mining regulation of the Oberbergamt of Sarrebrück for collieries dated 1/10/1946, amended by the police mining regulations dated 1/3/1948, 30/1/1961 and 20/11/1967, chapter 12, section A : "Organisation of rescue operations" and section B : "Rescue operations".

(2) Belgium

Decree of the Regent dated 25/9/1947, amended by royal decrees dated 10/8/1950; 24/3/1955; 13/4/1965 and 16/4/1965, section IV : "Initial aid and medical attention to the injured and sick", section II : "Special regulations".

(3) France

(a) Mining code : Decree No. 56/838 dated 16/8/1956, heading IV, chapter II : "exercising of administrative supervision and measures to be taken in the event of accident".

(b) General regulation : Decree No. 51-508 dated 4/5/1951, heading XIII, chapter II : "Rescue operations".

(4) Netherlands

Mining regulation 1964 dated 21/12/1964, section XV : "Accidents and rescue measures".

(5) Italy

Police regulation for mines and quarries, decree of the President of the Italian Republic No. 128 dated 9/4/1959, heading X, section X : "Rescue operations".

(6) United Kingdom

Regulation concerning coal mines and other mines (fires and rescue operations) dated 1956, first appendix, part IV "Rescue measures".

III. The following complete texts are appended :

(1) Germany

(a) Rescue procedure (approved by the Oberbergamt of Dortmund on 26/11/1965 and by the Oberbergamt of Bonn on 29/11/1965 (Appendix I).

(b) Principles relating to rescue operations in coal mines approved by the Oberbergamt of Sarrebrück on 9/5/1967 (Appendix II).

(2) Belgium

Article 97 of the decree of the Regent mentioned above under II.2, as well as the conditions of the "Centre for the co-ordination of rescue operations for the Campine Basin" and the "Belgian National Centre for rescue operations in mines at Charleroi" (Appendix III).

(3) France

(a) Decree of the Minister for Industry dated 14/4/1965 relating to the organization of rescue operations in mines of solid mineral fuels (Appendix IV).

(b) Circular DM/H No. 259 to the chief engineers of mines on the organising of rescue operations (Appendix V).

(4) Netherlands

Instruction dated 29/2/1968 of the general-inspector for mines, relating to the requirements to be met by the rescue service (Appendix VI).

(5) United Kingdom

The regulation quoted above under II. 6 (Appendix VII).

(6) Italy

The chapter quoted under II. 5, also articles 656 to 658 of the police regulation for mines and quarries dated 9/4/1959 (Appendix VIII).

IV. Other regulations, directives and instructions concerning the organization of the rescue operations are also applied in the various countries.

However, these are essentially regulations or instructions for rescue centres or rescue stations.

Since the mandate formulated by the Permanent Authority refers expressly to the use of regulations emanating from mining suthorities, it would be going too far to include regulations for rescue stations in this study.

However, in the majority of cases these latter have been communicated to the rescue experts during their visits to the rescue centres; furthermore, part of the text of these regulations is given in the reports on these visits.

The instructions or directives for rescue stations in the possession of the secretariat are listed below as an additional item of information :

(1) Germany

(i) Principles concerning the preparation and execution of rescue operations in coal mines (agreement of the Oberbergamt of Sarrebrück dated 29/6/1965).

(ii) Central rescue procedure prepared by the Sarre mines for a period of 2 to 3 years with the agreement of the Oberbergamt of Sarrebrück.

(2) France

In each basin, the installation and functioning of rescue centres and rescue stations are governed by special regulations and instructions. As an exemple, the following are quoted in respect of 2 basins :

(a) Coal-mining districts in the North and the Pas-de-Calais :

(i) regulation dated 21/2/1966 fixing the conditions for the installation and functioning of the central rescue stations at Lens

(ii) Instruction dated 21/2/1966 relating to the setting up and organization of rescue stations at workings (secondary stations).

(b) Coal-mining districts in the Cévennes :

(i) regulation dated 12/4/1966 concerning the central rescue station at La Grand' Combe

(ii) Instruction dated 12/4/1966 governing the installation and functioning of a rescue station affiliated to the central rescue station of the coal-mining districts of the Cévennes basin.

(3) Netherlands

(i) Regulation No. 84 : instructions for the head of the rescue service.

(ii) Regulation No. 85 : instructions for the team leader.

(iii) Regulation No. 86 : general instruction to be followed in the event of fire or explosion.

(iv) Regulation No. 87 : rescue procedure.

V. The inital study of all these regulations effected by the secretariat of the Permanent Authority, shows that, generally speaking, the rescue organization is very similar and that any differences arise from local conditions and peculiarities.

In conclusion, it should be stressed in this connection that the rescue specialists hold regular exchanges of views in accordance with the mandate of the Permanent Authority, and are regularly informed on the most current questions in this field, for which purpose the annual reports of the rescue centres and the 2-yearly reports of the Rescue Organisation *(1)* form a notable contribution.

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(1) The Seventh Report on the Rescue Organization for the years 1967 and 1968 was adopted by the Permanent Authority at its plenary meeting on 26/2/1970.

Subject	GERMANY		BELGIUM	FRANCE	NETHERLANDS	ITALY	UNITED KINGDOM
	RUHR	SARRE					
1. Rescue service	Mining regulation dated 18.12.1964 for coal mines in the Dortmund District (Bonn). All workings in use must have a rescue service (para. 65, sub-para. 1). With the exception of the officials in charge of the maintenance of the apparatus, the rescue service may only include persons whose suitability to serve in this service has been medically certified. This suitability must be checked every 2 years at least, by medical examinations (para. 66, sub-para. 1). The members of the rescue service are to be provided with service instructions (para, 66, sub-para. 2). A superintendent shall be appointed as head of the rescue service, in order to supervise the rescue operations and be in charge of the rescue personnel (para. 67, sub-para. 1).	Police regulation dated 20.11.1967 for coal mines in the Sarrebruck Oberbergamt. Every autonomous working site must have at least one rescue service familiar with breathing apparatus (para. 264, sentence 1). The members of the rescue service are to be provided with service instructions (para. 267, sub-para. 3). A superintendent belonging to the rescue service must be made responsible for the rescue operations of each autonomous working site (Team leader - Oberführer) (para. 266).	Decree of the Regent dated 25.9.1947, amended by Royal Decrees dated 10.8.1950, 24.3.1955, 13.4.1965 and 16.4.1965. The use of the breathing apparatus referred to in article 95 shall be entrusted to skilled workers, absolutely familiar with the underground workings and numbering at least four per item of apparatus stipulated (article 96, sub-para 1). These workers are to be distributed as far as possible between the various working points and chosen from those living near the sites. Their names and addresses shall be posted at each of the workings where they may be required to intervene (article 96, sub-para. 2).	Mining code : Decree No. 56-838 dated 16.8.1956, also General Regulation : Decree No. 51-508 dated 4.5.1951. In the event of an accident occurring in a mine, the mayors and other police officers, in conjunction with the engineer of mines, shall take all suitable steps to remove the danger and provide for subsequent action; as in the case of imminent danger, they may requisition equipment, horses, and men, and arrange for work to be carried out under the direction of the engineer of mines or engineers placed under the direction of specialists delegated for this purpose by the local authority (mining code : article 87).	Mining regulation 1964 (Decree dated 21.12.64 bearing on the directive in article 9, sub-para. 1 and 3, of the law of 1903 on factories). Works above ground and drilling installations shall be provided, at the places appointed by the management of the factory undertaking, with the approval of our Minister, with : a) ..... b) ..... c) one or more groups made up of persons sufficiently skilled in the manipulation of the rescue means referred under a) and b) d) a suitable register of these persons and the drills which they have carried out (article 279).	Police regulation for mines and quarries - Decree of the President of the Republic dated 9.4.1959, No. 128. Without prejudice to the conditions in Article 539, a rescue team must be formed in all mines classified for the presence of inflammable, poisonous or other harmful gases (article 528). The men comprising the rescue team must be volunteers, at least 24 and not more than 50 years of age, be recognised as physically suitable by medical examination repeated every year, possess well-tried self-control, and be particularly suited to carrying out work essential to rescue operations. They must have a good knowledge of below ground. A departmental head shall be placed in charge of the team, and a suitable person must be appointed to replace him in his absence (article 529, A1.1 and 4).	Regulation concerning coal mines and other mines (fires and rescue) dated 1956, First Appendix, part IV. The owner of each mine must : (i) supply, maintain and direct, in accordance with the following conditions of this part of these regulations, a rescue centre facilitating rescue operations and other necessary work in this mine following an explosion or a fire, or in a part of this mine where the atmosphere is probably unbreathable, or (ii) take any steps to procure for this mine the means available from a rescue centre organized and directed under the conditions laid down, in the case of a station situated up to 15 miles from the entrance to the mine or at a greater distance not exceeding 20 miles, depending on the authority of an inspector notified to the owner. (Regulation No. 12, sub-para. 1). Each rescue centre shall be placed under the direct authority of a competent foreman who has undergone full training in rescue work and, unless he was employed in this capacity before 1 January 1929, guaranteeing at least 5 years practical experience in underground mining works (regulation 13, sub-para. 1).
2. Rescue station	The rescue personnel must be provided at the workings, with a depot for setting in order and maintaining the apparatus and equipment (Rescue station of the mine) (para. 65, sub-para. 3).	The rescue service must be provided with a rescue station equipped with the necessary apparatus and equipment (store for arranging breathing apparatus and training room) (para. 265, sub-para. 1).	All coal mines, with the exception of those classified as non-gaseous employing less than 75 persons on underground work, shall be provided with depots for breathing apparatus able to serve quickly their various workings in the event of accident (article 95, para. 1).	All workings where more than one hundred workmen are employed simultaneously underground on the largest shift, must possess a rescue station equipped with rescue apparatus ready for immediate use, i.e. :		In mines of an isolated nature or associated therewith, referred to in articles 528 and 539, suitable premises must be provided for guarding and maintaining the equipment used by the rescue team, complying with the essential conditions required for their use. These premises, which may not be used for any other purpose, must be protected against fire and situated near to the surface entrance to the route by which the workmen normally gain access to and leave the workings below ground (article 534).	
3. Breathing apparatus	The owner of the mine must equip the rescue staff with apparatus (para. 65, sub-para. 2). The breathing apparatus of the rescue staff must only be used by them. The Bergamt may grant derogations to this ruling, except as regards the use of closed-circuit oxygen apparatus (para. 65, sub-para. 5). One person shall be made responsible for maintaining the breathing apparatus of the rescue teams (para. 65, sub-para. 6).	Work in unbreathable gas may only be carried out with breathing apparatus and under permanent supervision (para. 268). Only apparatus of a type authorized by the Oberbergamt may be used (para. 265, sub-para. 2). One person must be placed in charge of the maintenance of the breathing apparatus and their accessories (para. 265, sub-para. 3).	This breathing apparatus shall be of the closed-circuit system, i.e. with provision of oxygen and regeneration device for exhaled air, and their charging capacity must be sufficient for a continuous stay of at least one and a half hours in an unbreathable atmosphere. The model of equipment used must be one authorized by the Mines Administration (article 95. sub-para. 2). One breathing apparatus shall be provided for every 200 workmen employed simultaneously in the underground workings, subject to there not being less than five or more than ten per mine (article 95, sub-para. 3). The above breathing apparatus shall be maintained in constant good functioning condition. The necessary measures shall be taken at each depot to enable them all to be used simultaneously and at any time for at least 48 hours (article 95, sub-para. 4).	Portable breathing apparatus making it possible to remain at least one hour in an unbreathable atmosphere. Detection apparatus for detecting any dangerous proportion of carbon monoxide, and individual apparatus giving effective protection against this gas (general regulation / article 320, sub-para. 1-3). The operators shall be responsible for maintaining in their establishments in proportion to the number of workmen and the extent of the operations, the medicines and means of rescue advised to them by the Minister responsible for mines, and for complying with the statutory instruction approved by him for this purpose. (mining code : article 88).	a) a sufficient number of efficient breathing apparatuses, ready for use and suitably disinfected,making it possible to enter an atmosphere contaminated by suffocating or poisonous gases or by radio-active substances b) other sufficient equipment of an effective nature, ready for use and suitably desinfected, necessary for rescue work above and below ground (article 279). Only persons sufficiently specialized, equipped with the apparatus referred to in article 279, sub-para. 1, must carry out work in an atmosphere contaminated by suffocating or poisonous gases, or by radioactive substances. A sufficiently equipped team must be ready or prepared immediately when a rescue team takes over its tour of duty. The appropriate measures must safeguard the safety and health of the persons responsible for rescue work (article 280, sub-para. 1-3).	In premises allocated to the rescue team the following must be maintained in a constant and perfect state of maintenance and functioning : (a) autoprotecting breathing apparatus with independent functioning of a least one hour, at least equal in number to the strength of the rescue team; (b) - (g) The breathing apparatus and masks must include a sufficient stock of spares for consumable elements. The maintenance of the autoprotecting apparatus must be carried out by a workman specially appointed for this purpose (article 535, A1. 1a), 2 and 6). The functioning of the autoprotecting breathing apparatus and other rescue apparatus and clothing, must be checked on the initiative of the management, at least once a month. The results shall be recorded in the register (article 538).	Failing any exemption granted by an inspector by notification sent to the manager, the breathing apparatus shall not be kept in the mine, but shall be obtained from a rescue centre as required during rescue operations or training in the mine (regulation No. 25, sub-para. 1; for fuller details in this connection see sub-paras. 2 and 3) *(1)*. (For other information on the rescue service and rescue stations see regulation No. 14, sub-para. 1 - 3 (permanent rescue teams); regulation No. 15, sub-para. 1 - 2 (cooperation with rescue teams); regulation No. 16, sub-para. 1 - 3 (rescue teams); No. 17 (communications with rescue personnel); regulation No. 23 (equipment at rescue centres)) *(1)*.
4. Training premises	The rescue team must be provided with training premises (para. 65, sub-para. 4.).	The rescue service must be provided with a rescue station equipped with the necessary apparatus and installations (store for keeping breathing apparatus and training room) (para. 265, sub-para. 1).			It must be possible for the drills to take place in suitable premises which can be filled with smoke and suffocating gases (article 279, sub-para. 2).		The manager of each mine shall be responsible for providing above ground a room of suitable dimensions, adequately equipped, for use by any person taking part in the rescue operations or drills (regulation No. 27, sub-para. 1, 1st sentence; for other details see sentence 2 and sub-para. 2 - 3) *(1)*.
5. Principles for the training, formation, equipping, supervision, and intervention of the rescue service	The training, formation, equipping, intervention and supervision of the rescue service must be organized in accordance with plans *(1)* approved by the Oberbergamt (para. 65, sub-para. 7).	The rescue centre organises and checks the rescue operations in the district. In agreement with the Oberbergamt, it draws up the necessary conditions *(1)* for this purpose, especially : a) the principles *(1)* for the formation, training equipping and intervention of the rescue service, b) the principles applicable to the preparation and execution of rescue operations (para. 267, sub-para. 2).	These workmen selected will perform drills periodically in the handling of the apparatus (article 96, sub-para. 3).	A ministerial decree *(1)* fixes the general conditions for organizing rescue stations, and the regulations to be followed for the training of the teams, the maintenance and use of the apparatus (general regulation : article 321, sub-para. 1).	The rescue procedure *(1)* for the following calendar year, referring to all the mines and drilling installations covered by a mining undertaking, is sent annually to the General Inspector of Mines, within the 14 days preceding the calendar year in question. When a mining or drilling installation begins to work during a particular calendar year, it is first necessary to send to the General Inspector of Mines in good time, a rescue schedule for this site relating to the year in question. Our Minister decides which data shall be included in the rescue schedule *(1)* (article 279, sub-para. 3, 4, 5).	The members of the rescue team must be instructed in the functioning of the breathing equipment and the instruments for checking the atmosphere below ground, and trained to execute, carrying the apparatus on their own backs, any operations which may become necessary in a mine in the event of accident (article 536). The members of the rescue team must undergo periods of instruction and training in the places and manner indicated by the manager. The rescue teams must take part in below ground drills at least once a month (article 537, A1 1 and 2).	Competent instructors must be employed at the rescue centre to train the rescue personnel (regulation No. 13, sub-para. 2; for other details see sub-para. 3 - 6) *(1)*.
6. Common rescue and mutual assistance stations	In the event of a mining catastrophe, the rescue service lends assistance to that of neighbouring workings in accordance with the mutual assistance procedure (rescue procedure, chapter 5) *(1)*.	c) a mutual assistance procedure for mines in the case of rescue operations (general rescue procedure) (para. 267, sub-para. 2). The owner of mines in a district must maintain jointly a rescue centre (para. 267, sub-para. 1). The mine owner or a member of the supervisory personnel appointed by the latter must ensure that, when any intervention of the rescue service becomes necessary, the rescue centre is immediately informed and must satisfy himself that the reserve teams are ready to come into action with their equipment (para. 269).	The competent minister can authorise adjacent mines to set up a common depot for breathing apparatus as envisaged in article 95 above. This common depot must satisfy the following conditions *(1)* (article 97, sub-para. 1).	This decree *(1)* states the conditions under which several workings can be grouped for the purpose of creating a common station (general regulation : article 321, sub-para. 2). In the case of large basins, a ministerial decree *(1)* can prescribe the installation of rescue centres; it fixes the area covered and the functioning conditions in conjunction with the stations of the affiliated mines (general regulation : article 322). Workings where one hundred or more workmen are employed simultaneously below ground on the largest shift may, if necessary, be subject by ministerial decree to certain obligations concerning the organisation of the rescue operations (general regulation : article 323). The operators and managers of the mines adjacent to that where an accident occurs, supply any rescue means available to them, either in men or in any other way, subject to any claim for their compensation where applicable, against the proper party (mining code : article 90).	Our Minister may grant dispensation from the conditions of sub-paragraphs 1 and 2 for selected mining or drilling works; he can approve the formation for certain mining undertakings, of a common rescue service, with a view to carrying out the arrangements made by virtue of these sub-paragraphs (article 279, sub-para. 6).	The operators of mines employing less than one hundred workmen below ground on the largest shift can be authorised, by decision of the chief engineer, to join with those of adjacent mines with a view to forming a common rescue team. The instructions relating to the training and drilling of the members of the common team must be approved by the chief engineer (article 539). For mines covered by the preceding article, the Minister of Industry and Trade may, at the proposal of the chief engineer, prescribe the creation of a common central rescue station (article 540). If it is apparent that the efficiency of the rescue team is inadequate when it is brought into action, the manager requests the intervention of teams from other mines. The manager receiving this request must place their rescue teams at the disposal of the person making the request (article 541) *(1)*.	(For the questions in this connection see regulations Nos. 19 - 21 : qualifications of rescuers; regulation No. 22 : records of rescue centres; regulation No. 23 : equipment of rescue centres; regulation No. 24 : rescue equipment in mines; regulations Nos. 26, 28, 29, 30 - 34 : procedures and conducting of rescue operations) *(1)*.
	(1) Rescue procedure (approved by the Oberbergamt in Dortmund on 28.11.65 and by the Oberbergamt in Bonn on 29.11.65) see Appendix I. It contains details concerning : *the rescue service, the rescue centre, participation of the rescue centre, intervention, mutual assistance, records.*	*(1) Principles relating to rescue operations in coal mines dated 9.5.57 (see Appendix II). They give information on :* *(i) the object of the rescue operation* *(ii) rescue services and necessary installations* *(iii) obligations of the rescuers* *(iv) obligations of the superintendents who do not belong to the rescue service* *(v) the rescue operations* *(vi) accidents due to the wearing of breathing apparatus.*	*(1) Article 97 of the above regulation is given in Appendix III. It covers* *(i) the management and training of the rescue service* *(ii) the intervention and continuous availability of the rescue service* *(iii) the allocation and maintenance of breathing apparatus* *(iv) other equipment and installations.* *Finally, the duties of the Centre for co-ordinating rescue operations in the Campine basin are listed, together with those of the "Belgian National Centre for Rescue Operations in Mines" at Charleroi.*	*(1) Decree of the Minister of Industry dated 14.4.65 is given in Appendix IV. Its aim is :* *(i) to define the general conditions for the organisation of rescue stations* *(ii) to prescribe the installation of rescue centres and to fix the area covered by them and the functioning conditions.* *Circular of the Minister of Industry DM/H No. 2559 concerning the organisation of rescue operations (Appendix V).*	*(1) Instruction dated 29.2.1968 from the General Inspector of Mines : Requirements to be met by the rescue service. It also deals with the rescue procedure (Appendix VI).*	*(1) The full text of chapter X "Rescue operations" of the police regulation for mines and quarries dated 9.4.1959 (heading X) is given in Appendix VIII.* *It also mentions articles 658 to 658 "rescue operations".*	*(1) The text of the above-mentioned regulation concerning coal mines and other mines (fires and rescue operations) dated 1956, First appendix, part V is given in Appendix VII.*

Appendix I

GERMANY

Rescue procedure

(Approved by the Oberbergamt of Dortmund
on 26/11/1965 and by the Oberbergamt of Bonn on 29/11/1965)

Rescue procedure

of the ..... mining company

(§ 65, sub-paragraph 7 of the BVOSt)

Contents

Appendix *(1)* : Additional information on the rescue service

1. Strength and composition of the rescue service
2. Alarm
3. Continuous coverage during non-working days
4. Improvement
5. Rescue station
6. Mutual assistance
7. Equipment
8. Other information
9. Amendments and additions to the rescue procedure.

Appendix *(1)* : Model referred to in 6.3 :

Tasks entrusted to various persons and supply of premises.

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(1) not attached.

The composition, training, equipment, intervention and supervision of the rescue service are governed by the following procedure (§ 65, sub-para 7 of the BVOSt).

1. Rescue service

1.1 Duties

The rescue service intervenes below ground in the course of operations intended to save human lives and to preserve property after explosions, fires and mine-fires, and any other incidents which threaten to release harmful gases or bring about a lack of oxygen (§ 155 BVOSt) *(1)*.

1.2 Composition

The rescue service consists of :

the head of the service (head overman or assistant overman);

the deputy(ies);

the rescue teams (team leader and rescuers);

the head of equipment;)
) preferably metal workers.
the officials in charge of equipment.)

It also includes special members (section 1.7).

The rescue team consists of a team leader (superintendent in accordance with § 50 BVOSt) *(1)* and four rescuers.

The number of superintendents belonging to the rescue services does not exceed a third of its strength.

Some of the rescuers are below ground workers, locomotive drivers, compressed air and electric mine-shaft winch operators, pit or blind shaft sinkers.

1.3 Strength

The number of rescue teams is proportional to the space and dangerous character of operations below ground. It is also calculated in relation to the assistance available from other rescue services, and to the probable delay in their arrival on the site. The number of special members is not taken into consideration.

No more than two thirds of the members of the rescue service may be occupied below ground at any station.

1.4 Recruitment

1.4.1 General

Entry into the rescue service is voluntary. Applications are addressed to the head of the service.

The only persons recruited as rescuers are miners fulfilling the following conditions:

(i) between 21 and 40 years of age inclusive;

(ii) having worked below ground for at least one year;

(iii) possessing a medical certificate classifying them in groupe A/1 or B/1 and stating their suitability for rescue work (section 1.5);

(iv) having successfully completed the training cycle referred to in 1.4.2.

The only persons who can be recruited as officials responsible for equipment are miners belonging to groups A1 or B2 (§ 21 BVOSt)*(1)*, recognised medically as free

(1) Mining regulation.

from contagious skin conditions or pulmonary tuberculosis (section 1.5) and having successfully participated, after acceptance by the head of equipment (1.6.3.2), in an elementary course given at the rescue centre.

The head of equipment may, where applicable, be a person not belonging to groups A1 or B1.

Candidates who have passed the entrance test are registered as members and then belong to the rescue service in which they take part from then on. The date of entry is that of the day of the first drill. The accepted candidates receive the service instructions for rescuers, receipt of which they confirm by signing the members register.

After these formalities, the rescuers receive their membership card, giving the date of their entry.

1.4.2 Traning and examination of the candidates for the rescue service.

1.4.2.1 Theoretical training

The theoretical training includes the following :

Human respiration; composition of the air in the mine, incendiary gases and explosion fumes; effects of harmful gases, particularly carbon monoxide, on the human structure, and dangerous effects of lack of oxygen.

Design and functioning of the closed-circuit oxygen apparatus; its positioning and method of use for training and in the event of a disaster; conduct to be observed in the event of a disaster; transport of injured; service instructions for the members of the rescue service.

1.4.2.2 Practical training

The practical training begins as soon as the theoretical training is finished. The candidates get used to working while carrying the breathing apparatus. For this purpose they must exercise on a pulling apparatus, carry out practical work, and use the training premises, This training takes at least two sessions of one hour.

1.4.2.3 Entry examination

After training, the head of the service gives the candidates an entry test. First of all, the candidates have an oral examination in which they must show that they possess the required knowledge on the oxygen closed-circuit apparatus, on the positioning of the apparatus. and on the way to carry on in the event of a disaster. They then undergo a rescue drill of two hours in the training premises. The entry test is regarded as successful when the candidates have proved that they have the required knowledge and have carried out the drill correctly without interruption.

1.5 Verification of suitability for rescue work

The candidates and the members of the rescue service - excluding officials responsible for the equipment who are not rescuers at the same time, are subjected to checks of their suitability for rescue work, in accordance with the medical check procedures.

These inspections are carried out only by doctors authorised for this purpose by the Oberbergamt.

The officials responsible for the equipment undergo a medical examination relating to contagious skin conditions and to pulmonary tuberculosis. Repeat examinations take place every two years, unless the doctor decides to carry out an examination at a shorter interval.

The special members over 50 years old undergo a check at least annually. After any serious illness or one of long duration, a fresh medicsl examination is carried out to check suitability of the person concerned for rescue work. The individual is only reinstated in the rescue team on sight of a medical certificate guaranteeing full suitability.

1.6 Training and improvement of the rescue service

1.6.1 Improvement of the leaders and rescuers

1.6.1.1 General

The practical and theoretical training of the leaders and rescuers takes place during training shifts and (or) drills of at least two hours outside working time. The drills are spread evenly throughout the year. The leaders and rescuers carry out a drill once a year below ground during the course of a training shift, the period of the drills of long duration being four hours. They take part also in three drills of at least two hours with the closed-circuit oxygen apparatus of which at least two take place in the training premises. They carry out a fifth drill of half an hour at least with breathing apparatus with air conduction by injector.

Courses are also organised, either during training shifts, or in the form of two additional sessions outside working time. The drill carried out using breathing apparatus with air conduction by injection must be accompanied by a course.

1.6.1.2 Drills

The drills are carried out under the supervision of the head of the service or a team leader delegated by him.

The drills below ground intended for the leaders and rescuers include a number of tasks, for example rescue of workers who are victimes of accidents, revival operations, erection of barriers against fire and of rapid barriers, organization of a liaison service, taking of samples of incendiary gases, inspection of internal shafts.

Drills below ground are not carried out at working sites where the atmosphere contains harmful gases or is lacking in oxygen.

Drills carried out with closed-circuit oxygen apparatus in the training premises last at least two hours. They are carried out at a temperature above the average (up to 40°C) and in a smoky atmosphere, with the humid temperature not exceeding 28°C. At the beginning of the drills, each participant carries out at least 60 pulls on a exercising apparatus, so that the alkali cartridge warms up immediately and the wearer can become used to the warmth of the air in the closed-circuit apparatus. During the drill, the number of pulls is increased to at least 180 and the wearer must run round the training premises several times depending on its area. So far as possible, those concerned also carry out rescue activities (erection of barriers against fire, transport of injured, etc.). During these drills, the recording apparatus and auxiliary apparatus of the rescue service are brought into action. If the drill takes place with breathing apparatus with air conduction by injection, two members of a rescue team work for periods of at least 15 minutes in the smoky premises, during which the other members of the team are shown by the team leader how to position and handle the above apparatus.

The drills are not regarded as being accomplished unless they are completed without interruption.

1.6.1.3 Courses

Courses include the following items :

general matters regarding breathing protection; discussion on current models of oxygen circuit apparatus; rescue procedures; service instruction for the members of the rescue service; basis of operation; method of intervention by the rescue service in the event of a disaster; revival and first aid; kind and prevention of fires and mine-fires, fire-fighting; extinguishers for use in mines, discussion and practical exercises; construction of barriers against fire and rapid barriers; alarm; harmful gases and lack of oxygen; danger of carbon monoxide during fires in mines; behaviour in the event of fire; recording apparatus and auxiliary apparatus of the rescue service with practical handling.

So far as possible, a doctor is asked to attend the revival and first aid courses.

1.6.2 Improvement of officials responsible for equipment

Persons responsible for the equipment are kept regularly informed by the head of equipment; every two months at least, they are given the opportunity of familiarising themselves with all operations to be carried out on the apparatus. Any such person who, in exceptional cases, is a rescuer at the same time, also takes part in the improvement course referred to in 1.6.1.

1.6.3 Training and improvement of leaders and officials responsible for equipment.

1.6.3.1 Heads of service, deputy heads of service and team leaders are trained and improved by the rescue centre in accordance with procedures approved by the Oberbergamt.

1.6.3.2 The head of equipment and those in charge of equipment are trained and improved by the rescue centre in accordance with procedures approved by the Oberbergamt. Before taking part in an elementary course organised by the rescue centre, those in charge of equipment are shown by their superior how to check and maintain breathing apparatus.

1.7 Special members

The rescue service includes as special members, responsible for special duties during intervention of the rescue service involving the use of breathing apparatus, certain persons with special training (e.g. specialised overmen, ventilation engineers, collaborators from certain functional services, etc.), and meeting the following conditions:

(1) having belonged as a rescuer or head of rescue service for at least one year;

(2) having successfully completed a course of team leader at the rescue centre;

(3) taking part at the least every six months in a drill of at least one hour with a closed-circuit oxygen apparatus.

These members are registered as special members in the members register.

1.8 Close of activity

1.8.1 Rescuers reaching the age of 45 years and heads of service, deputy heads of service and team leaders reaching the age of 50 years no longer belong to the rescue service.

There is no age limit for special members and for those in charge of equipment.

1.8.2 Professional rescuers and full-time members of the voluntary rescue service are bound by the following regulation: subject to the agreement of the Oberbergamt, the rescuers remain members of the rescue team until they have completed their fiftieth year, and heads of service, deputy heads of service and team leaders until they have completed their fifty-fifth year of age.

1.8.3 Membership of the rescue service ceases as soon as the doctor finds any permanent incapacity.

1.9 Duties of members of the rescue service

1.9.1 Head of service

1.9.1.1 The head of service is the official superior of all the members of his service (including special members), during their training and in the event of a disaster.

He ensures that a sufficient number of rescuers forming a proper group is ready to intervene, and that all members are quickly warned and brought into action in the event of a disaster.

Subject to the authority of the head of the rescue operation, he is also responsible for the efficient action of the rescue service.

1.9.1.2 The head of service is responsible for the following duties:

(1) sending to the Bergamt and to the rescue centre the I report (formed from the centre) after each intervention of the rescue service following a disaster;

(2) submitting the annual report (form from the centre) before 1st February to the Bergamt and to the rescue centre;

(3) sending in good time to the rescue centre the schedule of drills and courses for the next quarter;

(4) giving immediate advice to the rescue centre of all incidents involving the apparatus (e.g. on inspection);

(5) giving immediate advice to the Bergamt and to the rescue centre of accidents likely to have some connection with the use of breathing apparatus, the apparatus in question and its ancillary breathing equipment are placed immediately at the disposal of the centre, by agreement with the Bergamt.

1.9.1.3 The head of service receives the applications, decides whether the candidates comply with the conditions referred to in section 1.4.1, carries out the training of suitable candidates, arranges the entry test, and gives the accepted candidates the service instructions and the membership card.

1.9.1.4 The head of service ensures that the drills and courses laid down for the members of the rescue service (1.6) are organised regularly, and that the drills are verified as necessary (1.6.1.2).

During drills carried out with closed-circuit oxygen apparatus, he arranges for all the apparatus available to be used with the same frequency.

1.9.1.5 The head of service takes care to see that the members of the rescue service (including the special members) undergo the medical examinations on the dates laid down in the regulations, and that only persons passed as medically fit and within the age limit take part in rescue activities.

1.9.1.6 The head of service keeps the register of members and drills of the rescue service.

1.9.1.7 The head of service must

(1) supervise the monthly check of all apparatus of the rescue service, and countersign the written inspection report;

(2) check the stocks of apparatus and ensure renewal in good time.

The head of service arranges :

(1) for the information referred to in 6.4 to be constantly kept up to date and posted at the places indicated;

(2) for the schedules and plans in 6.5 to be kept up to date by the surveyor within the periods laid down, and exhibited or made easily accessible at the places prescribed.

1.9.2 Team leaders

1.9.2.1 The team leaders carry out the instrictions which they receive from the head of service.

They are responsible for their team during drills and in the event of a disaster.

Their attention is drawn to the fact that they must not exceed the tasks delegated to them, and that they must put the safety of their section before the carrying out of the task.

1.9.2.2 The heads of section must report to the head of service after each drill. At the request of the head of service they keep up to date the drill books; they record therein, and report to the head of service, any special observations arising during the drills (e.g. defective apparatus, failure of certain rescuers, etc.).

1.9.3 Head of equipment

The head of equipment ensures that all apparatus, devices and equipment of the rescue station are constantly in good working order.

After each time they are used, he must restore to condition and report unusable apparatus.

He must check and maintain the apparatus in accordance with the directives of the rescue centre.

He is responsible for reporting to the head of service any shortage of stocks at the rescue station, as regards serviceable apparatus, spare parts and accessories, also other materials.

1.9.4 Person responsible for equipment

Persons in charge of equipment assist the head of equipment in carrying out his duties, and replace him when necessary.

The person in charge present at the base of operation is responsible for maintaining and checking apparatus and all accessories used there.

1.9.5 Members of the rescue service

The members of the rescue service must report without delay to the rescue station and hold themselves ready there to go into action, as soon as they are alerted, or as soon as they learn, in one way or another, that the rescue team is called upon to intervene.

The rescue service carries out the instructions of its leader.

2. Rescue station

2.1 The breathing apparatus, accessories and their parts, also all devices and apparatus used by the rescue service are arranged on view and in order in special premises, reserved exclusively for the rescue service (rescue station).

The head of service and the head of equipment each possess a key to the rescue station. Two other keys are also held available, one in the office of the head of service below ground and another in the shift control room. The rescue station is connected to the telephone network of the depot.

2.2 The number of items of serviceable breathing apparatus is related to the strength of the rescue service.

Each member of the rescue service possesses a breathing device.

2.3 The rescue service possesses training premises in which drills can be carried out at high temperatures and in smoke. These premises are equipped with a suitable indicator device and emergency exits, and can be ventilated quickly.

3. Participation of the rescue centre

The rescue centre is particularly responsible for the following tasks :

(1) advice and assistance during action by the rescue service;

(2) maintenance of an operational depot;

(3) preparation of a plan of assistance and organisation of assistance in the event of a mining catastrophe;

(4) regular checking of the rescue service and of the rescue station, as well as one of its items of apparatus and installations;

(5) training and improvement of heads of service, team leaders and persons in charge of equipment;

(6) assitance to the head of service for training and improvement of the rescue service;

(7) examination of breathing apparatus after accidents (section 1.9.1.2).

4. Intervention

4.1 Alarm

By means of a proven alarm system, all members of the rescue service can be warned without delay and in a minimum period of time in the event of a disaster, even if they are below ground.

The alarm system is checked one a month (alarm test).

Once a year, the rescue service undergoes an alarm drill, the results of which are given in a written report, the alarm interval running from the time the alarm is released until that when two rescue teams are ready to go into action.

4.2 Measures to be taken in the event of intervention

4.2.1 As soon as the rescue service is called, the Bergamt and the rescue centre are so informed without delay. The interventions anticipated from the rescue service are communicated a sufficiently long time in advance to the Bergamt and to the rescue centre.

4.2.2 In the event of intervention of the rescue service, steps are taken to ensure that replacement apparatus and rescuers are available in time. If the actual numbers and those of adjacent workings of the same company are insufficient, an appeal is made to the workings bound to help in accordance with the assistance plans.

4.2.3 Pending the arrival of the head of the Bergamt, who is authorized to direct the rescue operation (§ 205, sub-para. 1 ABG), *(1)*the manager of the works or his representative direct the rescue work from the surface, in cooperation with the representative of the rescue centre, and give the necessary instructions to the head of service.

The person in charge of the rescue operation has available above ground a room equipped with a sufficient number of connections to the official telephone network and the internal network. As soon as intervention by the rescue service begins, a report is prepared, under the authority of the person in charge of the operation, of communications received and instructions given and decisions taken.

The head of service gives the team leaders the necessary directives for carrying out their duties, and directs the intervention of the rescue service in detail.

4.3 Base of operation

4.3.1 In the event of intervention of the rescue service, an operation base is established below ground, in an ad hoc position in agreement with the person in charge of the rescue work.

Here the breathing apparatus, revival apparatus, and any auxiliary means required for carrying out the operations, also first aid equipment, is kept at the disposal of the rescuers and restored to condition immediately after each intervention.

4.3.2 A person responsible for equipment is kept permanently at the operations base to verify and maintain the apparatus stocked at this point, also its accessories.

The reserve teams are stationed near the operations base.

The operations base is connected without delay to the telephone network of the mine.

In addition, when possible, a telephone link is established between this base and the place where the rescue teams are in action.

4.3.3 The operations base is under the supervision of the team leader and, in his absence, of a superintendent with experience of mine rescue, specially appointed to replace him.

Interventions are recorded in a register giving the time at which they took place.

4.4 Behaviour to be observed in the presence of harmful gases and in an atmosphere lacking in oxygen

4.4.1 If the atmosphere contains harmful gases and is lacking in oxygen (§ 155 BVOSt) *(2)*, the rescuers use breathing apparatus, checked shortly before use. Each time they are used, new alkali cartridges and completely full oxygen bottles are used.

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(1) General mining law,
(2) Mining regulation.

4.4.2 Only members of the rescue service use closed-circuit oxygen apparatus (§ 65, sub-para. 5 BVOSt) *(1)*.

If it is necessary, in exceptional case, to supply other breathing equipment to persons not belonging to the rescue service, authority will be requested from the Bergamt. (§ 65, sub-para. 5 BVOSt) *(1)*. The work of these persons is supervised by a team leader of the rescue service.

4.4.3 During an intervention with closed-circuit oxygen apparatus, the team leader checks the reserve of oxygen for each item of apparatus at suitable intervals. He orders retirement as soon as the item of apparatus with the smallest reserve of oxygen still contains at least twice as much as is necessary (estimated) to accomplish the return journey.

4.4.4 The head of service may only place teams in action when he has spare teams available; generally speaking, a team is kept in reserve for each team in action.

By derogation to the above, and for the saving of human life, the head of service may however place teams in action before spare teams are available, when he is sure of the early arrival of the latter.

4.4.5 The rescue service only operates with complete teams (one leader and 4 men) and special members do not count in calculating the strength of a team.

When local conditions enable a smaller number of rescuers to be placed in action without inconvenience, the head of service can so decide in agreement with the person in charge of the rescue operations; the rescuers in action must always be accompanied by a team leader.

4.5 Behaviour to be observed under difficult conditions

4.5.1 The conditions are considered as difficult :

(i) in underground workings where the atmosphere is hot and damp;

(ii) in the case of low visibility;

(iii) in the case of reconnoitring operations in unknown terrain;

(iv) in workings difficult to negotiate.

Under such conditions, the following directives are observed :

(1) Between the operations base and the team in action, a line of permanent communication (telephone without battery) is established. In the case of stationary activities, a link is established between the place of intervention and the operations base.

(2) Each reserve team is stationed as near as possible to the place of intervention, with the breathing apparatus in the slung position without donning it. Its leader is provided with head-phones.

(3) A line of communication is established between the position of the reserve team and the operations base.

4.5.2 When the rescue team operates in underground workings where the atmosphere is hot and damp, it is also necessary to comply with the following regulations :

(1) Preference is given to making use of the following rescuers

(i) those, used to difficult manual work;

(ii) also to working in a hot or damp atmosphere;

(iii) not more than 40 years of age.

It may be possible to derogate from this ruling for the saving of human lives.

(2) Rescuers recovering from illness are excluded, also those not in full possession of their resources (e.g. influenza, effects of the absorbtion of alcohol, etc.), also special members more than 40 years old. The rescuers must wear

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(1) Mining regulation.

light clothing (roll up shirt sleeves and bottoms of trousers), insofar as a danger of explosion does not oblige them to wear fire-proof clothing.

(3) On instructions from the head of service or his deputy, the team leader in action measures, by means of a psychorometer, the dry and humid temperatures, and gives the results by telephone.

(4) The head of service or his deputy at the operations base is responsible for deciding the duration of the intervention. Depending on the humid temperature t_h given to him, he fixes the authorised duration of the intervention on the basis of the following table and taking into account the indications in 5 :

t_h C	31	32	33	34	35	36	37	38 - 40
mn	70	60	50	45	40	35	30	25

(5) During interventions requiring a particularly intense physical effort (e.g. scaling ladders, structures difficult to negotiate, use of fire-proof clothing), the period of action indicated by the table will be reduced by 10 minutes. In the event of appreciable differences between the humid and dry temperatures, it will be reduced further as follows :

(i) dry temperature more than 5 to 10° above the humid temperature :

5 minutes :

(ii) dry temperature more than 10° above the humid temperature : 10 minutes

(6) Before any intervention, the members of the rescue service undertake not to take excessively long breaks during action (not to sit down), and to report to the team leader any sign of heat-stroke, such as heaviness in the legs, headache, difficulties in seeing and hearing, nausea, giddiness, etc. The team leader informs the head of service or his deputy accordingly by telephone, and returns with all his team without delay.

(7) Blankets and hot drinks are made available for rescuers returning from an operation.

Breaks of at least two hours are provided between two interventions.

5. Mutual assistance

5.1 In the event of mining catastrophes, the rescue service lends assistance to those of adjacent workings in accordance with the mutual assistance plan.

5.2 If the rescue service of the workings in question itself requests the assistance of other services, it places some of this members at their disposal as guides.

6. Records

6.1 For the purpose of the examinations referred to in 1.5, the "Medical certificate" and the "Health bulletin for sickness examinations" prescribed in § 16 (2) of the BVOSt are used *(1)*.

6.2 Various record documents are prepared on forms in the rescue centre :

(i) Report I on the use of breathing apparatus in the event of disaster.

(ii) Report II on an incident with breathing apparatus.

(iii) Report III on operations for revival of an injured person.

(iv) Certificates of participation in a course.

(v) Register of members.

(vi) List of members.

(vii) Drill books.

(viii) Certificates of inspection of equipment.

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(1) Mining regulation.

(ix) Annual report.

(x) Liaison service in the case of intervention of the rescue service.

6.3 The duties and responsibility of persons participating in the rescue work without acting as members of the rescue service or without belonging to the latter, are defined in the specimen appended. These persons are informed of their duties. The premises needed for rescue work are also shown in the appendix.

6.4 Of the forms referred to in 6.2, the "List of members" and the "Liaison service in the case of intervention of the rescue service", are posted at the following places :

(1) office of the head of service below ground;

(2) office of the head of service;

(3) telephone switchboard;

(4) shifts control room;

(5) rescue station.

The list of members is also posted in the overman's room.

6.5 The schedule and plans relating to the "Plan for protection against fires below ground" are posted or made easily accessible at the rescue station and in the overman's room.

7. Additional training

The competent Bergamt receives regularly additional information on the rescue service, in accordance with the form appended. A copy of this information is sent to the rescue centre.

(Stamp and signature of the owner of the mine)

We approve the above "Rescue procedure", the appendix on "Additional information on the rescue service", *(1)* and the appendix on "Tasks delegated to persons and supply of premises" *(1)*.

G.-Z. 42/15 - 114.40/8363/65

Dortmund, 26 November 1965
Oberbergamt
signed SANDERS

We approve the above rescue procedure, in accordance with § 65, sub-para. 7 of the general order for mines dated 18.12.1964.

C.-). 41 I 5917/65

Bonn, 29 November 1965
Oberbergamt
signed SCHWAKE

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(1) Not attached.

Appendix II

GERMANY

Principles relating to rescue operations in coal mines established by the rescue centre of the Saarbergwerke AG (Approved by the Oberbergamt of Sarrebrück on 9/5/1967)

Summary

Principles
relating to rescue operations in coal mines

The following conditions are applied for the formation, training, installations, action and supervision of the rescue service :

1. Purpose of rescue operations in mines

The purpose of the rescue service in mines is to enable human lives and property to be saved in the event of explosion, mine-fires or other events likely to create danger of poisoning by harmful gases or asphyxia, and which require the intervention of an experienced team equipped with protective breathing apparatus.

2. Rescue service and necessary installation

2.1 General considerations

2.1.1 Every autonomous works department must possess a team of rescuers (§ 264) *(1)*. The latter must be provided with a rescue station equipped with breathing apparatus and the necessary installations for maintaining it (§ 265) *(1)*.

2.1.2 In agreement with the Oberbergamt, joint or district rescue stations may be installed to meet local requirements.

2.1.3 The measures set out in this document and in the "principles for the preparation and execution of rescue operations" (document No. 52) must be taken in order to alert the rescue team and bring it into action quickly, and to carry out the rescue operations.

2.1.4 The rescue installations in the mines are supervised by the rescue centre (PCS).

2.2 The rescue service

2.2.1 Composition, division and strength of the rescue service

2.2.1.1 The rescue service consists of :

the executive officer (as far as possible a head overman or deputy overman),

his deputy (deputies),

team leaders, rescuers and persons in charge of maintaining equipment.

The rescue service also includes members for special purposes (2.2.6). It is divided into teams consisting of a team leader and 4 men.

2.2.1.2 For each mine, the minimum strength of the rescue service is fixed in the main schedule for rescue operations. It is related to the strength of the personnel and the more or less dangerous character of the mine. The minimum strength is 1 executive officer, 2 team leaders, 8 men and 2 persons responsible for maintaining the equipment. The strength of the rescue service is fixed without taking into account the number if members for special purposes. With regard to the team leaders, it is necessary to provide for a sufficient number of replacements.

2.2.2 Recruitment

2.2.2.1 Recruitment in the rescue service is on the basis of volunteers. The executive officers, team leaders and rescuers are chosen solely from the members of the personnel (superintendents and workmen) of the below ground services. The persons responsible for maintaining the equipment must belong to the above ground personnel as far as possible, be familiar with the conditions below ground, and be metal-workers.

2.2.2.2 Only personnel fulfilling the following conditions may be recruited in the rescue service :

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(1) Police regulation dated 20/11/1967 for coal mines.

1. be between 21 and 40 years of age and have worked below ground for at least 3 years (below ground or above ground in the case of persons responsible for the maintenance of the equipment);
2. have a cool and determined personality;
3. be sound in body and mind and suited to service on the rescue team, as certified by a doctor accepted by the Oberbergamt for medical examinations for suitability purposes;
4. have received the necessary training and passed the examination laid down.

2.2.2.3 The executive officer must be a head overman or a deputy overman. Before his nomination, he must have been in the rescue service for at least a year as a team leader, and have successfully completed a course of executive officer organised by the rescue centre.

2.2.2.4 The team leaders must be recruited solely from the superintendents working in the below ground services.

2.2.2.5 The members of the rescue service must be recruited from superintendents and experiences miners, also from carpenters, masons, winch operators, locomotive drivers, fitters and electricians, who must be uniformly distributed between the various teams.

2.2.2.6 Persons responsible for the maintenance of the equipment may only be recruited from persons who are medically certified as being free from contagious skin diseases or pulmonary tuberculosis. It is desirable for persons responsible for maintaining the equipment to be suited to work necessitating the carrying of breathing apparatus, but this is not a condition.

2.2.2.7 The executive officer examines whether the candidate complies with the required conditions; be then sends him for a medical examination in accordance with the form prepared by the rescue centre.

2.2.2.8 The candidate is accepted when his training is completed. Acceptance is decided by the executive officer, who records the name of the person concerned on the roll and the list of members of the rescue service, and gives him the service instructions (document No. 51). The new members of the rescue service signs to the effect that he will abide by these instructions.

2.2.3 Training.

2.2.3.1 It is essential for the members of a team of rescuers to receive reliable training and to practice regularly.

The intital training is given by the rescue centre. It consists of theoretical teaching, instructions on how to use the apparatus, and drills carrying the equipment.

2.2.3.2 The subjects for the theoretical teaching are as follows :

human breathing; structure, method of functioning, handling, treatment and use of equipment intended for rescue operations in mines, composition of the air in the mine, gases released by a mine-fire, and pockets of explosive gas; action of poisonous gases, especially carbon monoxide, on the human structure, and dangers resulting from lack of oxygen; causes of fires in mines, explosions, etc., and combating of these; structure, method of action and handling of mine extinguishers; organisation of the rescue service in the mine and intervention of the team of rescuers; transport, care of accident victims and revival.

2.2.3.3 In the course of the practical training, the candidate is accustomed to work in smoke and at a high temperature wearing the breathing mask. During the course of a special drill, his physical endurance is measured, he must then work continously for two hours, with an independant breathing apparatus (closed-circuit apparatus), in smoke and the high temperature (work on ergometric apparatus, mining-work, moving about in the training premises). For acceptance into the rescue service, the drill of the candidate must be continuous and the performances attained. In addition, the candidate must show by examination that he has the necessary knowledge of the method of operation and use of the breathing apparatus, also of the behaviour to be followed in the case of a disaster.

2.2.3.4 The executive officers, their deputies and the persons responsible for the maintenance of the equipment must have successfully completed special training courses given by the PCS. These courses must be renewed every four years.

2.2.4 Intervention

To permit rapid intervention, the rescuers must live, as far as possible, near the rescue station and be allocated between the various shifts (day), so that in the event of a disaster a complete team can be on the spot quickly. It must be possible to alert them quickly in the event of a disaster. The outside door of the rescuers building must be indicated by a special sign of the rescue team.

2.2.5 Drills

2.2.5.1 The rescuers, including the executive officer, his deputy and the team leaders, must take part, at least once every three months, in a drill lasting two hours wearing the closed-circuit breathing apparatus. The drill is not considered as accomplished unless it has been uninterrupted. Generally speaking, each year two drills must be carried out below ground and two in the smoke chamber in heat conditions. During the drills below ground, the rescuers must carry out similar tasks to those which may be necessary in the event of a disaster.

2.2.5.2 Each rescuer must also practice once a year with the breathing apparatus using air conduction by bellows.

In addition, each rescuer must participate at least once a year in a revival drill, and attend a lecture on the principles relating to rescue in mines, particularly on the service instructions intended for the rescue service (document No. 51).

2.2.5.3 The drills must be inspected by the executive officer, his deputy, or a team leader delegated by him for this purpose, unless the PCS undertakes to do this.

2.2.5.4 Each year there must be at least one alert drill by the rescue service. The result of the alert drill must be given in a report to the PCS on a special printed form provided for this purpose. The duration of the alert is the time elapsing between the beginning of the alert drill and the advice "to rescue teams ready to take action".

2.2.5.5 The executive officer records the various drills on a special printed form supplied by the PCS. The result of the drill and all the observations made must be included thereon. In addition, he makes a report to the PCS on a special form concerning the drills carried out below ground.

2.2.5.6 The drill days are fixed by the PCS according to a special programme. At the request of the PCS, general drills and alert drills take place additional to the programme.

2.2.5.7 During the rescue service drills, it is necessary to apply the "directives for rescue service drills" contained in the service instructions for the rescue service (form No. 51).

2.2.6 Special members

To permit the carrying out of special tasks in the event of intervention of the rescue service wearing breathing apparatus, persons with special training (e.g. specialized overmen, works engineer, etc.) can take part in the rescue service as a special case, if they fulfil the following conditions :

(1) have taken part in the rescue service for at least one year as an ordinary rescuer or as a team leader, or have experience of at least five years of below ground work;

(2) be suited for service in the rescue service;

(3) have successfully completed an executive officer's course in the PCS;

(4) take part, at least once a year, in a practice drill at the PCS and a below ground drill in their own mine, wearing the closed-circuit breathing apparatus.

On the roll and list of members of the rescue service they are shown as special members.

2.2.7 Departure from the rescue service

2.2.7.1 Rescuers who no longer satisfy the required conditions for acceptance (2.2.2.2., 2 and 3) must leave the rescue service.

2.2.7.2 Generally speaking, ordinary rescuers leave the team when they reach 45 years of age, and team leaders and special members when they reach 50 years of age.

In exceptional cases, and in agreement with the PCS, particularly experienced rescuers may continue to take part in the rescue service for a maximum of five years beyond this limit.

There is no age limit for persons responsible for the maintenance of the equipment.

2.2.8 Medical examinations for rescuers

2.2.8.1 Each member of the rescue service must have his state of health checked by an authorised doctor of the Oberbergamt for the purpose of the check examinations. Generally speaking, these examinations must be renewed at least every two years; they must take place each year for executive officers and special members more than 50 years of age, also for rescuers more than 45 years of age (2.2.7.2).

2.2.8.2 In addition, after any serious or prolonged illness, it is necessary for the rescuers to undergo a medical examination, in order to establish whether they are still suitable for service in the rescue team. This service may only be resumed on submission of a medical certificate certifying suitability.

2.2.8.3 The medical certificates must make a special point of referring to the satisfactory functioning of the cardiopulmonary system. With regard to the persons responsible for the maintenance of the equipment, the examination must pay special attention to contagious skin diseases and pulmonary tuberculosis.

2.2.9 Guides familiar with the localities for the rescue team

2.2.9.1 With regard to mines authorised to organise their own team of rescuers, the Bergamt fixes the number of members of the personnel suited to receive training wearing the breathing apparatus, with a view to serving as guides knowing the workings to rescuers from outside, in the event of a disaster. These persons must satisfy the conditions required in 2.2.2.2.

2.2.9.2 The PCS is responsible for their training. Those concerned must carry out each year at least two drills in accordance with 2.2.5.1. i.e. one drill below ground and another in the training premises. For the medical examinations, see 228.

2.3 Rescue stations

2.3.1 Rescue centre (PCS)

2.3.1.1 The PCS organises and supervises rescue in the mines under its control (§ 267, sub-para. 2) *(1)*.

2.3.1.2 It carries out maintenance of the cars used for rescue purpose and a large stock of protective breathing apparatus and revival apparatus, also extinguishers with all their accessories, and places itself in this way at the disposal of the mines on request.

2.3.1.3 The following tasks are included in its activities :

(1) Training of rescue services by theoretical courses, discussions and drills.

(2) Inspection of rescue services and their drills.

(3) Inspection of rescue stations at mines and other rescue installations in mines.

(4) Establishing of the principles concerning the training of the rescue services also the preparation and implementation of rescue operations, service instructions intended for members of the rescue service (principle rescue plan), including the regulation of aid given by doctors, medical establishments and hospitals.

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(1) Police regulation dated 20/11/1967 for coal mines.

(5) Aid in the event of accidents or fires in the mines and during work involving risk of poisoning by harmful gases or lack of oxygen, in the form of dispatch of teams, apparatus and equipment, also by advice.

(6) Examination, supervision and specialist knowledge of rescue installations and apparatus in mines.

2.3.2 Common rescue station

The common rescue station is responsible :

(1) for holding ready and maintaining apparatus, spare parts and other items of equipment;

(2) for maintaining drill premises for mines which do not possess their own premises for this purpose, and for arranging drills there;

(3) for giving assistance during drills or action by teams of rescuers, by placing at their disposal persons responsible for maintaining apparatus and equipment.

2.3.3 Rescue station

2.3.3.1 The purpose of the rescue station is to ensure satisfactory storage and maintenance of the breathing equipment, revival equipment, and of the rest of the equipment for the rescue team. It must only be used for this purpose. The appliances (vehicles conveying appliances) and other working implements which must be kept ready in sufficient quantity for the rescue service, may also be stored in another place or even above ground, depending on local conditions.

2.3.3.2 The rescue station must, as far as possible, be divided into a room serving as a store for the equipment, a workshop for the persons responsible for the maintenance of the equipment, and a garage.

2.3.3.3 When a special store is provided for the equipment, it must only be used to store the equipment ready to use. It must be well-fit, free of dust, be possible to heat, protected against the rays of the sun, and situated at ground level. It must be provided with a telephone and must be maintained at an average temperature of 8 to 20° C.

2.3.3.4 The workshop must be installed to permit cleaning, disinfecting and drying, also repair of the component parts of the equipment; it must also be provided with oxygen filling equipment.

2.3.3.5 Keys to the rescue station must be kept under glass in the office of the below ground head of operations, in the lamp-room, and in the sick-room. In addition, the executive officer and the persons responsible for the maintenance of the equipment must be in possession of keys.

2.3.4 Breathing apparatus

2.3.4.1 Each rescue station must possess at least 11 independent breathing apparatuses (closed-circuit apparatus). This apparatus must only be kept at the rescue station.

2.3.4.2 The items of apparatus or parts of apparatus which are unusable must be marked or stored so that it is not possible to use them by mistake or in ignorance.

2.3.4.3 The breathing apparatus and other apparatus used in the mine must be provided with a number and a plate indicating that they belong to the mine.

2.3.4.4 It is advisable to keep in reserve, for each closed-circuit apparatus in working order, at least two alkali cartridges and one full oxygen bottle. There must be a mouth-piece or a mask for each rescuer. The oxygen used must have at least 98.5% purity.

Chests must be kept in readiness for transporting breathing equipment, replacement bottles of oxygen and alkali cartridges.

2.3.4.5 The apparatus is distributed by a person responsible for maintenance, on the instructions of the executive officer, the works management or that of the rescue operations, in agreement with the executive officer. Before distribution, the official in charge checks that the apparatus is in working order.

2.3.4.6 Repairs and cleaning of the apparatus must be carried out by the persons responsible for maintenance, in accordance with the instructions given for this purpose (§ 7 of the service instructions for the rescue team - document No. 51). The various persons responsible for maintenance of the equipment must play an equal part in the work in hand.

2.3.5 Revival apparatus

2.3.5.1 The revival apparatus of the rescue service must be kept at the rescue station. It must be accessible to the medical assistants for use in the event of a disaster.

2.3.5.2 Mines which have no rescue station of their own can store it in the sick-room. Maintenance is carried out by the persons responsible for the maintenance of equipment from the rescue station serving the mine.

The inspection and maintenance of the revival apparatus of the detachment services situated at a distance is regulated by the rescue centre.

2.3.6 Training premises

For drills in smoke and heat, the rescue team must have the use of premises provided with a heating, lighting and ventilation system, and a signalling device. Several mines may possess common training premises. The production of smoke for the drills must not involve the formation of poisonous gases.

2.3.7 Inspection of rescue stations

The executive officer and the person responsible for the maintenance of the equipment must check one a month the condition of the rescue installations and apparatus in the mines. The results of the inspection must be written down and countersigned by the executive officer. The inspection register must be kept at the rescue station. The head of the P.C.S. or an official delegated by him for this purpose, inspects the rescue stations every six months.

3. Obligations of the rescuers

The general obligations of the rescuers and the special obligations of the executive officer, the team leaders, the rescuers and the persons responsible for maintaining the equipment, are defined in detail in the service instructions intended for the rescue service (document No. 51).

These service instructions must be handed against receipt to the executive officers, the team leaders, the rescuers and the persons responsible for the maintenance of the apparatus.

4. Obligations of superintendents not belonging to the rescue service

4.1 The operator of the mine or the person in charge of the below ground workings authorised by him, is responsible for the measures to be taken to ensure, in the event of accident, that the rescue service is alerted quickly and the rescue operations put in hand systematically.

4.2 As soon as the use of breathing apparatus becomes necessary or probable in a mine, for example when a smell of smoke or fire is reported, the person responsible for the workings below ground or his deputy must, before investigating himself, see that the works management and the P.C.S. and the Bergamt are immediately advised by telephone (§ 269 BPV St) *(1)*.

4.3 In the event of intervention by the rescue service, the person in charge of the workings below ground must immediately take the necessary action to provide replacement personnel.

4.4 In mines with their own rescue service, all below ground superintendents, also persons required to participate in the rescue operations, shall receive instruction once a year given by the works manager or his deputy, on the question of rescue in mines, the preparation and carrying out of rescue operations, the alerting procedure and the rescue procedure in the mines, the services responsible for giving assistance, especially on the measures taken in the mine, in order to protect the underground excavations against fires and risks of explosions.

(1) Police regulations dated 20/11/1967 for coal mines.

5. Rescue operations

5.1 Preparation and execution

For the preparation and execution of the rescue operations, the "Principles relating to the preparation and execution of rescue operations" (document No. 52) must be applied.

5.2 Intervention of the rescue service

5.2.1 The head of rescue operations orders the executive officer to bring the rescue service into action, by assigning to him clearly defined duties. The executive officer settles in detail the intervention of the rescue service on the basis of the strength and means available to him, and taking into account the local circumstances. He gives the team leaders clear orders regarding certain defined tasks in space and time. If necessary he requests aid from the person in charge of below ground workings, who takes the necessary action to supply reserve rescuers in good time. If his own rescue service is inadequate, the head of the rescue operations designate the rescue service from other workings which is shown in the general rescue plan as being responsible for giving help, and arranges to advise it.

5.2.2 The executive officer makes a report to the head of the rescue operations on the fire and the extent of the disaster, interference with ventilation, prohibition measures, working sites in danger, etc.

5.2.3 Only members of the rescue service provided with closed-circuit breathing apparatus may be dispatched to combat the disaster.

In exceptional cases, persons not belonging to a rescue service and provided with other breathing apparatus, may be engaged in the operations when the Bergamt has given its agreement.

5.2.4 When required to intervene, the rescue teams of other mines are placed under the orders of the executive officer of the rescuers of the mine where the intervention is taking place. The executive officer of the PCS may assume direction of the operations.

5.2.5 In principle, the rescue service may only intervene when two complete teams, provided with breathing apparatus, are on the spot (2.2.1.1). In cases of particular urgency, a team may carry on if it is certain that the second will arrive soon.

Special members may only participate directly in the operations with the express authority of the head of rescue operations; when the strength of a rescue team is fixed, they must not be counted as taking part.

5.2.6 In areas with accumulations of poisonous gases or where there has been shortage of oxygen, the rescue service may only go in, in the first instance, with a strength of at least one team. A rescuer must never retrace his steps alone, but the whole team must come back. The intervention of a lesser number of rescuers may be authorised in exceptional cases, when special circumstances so require, but it is necessary for at least one leader and two men to advance together (over a short distance and under known conditions). Once the local conditions are clearly established, individual rescuers may also be given particular tasks, constant supervision and liaison being guaranteed with other rescuers.

5.2.7 When the rescuers go forward, it must not be forgotten that penetration of narrow underground workings with breathing apparatus involves particular risks.

5.2.8 When rescuers are obliged to penetrate several times into the same area where each rescuer runs risk of poisoning by poisonous gases or lack of oxygen, it is necessary to establish a link by special portable telephone between the various rescuers and the operations base. In addition, it is recommended in such bases that breathing equipment ready to function should be prepared at suitable places in the action area, to replace those which might be defective.

5.2.9 Special care is necessary when advancing under very difficult conditions.

5.2.9.1 Very difficult conditions exist :

(i) in underground workings where the air is hot and damp;

(ii) when visibility is very limited;

(iii) when reconnoitring without knowledge of the action conditions;

(iv) in underground workings where descent is difficult.

In such conditions, the regulations to be observed are as follows :

The team which goes first must remain in constant contact (by special telephone) with the operations base.

A complete reserve team must be ready as near as possible to the point of intervention, the breathing apparatus being in the slung position.

A link must be established between the place where the spare team is situated and the operations base.

5.2.9.2 In the case of intervention in a hot and humid atmosphere, the following regulations must also be observed :

Only members of the rescue service must take part :

these shall preferably be :

(i) those used to difficult physical work and to working in heat or in a hot and humid atmosphere;

(ii) those under forty years of age.

Rescuers recovering from illness or those who do not feel at the top of their form (e.g. those suffering from influenza or under the effect of alcoholic beverages, etc.) must not be sent.

The rescuers must wear light clothing unless the risk of explosion requires fireproof clothing to be worn.

Depending on the instructions of the executive officer or his deputy, the team leader who goes first must measures with a psychrometer the temperature in humid and dry atmosphere, and transmit the results by telephone to the operations base.

The person in charge of the base or his deputy is responsible for fixing the duration of the intervention. Depending on the results of the temperature recordings given to him, he calculates the permissible duration in accordance with the following principles :

(1) at a humid temperature of 29 to 32°C and at dry temperatures up to 37°C, the duration of interventions must be restricted to less than two hours, i.e. 90 - 60 minutes;

(2) if the humid temperature reaches 32 to 34°C, and the dry temperature does not exceed 37°C, the duration of the intervention must be restricted to 60 - 45 minutes;

(3) at humid temperatures of 34 to 37°C and at dry temperatures not exceeding 37°C, the duration of the intervention must be restricted to 45 - 30 minutes;

(4) at higher dry temperatures and at humid temperatures above 37°C, interventions of less than 30 minutes for other purposes than the saving of human lives, must not be carried out except with the agreement of the director of the Bergamt or his deputy;

(5) the interventions mentioned in 2, 3 and 4 must only take place under the direction of the PCS.

Before the intervention, the rescuers must be asked to declare immediately to the team leader during the intervention, all symptons of heat stasis (heaviness of the limbs, headache, difficulties in seeing and hearing, nausea, giddiness). The team leader transmits these observations to the operations base and retraces steps immediately with the whole team. During the intervention breaks are to be avoided. Blankets and hot drinks must be prepared for rescuers returning after an intervention.

The rescuers must not be sent into action again until at least two hours after their last intervention.

5.3 Use of breathing apparatus

5.3.1 Only breathing apparatus of the type authorised by the Oberbergamt may be used.

5.3.2 The use of working apparatus with a CO filter is only permissible on the authority of the PCS for each case of intervention. It must only be authorised when the conditions are sufficiently known and foreseeable.

A petrol safety lamp is then carried, or an authorised device for detecting oxygen, in order to be able to ensure that the content of oxygen in the air is sufficient for breathing.

5.3.3 Before being issued by the person responsible for maintaining the equipment used, each breathing apparatus must be checked by the wearer and the head of section to ensure that it functions satisfactorily.

5.3.4 In the case of repeated use of closed-circuit apparatus, fresh alkali cartridges and full oxygen bottles will be used for each fresh intervention.

During the period of use permitted for the alkali cartridges, the cartridges already started may continue to be used after a break in respiration, if they have not cooled down in the meantime.

It is prohibited to re-use cartridges which have been used for a short time and cooled.

5.4 Signals

The team of rescuers will use the following signals :

1 blast	: stop
2 blasts	: coming back (we must retrace our steps)
3 blasts	: going forward
2 blasts + 2	= alarm signal
4 blasts	= is everything alright? (everything is alright)
1 blast + 2	: do you need help? (we need help)

When the rescue service is required to intervene in another mining area, agreement must first be reached on the signals to be used.

5.5 Operations base

5.5.1 When the rescue service is required to intervene below ground using breathing equipment, it is necessary to instal near the site of intervention, in a place not exposed to dangers of poisonous harmful gases or asphyxia, an operations base occupied by experienced rescuers, equipped which breathing apparatus and provided with a telephone link with the surface.

5.5.2 The operations base must be roomy and protected from cold draughts. It must be planned and equipped so that the apparatus used is in working order, and that spare parts can be clearly arranged there and the equipment already used can be prepared for re-use.

5.5.3 The operations base will be occupied permanently by a person responsible for the maintenance of the equipment, who will check the apparatus used on the spot, including the accessories, and will carry out maintenance.

5.5.4 A log of all interventions will be kept at the operations base in accordance with the specimen laid down.

5.5.5 The planning of the operations base in the event of a mining catastrophe is the subject of a special regulation on the "principles for the preparation and execution of rescue operations" (document No. 52).

5.6 Continuous cover above ground

During operations of the rescue service in the mine, the person in charge of operations below ground or a competent responsible person with a good knowledge of the workings must be in attendance permanently; he must be in a position to give full information on the service conditions and to make the following arrangements: (allocation of strength, supply of equipment and transport of the latter).

This does not apply to works do not jeopardize the safety of the mine (e.g. excavation work in underground workings with no air).

5.7 Reports after termination of the rescue operations

Once the intervention of the rescue service is completed, the mine makes a written report to the Bergamt and to the PCS, on the prescribed forms.

6. Accidents due to the carrying of breathing apparatus

6.1 Any accident occurring to a rescuer wearing breathing apparatus must, irrespective of the consequences, be reported without dely to the Bergamt and to the PCS on the prescribed form.

6.2 As far as the breathing apparatus involved in the accident is concerned, the oxygen pressure must be noted and the valve of the oxygen bottle closed. The apparatus must be handed to the PCS. for examination without being tampered with.

Appendix III

BELGIUM

Extracts from the Decree of the Regent dated 25/9/1947, modified by the Royal Decrees dated 10/8/1950, 24/3/1955, 13/4/1965 and 16/4/1967, Chapter IV "Initial aid and medical attention to the injured and sick", Section II : "Special regulations".

Article 97 : The competent Minister may authorize adjacent mines to establish a common depot of breathing equipment as referred to in article 95 above.

This common depot must satisfy the following conditions.

(1) The depot shall be under the direction of a head of service responsible to a supervisory committee, and also to the Mines Administration. This head of service must reside in the immediate vicinity of the depot, ensure the maintenance of the breathing equipment and organise practice drills provided for in the last sub-paragraph of article 96 above. He will have two capable advisers to help him in this task and to replace him as necessary; these latter shall also live in the immediate vicinity of the depot. The head of service and the two advisers shall take turns in being permanently at the depot. All three must be able to drive the motor car referred to below.

The head of service of the depot will keep a special register in which he will record each month his observations on the condition of each of the items of breathing equipment, and on the quality and quantity of the existing supplies regarding all aspects necessary for the use of such apparatus.

(2) The personnel of the depot shall also include 18 professional rescuers recruited exclusively from the supervisors or qualified workers of the workings in the area.

These rescuers shall live in the neighbourhood of the depot and will be divided into three groups, each including three teams of two men. Each group in turn will be on duty at the depot for two consecutive weeks; during this time the rescuers of the other groups will work in the mine.

On each shift, one of the teams of the group on duty will be permanently at the depot; during this period, the team in question will be trained in the use of the breathing equipment under the direction of the head of service or one of the advisers referred to above, and will help with the instruction and training of the guide-rescuers mentioned below.

(3) The personnel at each working site shall include at least three guiderescuers; one of the latter will be present at the workings of each shift.

These individuals, who are intended to serve as guides to the rescuers coming to the depot in the event of a disaster, must have a perfect knowledge of the topography of all the workings; they will be selected from the general supervisory staff.

At least four times a year they will undergo training at the depot in the wearing of the breathing apparatus, after receiving full instruction concerning its use.

(4) The number of items of breathing apparatus will be 1 for every 200 workers occupied simultaneously in the underground workings of the grouped mines, subject to this number not being less than 10 or more than 20.

However, the depot shall also include a sufficient number of a spare items of breathing equipment for the purpose of instructing and training rescuers.

(5) A motor car shall be kept permanently at the depot in running order, and containing ten items of breathing apparatus in perfect working order.

(6) The depot shall be connected to all the workings by telephone and arrangements will be made for communications to be received at any time, either by day or by night.

This decree leaves those concerned, through the medium of a ministerial authority, the choice between the organisation of rescue operations at local level or regional level.

All collieries in the South basin which were already grouped together previously and had created central rescue stations, have merely needed to adapt themselves to the new regulations of the decree.

The collieries in the Campine basin have each preferred to reorganise their own rescue station, in accordance with the conditions laid down by the decree dated 25/9/1947. However, at the beginning of 1957, the 7 collieries in the Campine basin also created a "Centre for rescue coordination", for the purpose of:

(1) co-ordinating mutual aid between the existing rescue brigades in the collieries;

(2) contributing to the selection and improvement of the advisers and rescue team leaders;

(3) keeping abreast of each incident and method of operation, with a view to acquiring the essential necessary experience as soon as possible;

(4) obtaining recognition for the principles that in the event of rescue operations the Centre for co-ordination should have something to say in this connection;

(5) organising at the Centre, during certain periods, drills with the rescue squads of the collieries;

(6) giving favourable consideration to co-ordinating efforts by regular and periodical contacts with local squads;

(7) constituting and maintaining the central equipment depot fully up to date;

(8) analysing samples in the laboratory and training chemists; studying, collating any documentation and effecting researches.

(9) organising a research office, to collate documentation and undertake researches on everything connected with rescue operations.

Very recently a "Belgian national centre for rescue operations in mines" with headquarters at Charleroi has been created, for the purpose of :

(1) effecting any studies and researches and carrying out any tests connected with mining rescue operations and the prevention of disasters, participating in such activities, promoting and circulating the results thereof;

(2) co-ordinating the activities of the various Belgian mining rescue centres, at technical and medical level, and organising relations with the administrations, institutions and public or private bodies needing to collaborate in the event of disaster;

(3) giving active help in the case of a disaster;

(4) acquiring and supplying all services and provisions, purchasing, selling transferring, hiring or letting all personal or real estate, in conjunction with the body concerned;

(5) representing all the Belgian mining rescue centres on all regional authorities and institutions, whether national or international, and of collaborating with them.

Appendix IV

FRANCE

Organization of rescue operations in mines of solid mineral fuels (Decree of the Minister for Industry dated 14/4/1965 - Article 320 to 322 of the General Regulations)

Organisation of rescue operations in mines of solid mineral fuel

Decree dated 14 April 1965
(art. 320 to 322 of the R.G.)

The Minister for Industry,

In consideration of decree No. 56-838 on the Mining Code, and particularly article 88 thereof,

In consideration or decree No. 51-508 dated 4 May 1951 bearing on the general regulation on the operation of solid mineral fuel mines and particularly articles 320 to 322 thereof,

In consideration of the decree dated 29 May 1929, modified by decree dated 19 August 1936,

In consideration of the decision of the General Council for Mines,

At the proposal of the Director of Mines,

DECREE

Article 1 : The purpose of this decree is to :

1. Define the general conditions for the organisation of rescue stations referred to in article 321 of the decree dated 4 May 1951 above-mentioned;
2. To prescribe the installation of rescue centres in the most important basins, to fix the area and conditions of operation in liaison with the rescue stations of the workings.

Article 2 : Each rescue station administered by workings occupying more than one hundred workmen on the largest shift must have at least :

(i) six portable breathing apparatuses if the number of workmen on the largest shift is is not more than 1200, twelve apparatuses if the number is more than 1200;

(ii) carbon monoxide detectors capable of detecting a proportion of 5/100000 of this gas, two if the number of workmen on the largest shift is not more than 1200, three if the number is more than 1200;

(iii) one revival apparatus for artificial respiration and oxygen inhaling;

(iv) a portable telephone line at least 100m in length with two telephones. If the workings to be served include gaseous areas, the telephone line must have qualities of mechanical strength and insulation, and the apparatus must be of unquestionable reliability, in the terms of article 23 of decree No. 30 dated October, 1961, relating to the acceptance of electrical equipment, flame safety lamps and liquid fuel locomotives in respect of security against fire-damp.

Article 3 : The apparatus referred to in article 2, its accessories and supplies, must be kept on the surface in premises near the pits, dry, well-ventilated, sheltered from dust and in the charge of a specifically designated employee. However, the revival apparatus can be kept in premises underground where it is protected from deterioration.

The nearest lamp-room to the rescue station must always be in a position to supply the rescuers with electric lamps and flame safety lamps in sufficient number.

Article 4 : The rescuers shall be selected from workmen or employees with a good knowledge of the structure of the workings, and familiar with the use of the apparatus from repeated methodical drills.

They must undergo, before acceptance, and then once a year and after any illness or injury causing temporary incapacity of more then two months, a thorough medical examination for the purpose of checking that they possess the suitable physical qualities.

Article 5 : The number of rescuers must be at least double the minimum number of portable breathing apparatuses required by article 2. They shall be distributed, as far as possible, in equal number between the various working shifts, They must live as near as possible to the rescue station. Their names and addresses shall be contained in a special register kept constantly up to date.

Article 6 : The team leaders and at leasr half of the other rescuers must be familiar with the first aid to be given to the accident victims. The team leaders must be instructed in the properties and actions of the harmful or inflammable gases and in the measures to be taken to rescue personnel and restore the structures. They must also be practised in the reading of mine plans.

Article 7 : At least a quarter of the engineers and superintendents attached directly to the underground workings must receive special training to be in a position to take over the direction of a rescue team. They must undergo the medical examinations provided for in article 4 above.

Article 8 : An instruction approved by the Chief Engineer of Mines determines :

(i) the conditions of siting, installation, functioning and guarding of the depots;

(ii) the measures to be taken for the conservation, maintenance, testing and use of the apparatus;

(iii) the nature and frequency of the drills to be gone through by the team leaders and the rescuers attached to the station, as well as by the engineers and superintendents of the workings subject to a special training by virtue of article 7;

(iv) the conditions in which the rescue teams are engaged, and the essential principles to be observed in conducting the operations.

Article 9 : By derogation from article 2 above, the Chief Engineer of Mines may authorise the grouping of several workings for the creation of a common rescue station, provided that these workings are situated in such a way that the transport of the rescuers and apparatus from the rescue station to any one of the workings served by this station can be effected under sufficiently rapid conditions. The number of items of apparatus at the common rescue station shall be at least twelve.

The number of rescuers per workings attached to a common rescue station must be equivalent to that which would have been fixed by virtue of the application of articles 2 and 5, if there were no common rescue station.

All the other conditions of articles 2 to 8 are applicable to common rescue stations. The instruction referred to in article 8 must fix the means of transport for the apparatus and rescuers in the event of a disaster.

Article 10 : The coal mines in the basins listed below are required to instal a rescue centre :

Coal mines in the Nord Basin and the Pas-de-Calais

Coal mines in the Lorraine Basin

Coal mines in the Blanzy Basin

Coal mines in the Loire Basin

Coal mines in the Cévennes Basin

Coal mines in the Provence Basin

The area covered by the central stations corresponds to the geographical coverage of the coal mines in the basin.

Article 11 : The number of breathing apparatuses at a rescue centre must be not less than one for a thousand workmen occupied underground at the affiliated workings. However, no rescue centre may possess less than twelve apparatuses and need not possess more than twenty. Each rescue centre must also possess carbon monoxide detectors, apparatus for artifical respiration, telephone lines and equipment in sufficient number and not less than the numbers fixed in article 2.

Article 12 : The rescue centre shall be placed under the immediate direction of an engineer familiar with the use of the equipment. He must have at his disposal rescuers properly drilled and familiar with the use of all the rescue apparatus used in the affiliated mines.

The number of rescuers of the centre must be at least 18. Unless a permanent staffing of rescuers is organised at the centre to permit its intervention with the least delay, the rescuers must live as near as possible to the centre; their names and addresses must be contained in a special register.

The conditions of article 4, sub-para. 2, and those of article 6 apply to the centres.

Article 13 : A regulation, approved by the Chief Engineer of Mines, fixes the conditions of installation and functioning of the rescue centre, particularly :

(i) conservation, maintenance, tests, use of apparatus;

(ii) supply to the rescuers of individual lamps, flame lamps and gas-verifiers as necessary;

(iii) training of the rescuers;

(iv) liaison with affiliated workings, alerting devices, transport of rescuers and equipment.

Article 14 : The conditions of this decree will come into force within a period of one year with effect from its publication in the Official Journal. However, the character of unquestionable reliability of the telephonic equipment referred to in article 2 will not be required until a period of two years has elapsed. Derogations may be granted by ministerial decree by decision of the General Council of Mines.

Article 15 : On the date of coming into force of this decree, the previous decree dated 29 May 1929 modified by decree dated 19 August 1936, will be abrogated, together with the ministerial approvals and decisions or derogations taken in application of the articles 4, 5 or 13.

Article 16 : The Director of Mines is responsible for the execution of this decree, wich will be published in the Official Journal of the French Republic.

Paris, 14 April 1965.

Minister for Industry,
for the Minister
and by Delegation,

Director of Mines,

Signed: DAUNESSE

Appendix V

FRANCE

Organization of rescue operations
(Circular DM/H No. 259 of the Minister
of Industry to Chief Engineers of mines)

Organization of the rescue service

(art. 320 to 322)
DM/H No. 259

The Minister for Industry to the Chief Engineers of Mines

1. The organization of the rescue operations in mines has been governed so far by the Decree dated 29 May 1929, modified on 19 August 1936. The amendments to the conditions of the general regulations, relating to the rescue operations, the progress made in the design of the apparatus, the development of the ideas and methods regarding equipment, training of rescuers, and the use of the equipment, have made it necessary to revise these regulations.

   The essential conditions of the Decree of 1929-36 have been inserted in the decree dated 4 May 1951 and they form articles 320 to 323 which refer, as regards the rules of organisation, training, maintenance, use, to a ministerial decree. In addition, the installation of centres is no longer left to the sole initiative of the operators, but maybe made obligatory in important basins.

   The corresponding conditions of the Decree dated 27 January 1959 are much less severe and leave to a ministerial decree the question of prescribing in certain workings, the establishing of rescue stations. This decree has therefore implicity exempted "other" mines from the application of the Decree of 1929-36. For these mines, as well as for fuel mines below the minimum strength of 100 workmen on the largest shift, it will be left to you to propose the creation of rescue stations to me, where applicable.

   The scope of the Decree dated 14 April 1965 is therefore limited to solid mineral fuel mines only. It refers at the same time to the conditions of article 321 and those of 322 of the General Regulations for the application of which separate Decrees were laid down. The purpose of this circular is to clarify certain of these conditions, especially those which differ from the old regulations.

2. The term "workings" shall be taken as meaning any individual mine, constituting an autonomous unit, or any group of mining shafts, shafts for the descent of personnel or equipment, ventilation shafts or shafts for placing filling materials, forming an autonomous unit. The structure of certain adjacent workings may be too complex to comply with either of these definitions. It is left to you, taking into account the extent of the workings, any communications between pits existing below ground, the situation and number of the pits, etc., to distinguish those combinations which could be said to constitute a separate working, The conditions of article 9 also afford another means of resolving this difficulty. The breathing apparatus must be of modern design, robust and light in weight. The progress achieved in their construction makes it possible to guarantee, in the case of recent apparatus, a stay of at least two hours in an unbreathable atmosphere. It is recommended that the apparatus of the team leaders should be provided with a mask or helmet to enable them to give the necessary orders, and that a reflector strip should be placed on all apparatus so that the rescuers can be easily discerned.

   Each rescue station must possess 2 or 3 carbon monoxide detectors. These detectors are intended for the rescue teams and must therefore remain at their disposal. The detectors currently used by the workings for supervising suspect working sites must not be those from the rescue station.

   Article 2 does not stipulate any minimum number of individual items of apparatus for effective protection against carbon monoxide, to be supplied to each rescue station in application of article 320 of the Decree dated 4 May 1951. In actual fact, the filtering apparatus at present in service is unlikely to give effective protection. But apparatus

with a reserve of oxygen which can be used in any atmosphere, has appeared recently on the market; it would be desirable to use it to gradually replace the filtering apparatus at the rescue stations. As a first stage, you will make sure that each Basin possesses a minimum of 25 apparatuses with a reserve of oxygen kept in the centre or distributed between the rescue stations of the workings.

The telephone equipment must comply with the regulations laid down for equipment of intrinsic reliability. It goes without saying that the obligation to have conventional telephonic equipment does not exclude the use of other means of telecommunication, provided that they give equivalent guarantees, which does not yet appear to be the case.

3. The storing in the underground workings of revival apparatus may be advantageous in bringing quicker aid to victims of accidents not justifying the intervention of the rescue team (e.g. caving in). However, this solution requires the existence of revival apparatus at each working, if the rescue station serves several workings as provided for in article 9.

4. The rescuers, which now undergo obligatory medical examinations, must be chosen paying particular attention to the following criteria: elimination of workmen who are too fat, have cardiac or pulmonary complaints, defective sight or hearing, or bad dentition.

   It is difficult to require that all rescuers should have a perfect knowledge of the workings and should be capable of moving around without a guide.

   In principle, at least a third of the rescuers from a working should satisfy these conditions. It is therefore advisable to choose them from the various areas of the mine and to keep them informed of the development of the works.

   The delegated miners complying with the conditions fixed in article 4 can be integrated into the teams of rescuers, but should be placed under the orders of the team leaders during the operations.

5. The number of rescuers shall be at least twelve for workings employing a maximum of 1200 workmen, and at least twenty-four for workings with more than 1200 workmen.

   This number is justified by the need to form teams of at least five men, including one team leader, to which may be added an engineer or a superintendent. Experience has shown that a team smaller in number would have difficulty in looking after its own safety and bringing to the surface a rescuer accidentally incapacitated. For short-distance operations, as an exception, a smaller number of rescuers can be engaged, provided that these latter remain in contact by sight or other reliable means, with a emergency team ready to intervene.

   If it is not alway easy to allocate the rescuers in equivalent numbers between the various working shifts, there must never be more than two thirds of the rescuers below ground.

   The lists of rescuers must be carefully kept up to date, and completed as and when departures occur, so that complete teams are always available.

6. The minimum number of rescuers capable of rendering effective aid to the victims of accidents is largely increased. There must be a tendency to see that all rescuers have undergone first aid training.

7. It is desirable for the greatest possible number of below ground engineers and superintendents recognised as medically fit, to be able to participate in the rescue work and to take over, where applicable, the direction of a team.

8. This instruction fixing the conditions of organisation and functioning of the rescue stations of the workings was merely sent to you. In future, it will be submitted to you for approval, and you will be able to make thereto any amendments which you consider necessary.

9. The rescue drills should be effected in turn at all the workings covered by the common rescue station.

You should ensure, in particular, that the common station has available, at any time, the means of transporting the personnel and equipment to the pit where the disaster has occurred, without delay.

10.-11.-12. Article 10 merely confirms a statement of fact. The other basins can be exempt from the obligation of a rescue centre, either by reason of their lesser importance, or by reason of the extreme concentration of the works or, conversely, of to great a dispersion of the workings.

What has been said above for rescue stations and workings applies to the centres, concerning which it is necessary to stress particularly the arrangements made to alert the rescuers and convey them as soon as ever possible to the workings which have appealed to the rescue centre.

If rescuers are in permanent attendance at a rescue centre making use of rescuers from workings, the numbers from the secondary stations should be sufficient to ensure that any functioning of the latter is not compromised by the absence of a section of the rescue personnel.

In certain cases, the rescue centre can also play the part of rescue station for workings immediately adjacent. In this case however, the numbers of the rescuers from the rescue centre and the number of breathing apparatuses must be at least equivalent to the sum of the corresponding minima laid down for the secondary station and for the centre in articles 2, 5, 11 and 12.

13.-14.-15. In the future, it will be your responsibility to approve the regulations for the centres. Article 15 of the new decree abrogates all decisions or approvals given in application of articles 4 and 5 of the Decree dated 1929-36. It will therefore be necessary to proceed with a fresh examination of these regulations and possibly to arrange for them to be modified, taking into account the alterations occurring in the regulations and, subsequently, to approve them.

The ministerial decisions which have permitted the grouping of several workings in execution of article 4 of the Decree dated 29 November 1929, will be abrogated at the same time as this decree, like the approvals of regulations for centre stations referred to previously. This is an excellent occasion to review, in its entirety, the organisation of the rescue operations. The period of one year laid down in article 14 of the new decree will make it possible to carry out this study with all the care it requires.

The material in articles 7 and 12 of the Decree dated 1929-36 has not been included in the new decree.

The conditions of article 7 lose all justification by virtue of article 322 of the decree dated 4 May 1951, the execution of which is assured by articles 10 to 13 of the new decree. The general conditions of articles 77 and 140 of the Mining Code, and of article 10, last sub-para. of the Decree dated 14 January 1909, completed by the delegations explained in articles 8 to 13 of the new decree, give sufficient expression to the mission which article 12 of the decree 1929-36 sets out to define.

For the Minister
and by Delegation,

Director of Mines

Signed : DAUNESSE

Appendix VI

NETHERLANDS

Requirements to be met by the rescue service
(Instructions dated 29/2/1968 of the General
Inspector for Mines)

Article 1

1. To be a member of the rescue service, it is necessary :

   (a) to have worked below ground for at least two years;

   (b) to have been passed as medically suitable;

   (c) to have taken part in theoretical training and in a sufficient number of drills in a smoke-filled encolusre.

2. The members of the rescue service must undergo a suitability medical examination each year.

Article 2

1. Each trained rescuer musc take part each year in 5 drills at least, 2 of these being in the smoke chamber and 2 below ground.

2. Every year an alert drill must be organised, and it is obligatory for the department for the control of mines to be immediately informed. In calculating the number of drills, this alert drill is equivalent to a drill below ground for all those concerned.

3. If it is found that a rescue team is insufficiently drilled, the General Inspector of Mines may order temporary participation of the members of this team in more frequent drills than provided for in the first sub-para.

Article 3

1. The number of items of rescue apparatus must be at least :

   10 units if the shift below ground has a maximum strength of less than 700 workmen;

   15 units if the shift below ground has a maximum strength of 700 workmen or more.

2. Taking into account the extent of the underground workings and the dangerous character of the mine due to the presence of gas or coal dust, the General Inspector of Mines may stipulate a greater number of items of apparatus than that laid down in the first sub-paragraph.

3. Failing written authority previously granted by the General Inspector of Mines, it is forbidden to make any radical alteration to the safety apparatus, to the extent of changing its functioning.

Article 4

The number of rescuers must be at least three times that of the number of items of rescue apparatus required.

Article 5

The direction of the rescue operations must be entrusted to an employee specially appointed for that purpose, who must be given an instruction approved by the General Inspector of Mines.

Article 6

The direction of the rescue service must be entrusted to an employee specially appointed for that purpose, who must be given an instruction approved by the General Inspector of Mines.

Article 7

1. In addition to the number of rescue apparatuses required by article 3, the following must be available at the rescue station or at another suitable point :

   (a) a sufficient number of spare parts for the rescue apparatus;

   (b) one or more large bottles of oxygen, equipped as necessary with a reduction valve, for filling the oxygen bottles of the apparatus;

   (c) for each item of rescue apparatus, a full oxygen bottle and 4 alkali cartridges;

(d) thermometers, CO detectors, stretchers, oxygen breathing apparatus, and auto-saving apparatus;

(e) a number of masks similar to that of the rescuers;

(f) the ventilation plan of the mine.

2. The oxygen used for the rescue apparatus must have a degree of purity of at least 99.2, certified by chemical analysis carried out at the request of the undertaking.

Article 8

The rescue procedure referred to in article 279, third sub-para. of the mining regulation of 1964, must give the following at least :

(a) the number of workmen below ground and the strength of the shift with the most workmen;

(b) the names of the head of the rescue service and of the rescue team leader, as well as those of their replacements and of the supervisor of the rescue station;

(c) the number of rescuers and the number of persons suitable for carrying out the functions of team leader;

(d) the means of checking the presence of the rescuers at the mine;

(e) the number, nature, date and duration of the drills;

(f) the nature and number of items of rescue apparatus;

(g) the inventory of the rescue station;

(h) the instruction intended for the head of the rescue organization;

(i) the instruction intended for the rescue team leader;

(j) the method of warning the rescuers and, if necessary, transporting them to the mines.

Appendix VII

UNITED KINGDOM

Decree concerning coal mines and other mines (fire and rescue) dated 1956, appendix 1, part IV : Rescue operations

PART IV

Rescue

Central rescue stations

12. (1) It shall be the duty of the owner of every mine :

(a) to provide, maintain and conduct, in accordance with the following provisions of this Part of these Regulations, a central rescue station to provide facilities for the conduct of operations for rescue and other necessary work at that mine after an explosion or a fire, or in an atmosphere which is or may be irrespirable thereat, or

(b) to make arrangements to ensure that there are available to that mine such facilities provided by a central rescue station so maintained and conducted, being a station situate within 15 miles of the entrance to the mine or such greater distance not exceeding 20 miles as an inspector may authorise by notice served on the owner.

(2) An inspector may by notice served on the owner of a mine exempt him from the preceding provisions of this regulation with respect to that mine;

(a) if the inspector is satisfied that there are in force effective arrangements for the conduct of operations for rescue at that mine independently of a central rescue station, or

(b) if the mine is situate more than 15 miles from such a central rescue station then existing and the inspector is satisfied that it would be unreasonable that the owner should be required to provide such a central rescue station or

(c) if the inspector is satisfied that the owner has unsuccessfully made resonable efforts to conclude such arrangements as are referred to in sub-para. (b) of the last preceding paragraph and that it would be unreasonable that he should be required to provide such a central rescue station.

(3) The owner of every mine to which paragraph (1) of this regulation applies shall ensure that it is in telephonic communication with the central rescue station the facilities of which are available to that mine.

(4) Without prejudice to the generality of section 175 of the Act, to an authority or exemption given under this regulation, there may be attached conditions requiring the provision at the mine of rescue equipment other or in excess of that specified in these regulations.

Superintendents of and instructors at central rescue stations

13. (1) Every central rescue station shall be under the immediate control of a competent superintendent being a person who has been fully trained in rescue work and who, unless so employed before 1 January 1929, has had not less than 5 years practical experience of work below ground in a mine.

(2) There shall be employed at every central rescue station instructors competent to train rescue workers.

(3) Arrangements shall be made to ensure that an instructor is present at and appointed to take charge of a central rescue station at any time when the superintendent is not present thereat.

(4) The number of instructors employed at a central rescue station at which a permanent rescue corps is maintained shall not be less than two, and, if the total number of persons employed below ground at the mines to which the facilities of that station are available exceeds 15 000, shall not be less than three.

(5) The number of instructors employed at a central rescue station at which a permenent rescue corps is not maintained shall not be less than two, and, if the total number of rescue brigades required by these regulations is to be maintained at the mines to which the facilities of that station are available receeds 50, shall not be less than 3, and, if the total number of such rescue brigades exceeds 100, shall not be less than 4.

(6) For the purpose of the two last preceding paragraphs, a superintendent who undertakes the training of rescue workers may be included as an instructor.

Permanent rescue corps

14. (1) At any central rescue station where a permanent rescue corps is maintained, that corps shall consist of not less than 6 men fully trained in rescue work, exclusive of the superintendent and of the person appointed to take charge of the station when the superintendent is not present thereat.

(2) One or more members of the corps shall be trained to act as captain thereof.

(3) The members of the corps shall be continuously employed at and in residence at the central rescue station.
It is understood that an inspector, by notice served on the superintendent of the station, may authorise members of the corps to reside not more than half a mile from the station, so long as suitable means of summons from that residence to the station are provided.

Rescue workers to act with permanent rescue corps

15. (1) It shall be the duty of the manager of every mine at which not less than 100 persons are employed below ground, and to which the facilities of a central rescue station are available, being a station at which a permanent rescue corps is maintained, to appoint men who are employed at that mine and have a good general knowledge thereof, and who have been fully trained in rescue work to co-operate with the corps in work and practice on the following scale, i.e. :

where not more than 500 persons are employed below ground at the mine, not less that one man;

where more than 500 but not more than 100 persons are so employed, not less than two men;

where more than 1000 but not more than 1500 persons are so employed, not less than three men;

where more than 1500 persons are so employed, not less than four men.

(2) The manager of every mine to which the last preceding paragraph applies and at which more than one such man has been appointed, shall endeavour to ensure that at no time are they both or all employed below ground simultaneously otherwise than in rescue work or practice.

Rescue brigades

16. (1) It shall be the duty of every mine to which the facilities of a central rescue station are available, being a station at which a permanent rescue corps is not maintained, to organise and maintain rescue brigades on the following scale :

where not more than 500 persons are employed below ground at the mine, not less than one brigade;

where more than 500 but not more than 2000 persons are so employed, not less than two brigades;

where more than 2000 persons are so employed, three brigades,

provided that :

(a) the preceding provisions of this paragraph shall not apply in respect of a mine at which less than 100 persons are employed below ground if arrangements are in force whereby a brigade from another mine will be made available promply in case of need, and

(b) mines of which the surface entrances to all the shafts and outlets for the time being in use lie within a circle having a radius of 2 miles, may be treated together as one mine if the managers have made arrangements therefore and served notice thereof on the inspector for the district;

(2) The manager of every mine to which this regulation applies shall appoint not less than 5 men fully trained in rescue work and employed at that mine, to each brigade, and shall appoint one of them as captain.

(3) The manager of every mine to which this regulation applies shall endeavour to ensure that at no time are:

(a) in the case of a mine at which one rescue brigade is maintained, all the members of that brigade, or

(b) in the case of a mine at which more than one rescue brigade is maintained, members of both or all the brigades,

employed below ground simultaneously, otherwise than in rescue work in practice.

Communication with rescue work

17. The manager of every mine to which either of the two last preceding regulations applies, shall make arrangements for summoning every person appointed thereunder from his residence in case of need.

18. In any prosecution for a contravention of article 15 or article 16 above, it shall be defence to prove that the manager has made reasonable efforts to induce appropriate persons to be trained in rescue work and that the failure to comply fully was due to an insufficiency of persons able and willing to acquire the requisite qualifications.

Qualifications of rescue work

19. No person shall be selected for training in rescue work with a view to appointment as a member of a permanent rescue corps, as a rescue worker to co-operate at a mine with such a corps or as a members of a rescue brigade at a mine unless :

(a) he is certified by a registered medical practitioner after thorough examination to be fit to undertake rescue work and to be free from any organic disease or weakness;

(b) he has had not less than two years practical experience of work below ground in a mine, and

(c) he is the holder of a certificate of proficiency in first aid granted by a society or body approved by the Minister for the purpose.

20. No person shall for the purpose of these regulations, be deemed to be fully trained in rescue work unless he has attended one or more courses of instruction and practiced therein at a central rescue station, being courses complying with a scheme approved by the Minister, and has been certified by the superintendent of that station to be efficient and able to undertake rescue work with breathing apparatus.

21. No person shall be qualified to be appointed or to be a member of a permanent rescue corps, a rescue worker to co-operate at a mine with such a corps or a member of a rescue brigade at a mine, unless he has, within the last preceding 12 months :

(a) been certified by a registered medical practitioner after thorough examination, to be fit to undertake rescue work and to be free from any organic disease or weakness, and

(b) attended a course of instruction and practice in rescue work, being a course including practices with breathing apparatuses in a hot and irrespirable atmosphere and complying with a scheme approved by the Minister for such courses for maintaining efficiency.

Records at central rescue stations

22. There shall be kept at every central station, a record of every person attending a course of instruction and practice in rescue work thereat, including the date and character of each practice and the condition of each man after each practice, and if anything abnormal is observed in the condition of any man, whether it is considered to be due to any defect in any apparatus used by him.

Equipment at central rescue stations

23. At every central rescue station there shall be provided and maintained in readiness for immediate use, the following equipment :

(a) twenty sets of breathing apparatus of a type approved by the Minister, with means of supplying sufficient oxygen or liquid air to enable such apparatus to be used for 48 hours, and means of charging such apparatus;

(b) four rescue helmets or other apparatus serving the same purpose, of a type approved by the Minister, with not less than 120 feet of tubing for each;

(c) four sets of reviving apparatus, not being apparatus of a forced breathing type, each with a cylinder or cylinders capable of supplying not less than 20 cubic feet of oxygen;

(d) a first aid box of a type approved by the Minister;

(e) 20 electric safety-lamps and 6 flame safety-lamps;

(f) cages of small birds for testing for poisonous gases;

(g) a motor vehicle of adequate capacity;

(h) 2 portable signalling devices and

(i) means for training persons to test for inflammable gas with a flame safety-lamp.

Rescue equipment at mines

24. It shall be the duty of the manager of every mine, other than a mine at which less than one hundred persons are employed below ground, to secure the provision and readiness for immediate use thereat, of the following equipment :

(a) a rescue helmet or other apparatus used for the same purpose, of a type approved by the Minister, with not less than 120 feet of tubing;

(b) reviving apparatus for the injured, of a type other than the forced breathing type, with a cylinder or cylinders capable of supplying not less than 20 cubic feet of oxygen;

(c) one electric safety-lamp and one flame safety-lamp for each man fully trained in rescue work and employed at that mine and

(d) two small birds for testing for poisonous gases.

Breathing apparatus

25. (1) Subject to any exemption given by an inspector by notice served on the manager, breathing apparatus shall not be kept at any mine but shall be obtained as required for rescue work or training thereat, from a central rescue station.

(2) Every item of breathing apparatus kept at a central rescue station, or at a mine in pursuance of an exemption given under the last preceding paragraph, shall be adjusted and tested at the times and in the manner specified in the first schedule hereto, snd the results thereof shall be recorded in accordance with those provisions.

(3) No oxygen cylinder shall be used for recharging breathing apparatus unless a part of the contents has been analysed and found to contain not less than 90 % of oxygen. A record shall be kept of the result of every such analysis.

(4) No breathing apparatus shall be used below ground in any mine unless, directly before use, it has been tested for leakage by immersion in the manner specified in the first schedule hereto and found safe, except

(a) upon a practice in air which is not irrespirable, or

(b) in a case in which subjection to such a test would prejudice an attempt to save life and the apparatus has been tested immediately before use for leakage by mouth suction.

(5) Without prejudice to the operation of sections 116 and 117 of the Act, on the occurrence of any accident or incident at a mine likely to require the use of breathing apparatus, the manager shall inform, by the quickest means available, the inspector for the district and the person for the time being nominated to receive notices under sub-para. (1) of section 116 of the Act.

Signals for use in rescue work

26. In rescue work and training for these operations, the signals specified in the second schedule *(1)* hereto shall alone be used for the purpose specified in relation thereto.

Accommodation for rescue workers at mines

27. (1) It shall be the duty of the manager of every mine to secure the provision on the surface thereat of a suitable room with sufficient accommodation for any persons who may be engaged in rescue work or practice. This room shall be near to a shaft or outlet normally used by persons employed below ground at the mine, and shall be adequatly heated and lighted and kept clean and properly maintained.

(2) At every mine at which not less than 100 persons are employed below ground, the room in question, if not permanently separated from accomodation used for any other purpose, shall be so arranged that it can readly be so separated. The equipment provided in pursuance of these regulations at that time shall be kept therein.

(3) The manager of every mine shall appoint a responsible person to be in charge of the room provided in pursuance of this regulation.

Plans

28. It shall be the duty of the manager of every mine to keep at the mine, or at such other place as may be approved by an inspector, a sufficient number of sets of plans of the workings of the mine, in a form suitable for use by rescue workers, so that at any time there are plans for each part of the mine showing clearly and accurately

(1) Not published in this document.

up to a date not more than three months past, the extent of the workings, airways and the direction of the air current therein and all principle doors, stoppings, air crossings, regulators and telephone stations, by means of the signs specified in the third schedule *(1)* hereto.

Inspection of equipment, etc.

29. It shall be the duty of the owner of every mine to which the facilities of a central rescue station are available, to make arrangements for the inspection at intervals not exceeding six months by the superintendent of the station or an instructor nominated by him, of the accommodation and equipment provided at the station for rescue work and training. Such arrangements shall ensure that on any such inspection the superintendent or his nominee shall be accompanied by an official of the mine, and that any defect or deficiency disclosed thereby is promptly reported to the manager of the mine.

Provisions relating to conduct of rescue work

30. (1) It shall be the duty of the manager of every mine to make rules allotting to competent persons the duties to be performed by them on any occasion on which rescue work is about to be or is being carried out at that mine.

(2) Such rules shall include provisions to ensure that on any such occasion, at any time when the manager is not himself performing those functions, a competent person is in charge on the surface to ensure that :

(a) no person enters any shaft or outlet for the purpose of going to a part of the mine affected, unless he is duly authorised to do so;

(b) the name of every person going below ground or returning above ground at the mine is recorded in writing;

(c) teams of rescue workers are organised and, where such a team is not a permanent rescue corps or a rescue brigade, a captain thereof is appointed;

(d) items of breathing apparatus are tested in accordance with paragraph 4 of article 25, and

(e) such other steps as can be taken on the surface to regulate and facilitate the rescue work are taken.

31. Whenever rescue work is about to be or is being carried on in any mine, no person shall go below ground for the purpose of going to a part of the mine affected, unless authorised to do so.

32. (1) Whenever rescue work is about to be or is being carried on in any mine, no person shall be authorised to go below ground to any purpose which may involve the use of breathing apparatus, unless he is a person for the time being qualified to be a member of a rescue corps, a rescue worker to co-operate at a mine with such a corps, or a member of a rescue brigade at a mine.

(2) On any such occasion, no person shall be permitted to engage in a second or subsequent spell of work involving the use of breathing apparatus, unless he has been medically examined since the preceding spell of work and is found fit to undertake it.

33. (1) Whenever rescue work is to be carried out in a mine in a atmosphere which is or may be irrespirable, there shall be organised as soon as possible, a base or bases (hereinafter referred to as a "fresh air base") in respirable air but as near to the places in which the work has to be carried out, as appears safe.

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(1) Not published in this document.

(2) Whenever any persons are engaged in rescue work beyond the fresh air base, there shall be stationed thereat, so far as is practicable;

(a) two persons, including a person competent to test and maintain breathing apparatus and other rescue equipment, and a person holding a certificate of proficiency in first aid granted by a society or body approved by the Minister for the purpose;

(b) a team of rescue workers ready for immediate service and equipped with breathing apparatus, and

(c) a set of reviving apparatus, a stretcher and a cage of birds.

(3) Telephonic communication shall, if practicable, be established and maintained between any fresh air base and the surface of the mine, or at an entrance below ground to a shaft or outlet.

34. (1) Whenever rescue work is to be carried out in a mine, no team of rescue workers shall go beyond a fresh air base, or where an appropriate fresh air base has not been established, shall go below ground unless the captain has been given clear instructions where the team is to go and what it is to attempt, by the person in charge at the fresh air base or on the surface, as the case may be, and if breathing apparatus is to be used, has assured himself that the apparatus in question has been tested in accordance with paragraph 4 of article 25.

(2) Unless the captain of such a team is personally familiar with the route to be taken, he shall not proceed without a plan of the relevent part of the mine, made in pursuance of article 28, and on which that route is clearly marked.

35. (1) It shall be the duty of the captain of any rescue team engaged in rescue work in any mine, to devote himself to the direction of the team and to secure its safety, and accordingly he shall not engage in manual work.

(2) Without prejudice to the generaltiy of the foregoing, the captain of a team so engaged shall examine the state of the roof and sides of any place to be entered or passed by the team, and he shall not permit the team to pass any place which appears to him insecure or, except where it is necessary to do so in an attempt to save life, to pass through any passage less than two feet high and three feet wide.

(3) If visibility is obscured by smoke, the captain of a rescue team shall ensure that a life-line is taken in from the fresh air base or another place at which the air is respirable, and that no member of the team moves out of reach of that line or, if that is not practicable, that any road branching from a route is fenced off before the junction is passed.

(4) If visibility is not obscured by smoke, the captain of a rescue team, when passing any junction, shall see that the route is clearly indicated by means of arrows or other suitable marks.

36. The captain of any rescue team which is to use breathing apparatus in the course of any rescue work at any mine, shall make sure that each item of such apparatus is working properly immediately before the team enters an atmosphere which is or may be irrespirable, and shall, in the case of such apparatus in which compressed oxygen is used, read the pressure of oxygen at intervals not exceeding 20 minutes.

37. Whenever a fire is being dammed off, there shall be kept available at or near the place, two sets of breathing apparatus and persons qualified to use them under article 32, or two smoke helmets and persons competent to use them.

Appendix VIII

ITALY

Police regulation for Mines and Quarries
dated 9/4/1959

Heading X, Chapter X, "Rescue"
Heading XVI, Articles 656 - 658, "Rescue operations"

HEADING X, CHAPTER X

"Rescue"

Article 528

Without prejudice to the conditions of article 539, a rescue team must be formed in any mine classified with the presence of inflammable, poisonous or otherwise harmful gases.

Article 529

The men making up the rescue team must be volunteers, be between 24 and 50 years of age, recognised as physically fit by medical examination repeated every year, possess a proven cool temperament, and be particularly suited to carry out the activities inherent in rescue operations. They must have a good knowledge of the workings below ground.

If the volunteers are insufficient in number, the manager shall select the members of the team, after seeking advice from the college of representatives for safety.

The workmen belonging to the rescue teams must take part in rescue operations and drills.

A head of service is placed in charge of the team, and a suitable person appointed to replace him in his absence.

Article 530

It must be possible to advise the members of the rescue team easily, and they should preferably live near the mine.

If this is not possible, the management of the mine must have suitable means for calling the members of the team together rapidly.

Article 531

The minimum number of members of a rescue team is one for every 25 workmen allocated to the workings below ground on the largest shift, and must not be less than 5 in any circumstances.

The number of senior officials allocated to the rescue operations must be at least two.

Article 532

The management must keep up to date the list of the members of the rescue team, and post it above ground in a clearly visible position frequented by the workmen.

Article 533

The members of the rescue team must be suitably allocated between the three shifts.

Rescue stations

Article 534

In the mines, whether individual or grouped, referred to in article 528 and 539, suitable premises must be provided for storing and maintaining the equipment for the rescue team, complying with the essential conditions required for their use.

These premises, which may not be used for any other purpose, must be protected against fire and situated near the outlet to the surface of the route which the workmen normally take when going below ground and returning.

Article 535

The following should be constantly maintained in a perfect state of maintenance and functioning in the premises allocated to the rescue team :

(a) autoprotecting breathing apparatus able to function autonomously for at least one hour, and at least equivalent in number to the strength of the rescue team;

(b) apparatus for artificial respiration;

(c) masks with a filter against harmful gases which may be encountered, in number at least double that of the strength of the team;

(d) electric safety lamps, in number at least equivalent to the strength of the team, increased by 50 % if there is no lamp room, as well as fire-damp lamps and signalling apparatus, at least one unit for each gas known to be present or suspected, and for each group allocated;

(e) tarpaulins and flexible hoses for emergency barriers, and for activating ventilation circuits;

(f) tools, ropes and anything which may be necessary for the rescue operations;

(g) fire-proof protective clothing.

The breathing apparatus and masks must have a sufficient stock of parts for the consumable elements.

When the number of items of apparatus and rescue appliance is not clearly stated in this regulation, it is the responsibility of the chief engineer to lay this down in an instruction, after consulting with the manager and taking into account the characteristics of the mine.

The rescue appliances and apparatus referred to in (a), (b), (c), and (e) must be of approved type.

Once a year, on the initiative of the Mining District it is necessary to carry out a check of the rescue appliances and apparatus, verifying their number and condition of maintenance.

The maintenance of the autoprotecting apparatus must be carried out by a workmen specially appointed for this purpose.

Article 536

The members of the rescue team must be instructed in the functioning of the breathing equipment and instruments for checking the atmosphere below ground, and trained to carry out, while transporting the apparatus on their backs,any operations likely to become necessary in a mine in the event of accident.

Article 537

The members of the rescue team must complete periods of instruction and training at the places and in accordance with the methods indicated by the manager.

The rescue teams must undergo drills below ground at least once a month. The drills carried out, the names of the persons taking part and the findings thereof, must be noted in a special register, with the date and signature of the head of service in charge of the rescue team.

Testing of apparatus

Article 538

The functioning of the autoprotecting breathing apparatus and other rescue apparatus and clothing must be checked, on the initiative of the management, at least once a month. The results are recorded in the register.

Association between adjacent mines

Article 539

The operators of mines employing less than 100 below ground workers on the largest shift can be authorised, by a decision of the chief engineer, to associate themselves with those of adjacent mines, with a view to forming a common rescue team.

The instructions relating to the instruction and drills of the members of the common team must be approved by the chief engineer.

Central rescue station

Article 540

For the mines referred to in the previous article, the Minister for Industry and Commerce may, at the proposal of the chief engineer, prescribe the creation of a common central rescue station.

Rescue operations

Article 541

If, at the time it is required to go into action, the effectiveness of the rescue team is shown to be indequate, the manager shall request the intervention of teams from other mines.

The managers to whom this request is addressed, must place their rescue teams at the disposal of the person making the request.

HEADING XVI, Article 656 - 658

"Rescue operations"

Article 656

In mines or quarries, the rescue operations and work necessary to counteract imminent danger must be carried out on the initiative of the manager.

In the event of serious accident, the managers of the adjacent mines or quarries shall be required to supply the means and personnel at their disposal and, in case of need, to take the necessary measures within the sphere of their respective mines or quarries, subject to their right to equitable reimbursement. The operations referres to in the preceding sub-paragraphs shall be carried out under the supervision and with the approval of the chief engineer, or a subordinate appointed by him, when they are present.

Article 657

In the cases referred to in the previous article, the mayor of the parish and the public safety authority shall take the essential measures within their competence, in agreement with the engineer and with the specialist of the Mines Authority until the arrival of these latter, after having sought the opinion of the management of the mine or quarry where the activities mentioned in the previous article are taking place.

Article 658

The costs resulting from the immediate aid given to the victims of accidents and from the execution of the rescue work, also payments against requisition of equipment, motor cars and other emergency means, shall be the responsibility of the operator of the mine or quarry.

The accounts relating thereto shall be passed forward for payment by the prefect, at the proposal of the chief engineer, after audition of those concerned, and subsequently forwarded for collection of direct taxation for recovery by the preferential tax procedure.

ANNEX VII

E I G T H R E P O R T

OF THE "MINE RESCUE SERVICES AND MINE FIRES" WORKING PARTY CONCERNING THE ORGANISATION OF THE MINES RESCUE SERVICE FOR 1969/70

(Approved by the Mines Safety Commission
at its Plenary Session of 25 January 1972)

CONTENTS

Introduction

I. This, the 8th report on the organisation of the mines rescue services in the countries of the European Community and the United Kingdom for the 1969 and 1970, shows how just as in the earlier reporting periods the rise in the total number of rescue stations and trained personnel is closely related to the demands made by technical developments. These developments are necessarily aimed at increased concentration of workings and ever production units.

As of 31 December 1970, the number of rescue stations fell from 203 in 1968 to 187, and the personnel decreased from 11 198 in 1968 to 10 084. The total number of rescue personnel, per 1 000 men employed underground, has risen slightly from 20.5 in 1968 to 21.1.

II. 1. Within the programme of visits to mines rescue head-quarters, which included Essen, Nottingham and Mansfield (East Midlands Division), Lens (Nord/Pas-de-Calais), Friedrichsthal (Saar) and Merlebach (Lorraine), a visit was made to the mine rescue headquarters in Seruci (Sulcis Division).

The working party for "Mines Rescue Service and Mine fires" was thus able to obtain first-hand information on the safety equipment and rescue facilities, and also fire precautions and firefighting arrangements at Seruci colliery. The workings here are extensively mechanised and electrified.

2. The "Mines Rescue service and mine fires" Working party was able to complete some of the tasks assigned to the experts and listed in the Fifth and Seventh Reports on organisation of the mine rescue service.

Although this aspect of the work will be described in the annual reports of the Mines Safety and Heath Commission, *(1)* some particular items are worthy of mention, published under the titles listed below :

(i) Underground use of foamed polyurethane in coal mines (Annex VI to 7th Report of Mines Safety & Health Commission, September 1970)

(ii) Results of research into possible improvements in breathing apparatus (Annex VI to 8th Report of the Mines Safety & Health Commission, June 1971)

(iii) List of experts and apparatus available for rescue bore holes, both from the surface and below ground, as of 1 January 1971 (Annex III to 8th Report of the Mines Safety & Health Commission, June 1971).

(iv) Compilation of Regulations and Directives for mine rescue services in the European Community and United Kingdom (Doc No. 3845/1/71 dated 26. March 1971 *(2)* which will be published in the 9th Report of the Mines Safety & Health Commission, 1972).

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(1) The last report (8th) of the Mines Safety & Health Commission was published in June 1971 and can be obtained, as can all reports on mine rescue organisation , free of charge from the Secretariat of the Mines Safety & Health Commission of the European Communities, Luxembourg, 29, rue Aldringen.

(2) Doc. No. 3845/1/70 can be obtained free of charge from the Secretariat.

A - 1) ORGANISATION DU SAUVETAGE DANS LES MINES

Postes de sauvetage et sauveteurs

Situation : 31 decembre 1970

PAYS	République fédérale d'Allemagne			France			Belgique				Italie	Pays-Bas	Royaume-Uni	Nombre total
Bassin	Ruhr	Aix-la-Chapelle	Sarre	Nord Pas-de-Calais	Lorraine	Centre-Midi	Borinage	Charleroi/ Namur	Liège	Campine	Sulcis	Limbourg		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
a) Siège de la Centrale de sauvetage (domaine de compétence a)	Essen-Kray 1,2,4,5,6,	Höngen-Mariadorf 1,2,4,	Friedrichsthal 1,2,3,4,6,	Lens 1,2,4,6,	Merlebach 1,2,3,4,6,	(+)	Hensies 1,2,4,	Marcinelle 1,2,3,4,5,6,	Glain 1,2,3,4,	Hasselt 1,2,4,6,	Miniera Seruci 1,2,4,5,	(++)	(+++)	
b) Nombre de postes de sauvetage	69	5	9	32	9	22	1	1	1	6	1	5	A = 13 B = 13	187
c) Nombre de sauveteurs	3 949	262	578	426	451	823	21	142	106	271	34	279	2 742	10 084
d) Nombre total du personnel inscrit au fond	123 981	11 640	15 712	41 605	14 916	14 773	1 001	7 035	3 900	15 189	785	6 462	221 188	478 187
e) Sauveteurs par 1 000 personnes inscrites au fond	31,9	22,5	36,8	10,2	30,2	35,7	21,0	20,2	27,1	17,8	43,3	43,0	12,3	21,1

(+) Pour le bassin du Centre-Midi - Dans le bassin du Centre-Midi, il n'existe pas de poste central de sauvetage.

(++) Pour les Pays-Bas - Dans le bassin du Limbourg, il n'existe pas de poste de sauvetage.

(+++) Pour le Royaume-Uni - Chaque station de sauvetage dessert normalement les mines se trouvant dans un rayon de 15 miles. Elles sont subdivisées en postes de sauvetage du "Plan A" et postes du "Plan B"

- Les postes du "Plan A" : Ce sont ceux ayant (en plus du responsable , de son adjoint et des instructeurs) leur propre corps permanent de sauveteurs dont les membres habitent à la station ou à proximité. Ils sont assistés par un certain nombre de sauveteurs à temps partiel dans les mines desservies par le poste.

- Les postes du "Plan B" : Ce sont ceux qui ont un responsable, un responsable adjoint et des instructeurs mais pas leur propre corps de sauveteurs vivant à la station ou à proximité. Ces stations disposent de sauveteurs à temps partiel travaillant dans les mines desservies par la station. Ils sont organisés en brigades.

a) Domaines de compétence :

Numéros de désignation :

1 = Organisation du sauvetage
2 = Surveillance des sauveteurs et des postes de sauvetage
3 = Service de permanence de sauveteurs
4 = Formation
5 = Examen d'agrément des appareils de sauvetage
6 = Travaux de recherche dans le domaine du sauvetage

A - 2) ORGANISATION DU SAUVETAGE DANS LES MINES

ETAT DE L'EQUIPEMENT AVEC DES APPAREILS RESPIRATOIRES A CIRCUIT FERME D'UNE DUREE DE FONCTIONNEMENT DE DEUX HEURES AU MOINS

Situation 31 décembre 1970

Pays	République fédérale d'Allemagne			France			Belgique				Italie	Pays-Bas	Royaume-Uni	Nombre total
Bassin	Ruhr	Aix-la Chapelle	Sarre	Nord Pas-de-Calais	Lorraine	Centre-Midi	Borinage	Charleroi Namur	Liège	Campine	Sulcis	Limburg		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Type d'appareil														
a) Dräger BG 160 A	546	41	159	-	98	-	11	14	22	81	44	20	-	1036
b) Dräger BG 170/400	679	22	-	-	-	-	-	2	6	39	9	-	-	757
c) Dräger BG 172	765	19	29	-	37	-	20	34	20	14	-	48	-	976
d) Dräger 174	235	51	36	-	90	-	-	-	-	4	-	-	-	416
e) Dräger KG 210	-	-	-	-	-	-	-	-	6	-	13	-	-	19
f) AUER NR 11/32	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g) AUER NR 54/400	16	1	-	-	-	-	-	-	-	-	-	66	-	83
h) AUER NR 56/400	62	1	-	-	-	-	-	-	-	-	-	-	-	63
i) FENZY 56	-	-	-	369	-	308	-	-	-	5	-	-	-	682
j) Pirelli 45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
k) Pirelli 205	-	-	-	-	-	-	-	-	-	2	-	-	-	2
l) BBM Aerecheon	-	-	-	-	-	-	-	-	-	2	-	-	-	2
m) BBM Aerophor	-	-	-	-	-	-	-	-	-	-	-	-	96	96
n) Proto	-	-	-	-	-	-	-	-	-	2	-	-	724	726
o) Savox	-	-	-	-	-	-	-	-	-	-	-	-	86	86
p) Normalair	-	-	-	-	-	-	-	-	-	2	-	-	-	2
q) Aerorlox	-	-	-	-	-	-	-	-	-	2	-	-	600	602
r)														
TOTAL	2303	135	224	369	225	308	31	50	54	153	66	134	1506	5548
Par groupe de 100 sauveteurs	58,3	51,5	38,7	86,6	50,0	37,4	150	35,2	50,9	56,5	194,1	48,0	54,9	55,0

B - NOMBRE D'INTERVENTIONS DE SAUVETEURS UTILISANT DES APPAREILS RESPIRATOIRES A CIRCUIT FERME

Années : 1969 et 1970

Causes	Coup de grisou ou de poussières			Dégagement de gaz naturels			Incendies de mines			Feux de mines			Ouverture de barrages			Causes diverses			Total		
Bassins	a)+	b)++	c)+++	a)+	b)++	c)+++	a)+	b)++	c)+++	a)+	b)++	c)+++	a)+	b)++	c)+++	a)+	b)++	c)+++	a)+	b)++	c)+++
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1. Ruhr	-	1	31	1	37	659	-	7	933	-	12	795	-	11	5 353	-	4	41	1	72	7 812
2. Aix-la-Chapelle	-	1	452	-	10	36	-	-	-	-	-	-	-	1	5	-	-	-	-	12	493
3. Sarre	-	-	-	-	4	23	-	-	-	-	-	-	-	-	-	-	10	138	-	14	161
4. ALLEMAGNE	-	2	483	1	51	718	-	7	933	-	12	795	-	12	5 358	-	14	179	1	98	8 466
5. Nord/Pas-de-Calais	1	1	20	-	1	10	-	-	-	-	-	-	-	-	-	1	-	10	2	2	40
6. Lorraine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	-	1	12
7. Centre-Midi	-	-	-	-	4	20	-	2	49	-	6	781	-	2	74	-	4	20	-	18	944
8. FRANCE	1	1	20	-	5	30	-	2	49	-	6	781	-	2	74	1	5	42	2	21	996
9. Borinage	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Charleroi-Namur	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	6	-	2	6
11. Liège	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12. Campine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13. BELGIQUE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	6	-	2	6
14. ITALIE (Sulcis)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15. PAYS-BAS (Limbourg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16. ROYAUME-UNI	-	1	4	-	-	-	-	2	98	-	17	1 004	-	6	173	-	10	82	-	36	1 361
17. COMMUNAUTE + ROYAUME-UNI	1	4	507	1	56	748	-	11	1 080	-	35	2 580	-	20	5 605	1	31	309	3	157	10 829

a)+ Interventions pour le sauvetage du personnel.

b)++ Intervention pour le sauvetage du matériel.

c)+++ Nombre de cartouches d'épuration de l'air utilisées au cours de ces interventions.

C - ACCIDENTS SURVENUS AUX SAUVETEURS PORTANT DES APPAREILS DE PROTECTION CONTRE LES GAZ

Années : 1969 et 1970

BASSINS	Dans les cas d'accidents graves		A l'exercice	
	avec suite non mortelle	avec suite mortelle	avec suite non mortelle	avec suite mortelle
(1)	(2)	(3)	(4)	(5)
1. Ruhr	-	-	-	-
2. Aix-la-Chapelle	-	-	-	-
3. Sarre	-	-	-	-
4. Allemagne	-	-	-	-
5. Nord/Pas-de-Calais	-	-	-	-
6. Lorraine	-	-	-	-
7. Centre-Midi	-	-	-	-
8. France	-	-	-	-
9. Borinage	-	-	-	-
10. Charleroi-Namur	-	-	-	-
11. Liège	-	-	-	-
12. Campine	-	-	-	-
13. Belgique	-	-	-	-
14. Italie (Sulcis)	-	-	-	-
15. Pays-Bas (Limbourg)	-	-	-	-
16. Royaume-Uni	-	-	-	-
17. Communauté + Royaume-Uni	-	-	-	-

D. SUPPLEMENTARY DETAILS AND DATA INCLUDING NOTABLE CHANGES COMPARED WITH REPORTING YEARS 1967 AND 1968

I. FEDERAL REPUBLIC OF GERMANY

1. Mine Rescue Service Headquarters, Essen-Kray

(a) Re A.1) : Stations and personnel

No change

(b) Re A.2) : Closed-circuit breathing apparatus

There has been a slight change in the total amount of closed-circuit apparatus held, in that the proportion of apparatus giving four hours' service stands close to 77 %. Oxygen units of the obsolescent Drager BG 160 A type is being replaced as required by the new Drager BG 174, of which 235 are already in stock. Equipping the rescue teams with oxygen self-rescuers of the Drager Oxy-SR 45 type has continued. By the end of 1970 there were 317 of these devices in the rescue stations.

(c) RE B : Number of operations in serious cases

The number of operations carried out by the rescue teams within the reporting period has risen from 67 to 73 as a result of increasing cases in stale air (travelling stopped-off workings). The total number of mine fires has fallen; this is predominatly so in the case of spontaneous combustion. This must be attributed to improved stopping-off techniques and monitoring of abandoned workings, together with roadside packs accompanying the workings, concentration of mining operations and the decreasing number of workings in steep measures.

There has been an increase in the number of fires started by extraneous means. The reason for this is the rise in belt-road fires. The numerous operations aimed at recovering panels or parts of panels endangered by fire involved a great deal of preparatory work. In all cases the teams had to work under the worst climatic conditions which made great demands on the men involved.

The annual reports for 1969 and 1970 from the Essen HQ provide details of these operations. The annual reports will be sent out to members of the Working Party.

(d) RE D : Research and development results

Breathing apparatus

The final report on research into improvements to breathing apparatus carried out by the Hasselt Headquarters (Belgium) and Liege University on behalf of the Commission of the European Communities was laid before the Mines Safety & Health Commission.

By Command of the Minister of the Interior of the land North-Rhine Westphalia, the following breathing apparatus has been tested for use by fire brigades :

Drager Compressed-Air breathing apparatus PA 54/1800 S
Drager Compressed-Air breathing apparatus PA 38/1600
Matter Compressed-Air breathing apparatus UH 44
Drager Oxygen Protection apparatus TRAVOX 120

Filter-type self-rescuers

The "Plastics Tests Definitions" issued by the Mines Inspectorate, Dortmund, on 4 November 1966 stipulate that filter self-rescuers be tested in respect of the protection they give against the presence of fire decomposition products before plastics may be used. A new test rig was built at the Essen HQ in the reporting period. In all, 11 evaluations from this sector have already been issued on behalf of the Mines Inspectorate.

Once filter self-rescuers fitted with heat exchangers had been developed, the Dortmund Mines Inspectorate demanded that they be used. Filter self-rescuers without exchangers can be used up to the end of 1972 provided that a re-equipment plan is made out, detailing the changeover from apparatus without heat exchangers to the new types fitted with the exchangers. The plan has now been worked out in collaboration with the inspectorate, the collieries and the Rescue Headquarters; the replacement programme is already in hand.

398 filter self-rescuers have been used in 34 cases (mine fires and the like) in the reporting period.

Dust filters

By a decision of the German Mines Rescue Service Committee in 1969, the Essen Headquarters became the responsible centre for approving dust-filters to be used on the surface. To date six filters from various manufacturers have been approved.

Sampling tubes

Trials were successfully concluded in respect of the hydrogen sulphide tube H_2S/c and nitrogen tube NO_2/c from Dragerwerk AG, Lübeck, and also the carbon dioxide tube CO_2-0.1%-GT developed by the Auergesellschaft GmbH Berlin.

Prevention and control of mine fires

Trials with the "Blitzdammer" composition, started in the last quarter of 1968, have in the meantime been concluded. Good "pumpability", negligible shrinkage and rapid setting time render this material suitable for roadside packs and also for stoppings.

In the third quarter of 1970, a start was made with a test programme on the hydro-mechanical plaster procedure for stoppings and fire dams at the Essen Headquarters. Operational trials are still in progress.

A total of 42 decisions was taken with regard to fire protection underground; of these 18 dealt with means to prevent fires affecting ventilation, with special reference to downcast ventilation. The increasing number of fires within the area covered by the Essen Headquarters area resulted in the setting-up of a study group to handle "Belt fire hazards" at the end of 1970, assisted by the Essen Headquarters. The aim of the group is to develop, in collaboration with the manufacturers, a new laboratory method for testing rubber belts for non-flammability.

The Landesoberbergamt(Provincial Mines Inspectorate) of North-Rhine Westphalia has completed a draft of Regulations for Stopping-off and Damming workings in coalmines.

(e) Plans and directives

The Essen Headquarters has revised or re-issued the following comments :

Supplement to "Regulations for approval and construction of automatic Mine fire extinguishers (BuT)" dated 31 March 1960, by Section 34 : "Automatic Dry Powder Extinguishers for Underground Use", dated 30 May 1969.

List of Specialists and Apparatus for Rescue Bores from the Surface, as of 1 January 1970.

Plans for assisting Mine Rescue Services in the Essen Headquarters area, as of 1 May 1970.

Provisions for rescue operations (model alarm plan), 12 October 1970.

2. Friedrichsthal Headquarters (Saar)

(a) Changes in establishment

Closure of the rescue station at Velsen on 1 March 1969 reduced the number of stations in the Saar coalfield from 10 to 9.

(b) Regulations, plans, operating procedures

The following regulations, plans and procedures within the competence of the Headquarters were revised or re-issued in the reporting period in the rescue, fire and explosion sectors :

1. Mine rescue teams procedure dated 4 February 1969.

2. Hydromechanical plaster dams (practical introduction to fire dam construction), September 1969.

3. Master Rescue Plan as of 1 March 1970.

4. Principles of Gas Protection, 24 July 1970.

5. Procedures for Gas Protection Teams, 23 September 1970.

(c) Re D : Research and development

CO meters and alarms

Following on the successful conclusion of the largescale tests of CO measuring and alarm instruments in 1968, a systematic start has been made with equipping underground workings with apparatus of this kind. Districts equipped with CO meters and alarms have no longer to be inspected on rest days for traces of possible fires.

Hydro-mechanical plaster damming

The Saaralit-Bergbaugips-Verfahren (Saaralit-Mining Plaster Method) has been used within the reporting period in the following sectors :

(i) driving through blockages due to roof falls in roads and faces (filling the caved area);

(ii) filling cavities alongside gate-roads to prevent build-up of CH_4.

(iii) lining roads to prevent ventilation creep.

(iv) making air crossings.

Bentonite-$CaCl_2$ Pulp

For the first time in the Saar, bentonite-$CaCl_2$ pulp was used to control a latent fire by sealing off a coal pillar which had been loosened up by rock pressure, close to the seat of the fire. The bentonite-$CaCl_2$ paste was prepared with special additives and stirring equipment in the paste shop at Luisenthal Colliery to give a stable-structure compound which was carried in 1400-litre paste cans to the point of use and there injected by means of a high-pressure Hauhinco, 300/55 PAS, paste pump in conjunction with the paste hose NW 25 and infusion sonde.

II. FRANCE

(a) Re A.2 : Closed-circuit breathing apparatus

Rescue stations in the Centre-Midi coalfield have been equipped with 45-minute oxygen self-rescuers. These comprise 306 of the FENZY 66 type, and 50 of the Inter-Techniques I.T. 40 design.

(b) Re B : Number of operations in serious incidents

The operations related to the following :

(i) 4 February 1970, a firedam explosion at shaft 6, Courrieres, (16 dead and 11 seriously injured);

(ii) 21 August 1970, stale air from old workings at Lemay colliery (no victims, erection of a dam);

(iii) 3 November 1970, search for two men after an inrush of water in a rise heading at Lievin Colliery (breathing apparatus used, as local ventilation had been put out of order by the water);

(iv) 17 December 1970, ignition of firedamp in a crosscut heading at shaft 3, Courrieres (no casualties, water used to fight the fire).

(c) Re D : Research and development

In collaboration with CERCHAR and the Essen-Kray Mines Rescue headquarters, the Merlebach and Lens stations examined possible improvements in large-hole drilling from below ground to rescue trapped personnel.

This programme is still in progress. Appendix I gives details of the stage reached in the programme in the Lorraine coalfield.

Closed-circuit oxygen apparatus, FENZY M

Appendix II describes the apparatus, and experiments with it.

Gypsum applications underground in the Lorraine coalfield in 1970

4,170 tons of gypsum was used in 1970 for :

- 45 dams to close off abandoned panels (2,732 t);
- filling-in 11 caved areas (738 t);
- sealing-off 2 roads (700 t).

In all, 57 workings were processed using the mixer pump from the Mine Rescue Headquarters.

The following performance figures were achieved :

- 90 m vertical and 120 m horizontal range;
- 600 m pump lift (descending) per dam;
- sealing between tubbings and supports in a road (12 m^2), using 599 t gypsum, carried out by two PUTZMEISTER units, in 10 shifts, including installation;
- Mohno 4 NE 50 pump performance : - 10 t/hr (63 t in 6 hrs with a lift of 120 m);
- performance of the PUTZMEISTER KK 139 : 9 t/hr;
- performance of the PUTZMEISTER KA 139 : 6 t/hr.

All operations were carried out by colliery personnel supervised and assisted by Rescue Headquarters staff.

III. BELGIUM

(a) General

The Frameries Headquarters has shut down now that practically all collieries in the Borinage division have been closed, except the Hensies-Pommeroeul colliery.

The Inspectorate only permitted the Headquarters to close as of 1 January 1971 on condition that a special Headquarters would be placed at the disposal of Hensies-Pommeroeul colliery. Assistance can also be obtained from the Marcinelle headquarters, which is the nearest to the Hensies headquarters.

Marcinelle Headquarters has expanded its activity in terms of equipment, training etc to take in branches of industry other than coalmining.

(b) Re D : Research and development

Breathing apparatus

As mentioned above, the joint project dealing with physiological conditions involved in the wearing of breathing apparatus and financed by the Commission of the European Communities has now been brought to a close. The Hasselt Coordination Centre played an important part in this research programme. It was also responsible for co-ordinating the three Institutes involved in the project, and for compiling the report dealing with the results.

Rescue operations at high temperatures and in difficult climatic conditions

The Co-ordinating Centre made a comparison between the effectiveness of various methods and equipment used to cool men working at high temperatures.

Work under difficult climatic conditions

A medical study has been carried out in collaboration with the medical faculty of Louvain University into the behaviour of men working in difficult climatic conditions.

Controlling a tip fire

A fire extending over an area of 4 hectares was extinguished with the aid of a layer of cement and lime, followed by a gypsum layer, applied after the area of the fire had been sprayed with water.

The extinguishing operations lasted 44 days.

IV. UNITED KINGDOM

(a) Re A.1) Rescue stations and personnel

The Heriot Watt station in Edinburgh was closed during the year and transferred to a new modern building in Lingerwood, south of Edinburgh. Work began on two new stations in the second half of 1970 to replace two extremely old stations in the Midlands area.

(b) Re A.2) : Closed-circuit apparatus

In the second half of 1969 and the beginning of 1970, 600 Aerorlox Liquid Oxygen apparatus were delivered. 24 rescue stations each received 25 sets of equipment. During 1970 all rescue personnel were trained in the use of the equipment. The stations using the Aerorphor liquid oxygen equipment were equipped with Aerolox apparatus in 1970. Stations using the "Proto" type apparatus will be issued with Aerorlox apparatus in the middle of 1971. The Proto apparatus using compressed oxygen will be retained for the first teams to go underground because of their immediate availability.

(c) Re D : Research and development

The plan envisaging all pits fitted with self-rescuers was nearly complete by the end of 1970.

By the middle of 1971 every underground worker will have his own apparatus and will be trained to use it.

Systematic advanced training in the use of the apparatus will be carried out at all collieries.

Mines rescue competitions

Competitions are held yearly at some stations between rescue teams. Competitions of this kind promote interest in the rescue teams and increase their efficiency.

ANNEX I

LOCATION AND RESCUE OF TRAPPED MINERS

(Lorraine coalfield reports on the state of reserach to date)

I. LOCATING THE TRAPPED MINERS

In order to rescue the men, a method must be devised by which they can be located as accurately as possible. We have carried out a number of experiments to solve this problem and have been able to formulate the technical aspects of the apparatus involved with a fair degree of precision.

Thus during 1970 we extend the location range from 20/40m to 60/80 m.

This gives us reason to view optimistically the possible extension of this to even greater ranges.

Experiments on 20 March, and 6 June 1970

Without pre-amplifying, we were able to locate knocking signals through the rock over distances between 20 and 40 m. Electrical noise interfered with the readings of our instruments (light-pen recorder, magnetic tape recorder).

It became clear that the pre-amplifier was not powerful enough to deal with distances of the order of 100 m.

We consulted the "Communications Office" with the object of testing the SANGAMO tape recorder with six tracks and one acoustic track; they informed us of experience gained by the CIMEL ELECTRONIC in locating seismic noises.

Experiments on 17 October, 1970

Similar situation : Merlebach colliery, 826 metre level, first North-east panel between seams Erna 3 and Frieda 1.

The layout comprised : 6 geophones resin-bonded to strata bolts in the roof of Erna 3 (in the previous test they were wedged into boreholes).

Four of these geophones were of the 7.5 Hz type (CIMEL detectors 1,2,3,4) and the other two (Geo-Space 5 and 6) were of the 28 H7 type.

The four first-mentioned geophones were coupled to CIMEL pre-amplifiers with controlled dynamics (60 to 100 dB). The pre-amplifiers passed their output signals via the Sangamo recorder and Hartmann and Braun voltage amplifiers to the light pen, whereas the other two detectors (5 and 6) passed signals directly to the pen.

In the first few tests it became apparent that the amplifiers with H and B differential input upset the reading by noise; though this was not the case with the CIMEL pre-amplifiers. The interference was due both to the amplifiers themselves (transistor noise) and their cross-linkages.

In the second series of tests, the Hartman and Braun amplifier system (detectors 5 and 6) were disconnected, and the knocking signal from the various points were recorded on the Sangamo instrument. It was found that these recordings were superior to those from the preceding test. Noise here was reduced to a normal level (around 0,3 μV), whilst mechanical noise was reduced by cutting out the local booster fan situated a few metres away from the detectors.

CONCLUSION

Our experiments have shown that amplifiers used must have minimum noise and that the mechanical connection between the rock and the detector must be of a superior quality.

II. BOREHOLE FOR FIRST CONTACTS

(a) Bore

Longyear equipment for sinking the first contact bore was ordered as follows :

First case : drilled both ways with NQ-U-rods;

Second case : difficulties may occur

- drilling partly by NQ U (75.7 m.m. external dia) rods;
- the NQ U rods are retrieved and replaced by a BX casing (63.5 m.m. internal dia);
- drilling continued with BQ U (60 m.m. external dia).

(b) Containers

Canister for food, medicaments, essential support material etc., consist of the total inner core of 3 m and a pointed cap placed on an adapter (NQ U) or a BQ U tube (43 m.m. external dia).

The overshot used to retrieve the canisters, in the same way as the inner core barrel during drilling.

Container operations presented no problems.

(c) Telephone

Two self-locking drive heads (NQ U/BQ U) are being tested at present, which are drilled to accept the electric connecting cable, and have oblique edges to prevent the telephone container from being slung out of the NQ U or BQ U tube.

The head will be tested to see whether it is suitable for leading the nylon rope into the trapped men so that they can erect the sheave for returning the rescue canister to the surface through the rescue hole.

We feel that the cable telephone should only be a temporary solution. Attempts to use the drill rods as a wave carrier proved positive (3 April, between main roads North on 545 m and 686 m levels in the Reumaux seam at Merlebach); a casing with outside diameter of 125 mm, such as we used for our externally-fitted transceiver, provided us with an extremely satisfying connection, at 210 kc/s.

CERCHAR will use these data to design a transceiver to be coupled to a NQ rod (60.3 mm internal dia. and 69.9 mm external dia).

In the meantime tests will be carried out on :

- a battery telephone (CERCHAR),
- a sound-powered capsule telephone (PCS).

These will be removed from the NQ U and BQ U tubes to make room for the containers.

To cut down on the work here, we plan to run the permanent carrier wire between the NQ U (60.3 mm internal dia) and BQ U (55.5 mm external dia) tubes so that the inside of this tube (46 mm internal dia) will remain free for the containers (43 mm internal dia).

The reliability of the method has yet to be tested, as it is possible that the correcting cable may be parted.

III. RESCUE HOLE MACHINE

Analysis of the P 30 drill with extensible, rotary and retractable stand and with the necessary equipment for a 486 x 508 mm external diameter casing showed that the success of any recovery operation depends on the following factors :

- time taken to open out the recess and install the machine together, with its degree of complexity (two assemblies are fixed using 50 rock bolts, 1.20 to 2.40 m);
- the drilling technique used at the moment (drilling upwards under pressure with danger of the rod buckling).

If the P 30 is replaced by a more suitable machine, and if the compressed-air drill from Soding and Gebarth is exchanged for a hydraulic reamer with tie-rod transmission, the savings in terms of work involved are as under :

- driving the recess 25%
- installing the drill 30%
- drilling 40%
- casing 30%

We haved asked the Institut Français du Petrole to supply us with the addresses of modern drill manufacturers.

IV. RESCUE CANISTER TRAVEL IN THE CASED HOLE

4.1. Casing

Once it had been completed,the hole was cased three times using smooth 486 x 508 mm tubes not sealed at the joints, with an "Erdol" thread having six turns per inch and a taper of 6.25%.

These inside and outside threads were only screwed in to between 50 and 80% of their length, as they had seized owing to irregular movement of the drill.

Provided nothing unforeseen occurs, drilling performance should reach to 6 m/hr.

We noted that the winch ropes tended to tangle due to faulty hydraulic brakes when the single lenghts of casing started to turn.

We have continued research into ways of overcoming the following difficulties :

(1) Seizing of the tubes : a differential feed device is to be powered off the drill itself;

(2) Tangling of the ropes; 6 turns to the inch threaded tubes are to be replaced by four turns to the inch tubes, packed at the joints.

4.2. Aligning the pipe string

This is best carried out with the help of the trapped men linked by telephone to the rescue team.

In the event of the trapped men not being able to help, the idea is to line the string up by means of a camera.

Contact has been made with POLAROID for the camera and with THOMSON-HOUSTON for the ultrasonics.

4.3. Fitting the haulage cable for the rescue canister

The nylon rope carried down with the winch drum has been used with success several times to fit the steel cable into the pulleys on the casing head, the return and tension stations, and also to the rescue canister itself.

This job takes two hours (60 m hole). If the rope breaks (fall of ground) then to these two hours must be added :

(a) five hours if the rope and canister and rods are to be fed in;

(b) one hour if the rope is lowered through the first-contact hole;

(c) half an hour if a replacement rope held in the head is run down.

Only (b) and (c) are acceptable.

4.4. Lowering and raising the rescue canister

This was carried out without any problems :

- the device used to steer the canister in the tube worked faultlessly;
- the cable tension was regulated without difficulty

The drive speed worked out at 0.50 m/sec.

We should point out, however, that the canister is too narrow for corpulent miners and the height, outside the road (2.6 m), must be reduced to more acceptable dimensions (e.g. 1.80 m).

4.5. Communications link between rescue team and trapped men

Satisfactory results were obtained with the shortwave transceiver, CERCHAR X and Y phones and an antenna mounted on a wind-in drum.

To avoid having to erect the antenna, which could also be cut during the operation, we plan to use the canister cable as the lead. We have approached SCHLUMBERGER with the object of borrowing from them a 70 m long 12 mm diameter test cable.

V. LOWERING AND RAISING IN AN UNCASED HOLE

This method should only be used when the trapped men are in great danger (e.g. falls in caved areas, etc.)

There are a number of possibilities here and selection must depend on the time available and the conditions :

(1) Pulley frame and drill are carried down in the container when the men cannot erect a pulley in the axis of the hole.

This method has not yet been tested and the equipment is undergoing trials at present.

(2) The trapped men attach a pulley which had previously been wound up in the rescue hole by means of the rope lowered down the first-contact hole.

Recovering the apparatus through the rescue hole is no problem. Tests are at present being carried out on introducing the nylon rope through the first-contact hole.

We consider that the entire operation would take three hours.

(3) The trapped men cannot help, so that the material is carried down in the rescue canister, in which is a member of the rescue team

This took 10 hours in our 60 m hole. For safety reasons, a doll was substituted for the team member during the descent of the canister in the uncased hole.

Film

A film is to be produced on the sections relating to "Rescue Canister Travel in a Cased Hole" and "Travel in an uncased hole".

VI. Colloquia, Visits - Para 2 of ECSC Agreement

April 1970 : visit of a Polish delegation, pit visit at Wendel to inspect the P 30 drill.

August 1970 : visit by Herr de la Touche, Director of "Service Technique de la Chambre Syndicale des Mines de Fer de France".

CONCLUSIONS

The experimental work to date has given a clear insight into the problem.

The tests have further shown that the basic principles are correct.

Which of the methods quoted is elected depends on whether the operation can be carried out without mishap, and just how much time is needed. An exhaustive series of tests is needed to confirm our assumptions.

Not until these tests have been carried out can an apparatus be developed which will be properly adapted to the problem in question.

ANNEX II

OXYGEN CLOSED-CIRCUIT APPARATUS FENZY - M

(Report from Lorraine coalfield on operating principle of the apparatus).

I. PRINCIPLE

The Fenzy M is a closed-circuit apparatus operating with compressed oxygen, regenerating the exhaled air and cooling the inspired air.

Oxygen is supplied to the wearer by :

- constant throughput from a 175 litre cylinder at 200 bars;
- underpressure inlet valve;
- hand-operated backup valve to supply oxygen as required.

Exhaled CO_2 is purified by a U-shaped caustic soda regenerator cartridge weighing 1.4 kg, and retaining most of the moisture.

Inspired air is cooled by a cooler with a 1.2 kg ice cylinder and a very large exchange surface.

II. GENERAL FEATURES OF THE PROTOTYPE

It is slightly smaller than the DRAGER BG 174.

In use, complete with caustic soda and ice, the apparatus weighs 12 kg, giving three hours service.

III. TESTS

The apparatus was tested for 45 hours 30 minutes at the Central Rescue Station as under :

Laboratory : (19 hrs in 8 single tests, rescue worker on a bicycle machine)

- oxygen supply
- CO_2 purification
- temperatures.

1) Oxygen supply (Reduction valve, automatic throughput etc.).

Oxygen pressure gradient amounts to 48.5 bars hr in the laboratory compared with 48.68 in use (Annex 1).

Gradient remains constant throughout total period of use (Annex 3).

It is virtually identical with the value obtained by the DRAGER BG 174.

Should the worker become breathless as a result of exertion, each breath he takes releases automatic flow and thus increases the consumption considerably, because of the deficient volume of the breathing bag as illustrated by an oxygen pressure drop of 6 bars/min (Annex 7).

2) CO_2 purification by the U-shaped caustic soda cartridge Residue remains constant throughout period of use.
The value at rest was 0,2%, 0,5% during work over period of 3 hours.

The automatic throughput switched itself in frequently because the outlet from the cartridge was clogged by liquid soda (Annexes 5 and 6).

3) Temperature

A feature of the apparatus is the slow rise in inspired air temperature due to the water and ice, which remained virtually constant in volume so that the temperature can be held at an almost fixed level (Annex 2).

4) Comfort

The apparatus fits snugly to the man's back and is streamlined to avoid obstacles.

It has been accepted by our rescue men who are working with both French and other foreign types of apparatus.

5) Strength

This is a robust apparatus with the exception of the brass sleeve round the U cartridge which could be improved : a good deal of repair work was needed here to avoid interrupting our test programmes.

IV. CONCLUSIONS

On the basis of these results, cooling the inspired air by the water surface is to be preferred to a dry-ice cooling action.

The simple mechanical construction of the apparatus (reduction valve is in 14 parts) is of advantage when it comes to maintenance and repair.

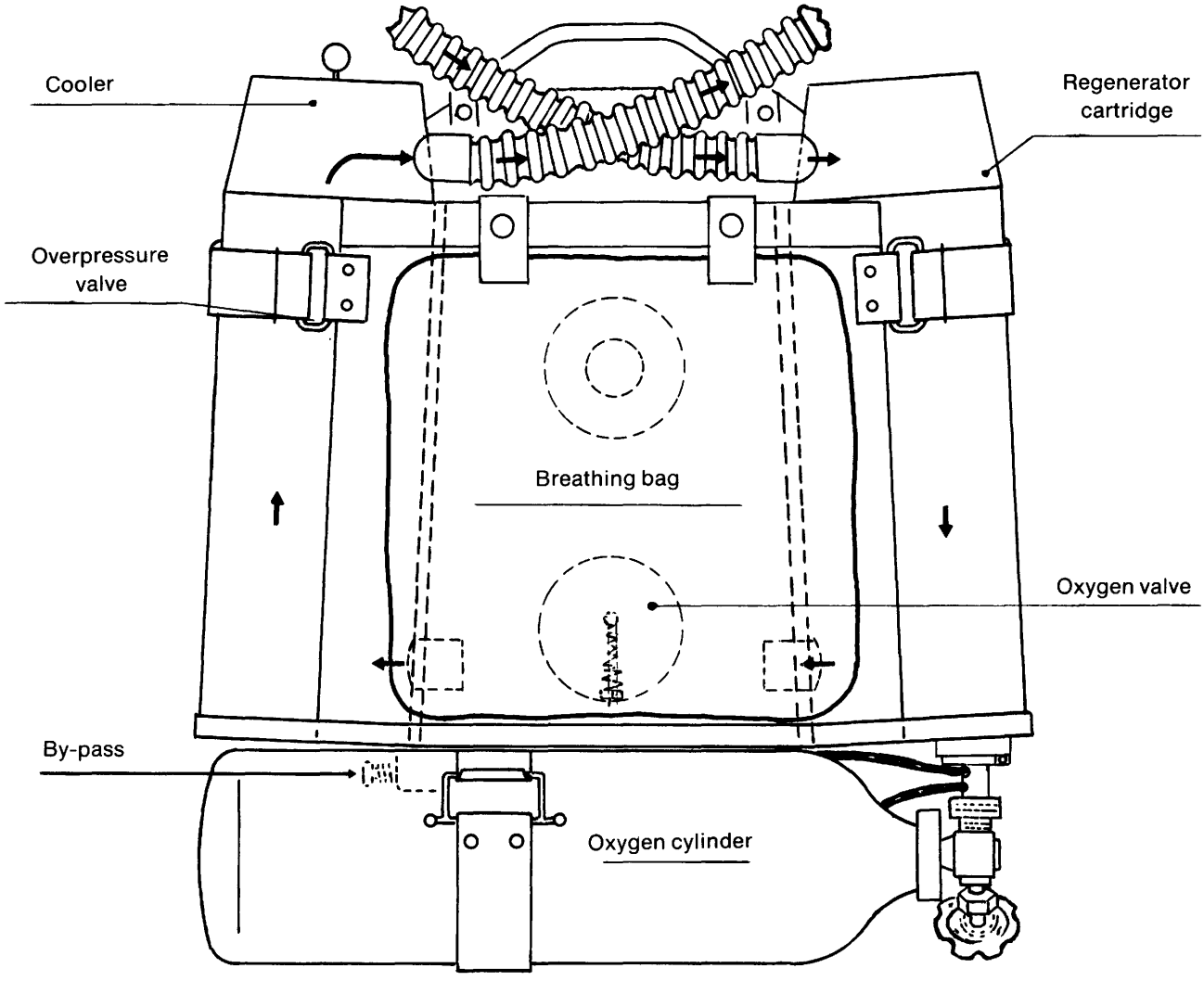
However, the manufacturer should look to these points :

- the volume of the breathing bag must be enlarged, and cartridge clogging prevented in order to prevent unintentional operation of the automatic throughput system.

- the pressure line should be protected against oxygen leakage.

Once fully developed, the apparatus must clearly rank with the best of the conventional foreign models.

FENZY M



(Annex II)

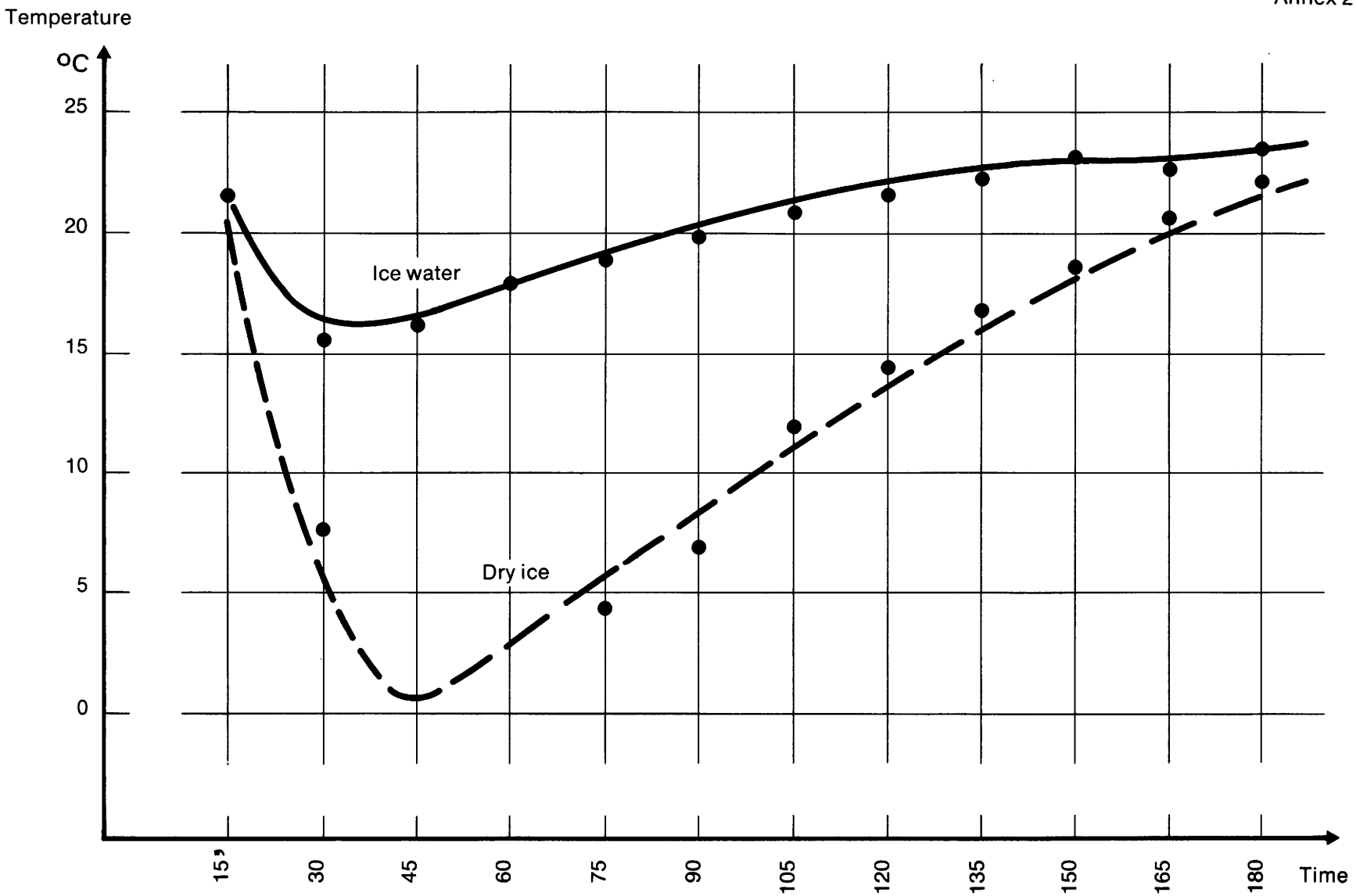
ANNEX I

Test Programme

Date	Duration	O_2 consumption
Laboratory		
12.01.71	2 hr	92 bars
20.01.71	3 hr	143
21.01.71	3 hr	134
27.01.71	3 hr	168
13.02.71	48 mn	38
15.02.71	70 mn	63
17.02.71	3 hr	148
24.02.71	3 hr	136
8 tests	19 hr	922
thus : 48.5 bars per hour		

Date	Duration	O_2 consumption
test chamber		
01.02.71	2 hr.	105 bars
02.02.71	1 hr.45	75
18.02.71	1 hr.45	90
23.02.71	1 hr.15	75
25.02.71	2 hr.	100
27.02.71	1 hr.	45
02.03.71	1 hr.45	95
08.03.71	2 hr.	90
11.03.71	1 hr.45	90
12.03.71	2 hr.	100
18.03.71	2 hr.	90
23.03.71	2 hr.	90
25.03.71	1 hr.30	70
26.03.71	2 hr.	95
06.04.71	1 hr.45	80
15 tests	26 hr.	1,290
thus : 48.680 bars per hour		

Annex 2



(Annex II)

ANNEX 3

Comparative throughput of reducation valve after 45 hrs 30 min operation.

Time	oxygen pressure				long-term throughput	
	cylinders		reduction valves			
	Test 1 12.1.71	Test 2 29.3.71	Test 1 12.1.71	Test 2 29.3.71	Test 1 12.1.71	Test 2 29.3.71
0 mn	200 bars	200 bars	5.7 bars	5.7 bars	2 litre/mn2	2 litre/mn2
15	182	182	5.2	5.1	1.80	1.82
30	169	170	4.8	4.8	1.68	1.72
45	157	160	4.5	4.5	1.57	1.61
60	147	148	4.3	4.3	1.51	1.53
75	137	137	4.2	4.1	1.44	1.45
90	127	128	4.1	4	1.36	1.38
105	118	118	3.9	3.8	1.31	1.32
120	109	106	3.8	3.6	1.20	1.27
135	100	98	3.7	3.5	1.20	1.22
150	92	90	3.6	3.4	1.15	1.15
165	85	82	3.3	3.3	1.10	1.12
180	77	72	3.2	3.2	1.04	1.07
195	69	65	3.2	3.1	0.99	1.03
210	62	55	3.1	3	0.95	0.99
225	54	48	2.9	2.9	0.91	0.97
240	47	41	2.8	2.8	0.89	0.93

ANNEX 5

FENZY M

17 February 1971

Wearer : STOLZ Jean-Baptiste — Badge No. 11 13

Colliery : SIMON L — Personal No. 811 132

Time		Temperatures		O_2		Bicycle machine (20 kg/m)
Single time	cumulative time	milieu	Fenzy M			
0	0	21.5	21	200	13	ice water
10	10	21.7	10.5	187	7	
5	15	21.5	10	180	10	
10	25	21.9	6.5	170	5	before 1250 g)
5	30	22	8.5	165	8	) - 150 g
0	40	21.7	2	157	5	after 100 g)
5	45	21.8	5	152	7	
10	55	21.8	3	145	5	
5	60	21.7	6	140	8	U Soda Cartridge
10	70	21.7	6.2	132	4	before 2,830)
5	75	21.6	9.3	128	7	) - 175
10	85	21.9	10.2	121	3	after 3,005)
5	90	22	12.5	118	6	
10	100	22	12.7	112	3	
5	105	21.9	15.5	109	6	
10	115	21.8	15.4	103	4	O_2 consumption
5	120	21.8	17.1	99	6	
10	130	22	17	93	3	
5	135	22	18	90	8	
10	145	22.2	20.2	82	4	
5	150	22	22.2	78)	20	continuous lung control
0	160	22	22.7	58)	6	cartridge clogged up
5	165	22.1	23.4	52)[78]	52	
10	175	22.1	23.2	0)		
5	180	21.9				

ANNEX 6

FENZY M APPARATUS

27 January 1971

Wearer : Hoffmann, Edmond

Colliery : Merlebach

Badge No. 559
Personal No. 367 334

Time		Temperatures		O_2		Bicycle machine (20 kg/m)
single	cumu-lative	milieu	Fenzy M			
0	0	20.2	20.5	205	13	
10	10	21	11.5	192	5	
5	15	21	14	187	9	ice water
10	25	21	13.7	178	4	
5	30	21	15.5	174	9	before 1070 g)
10	40	21.1	13.7	165	4	) -40 g
5	45	21	16.3	161	9	after 670 g)
10	55	20.9	15.5	152	4	
5	60	20.8	17.5	148	8	
10	70	20.9	17	140	3	soda cartridge
5	75	21	19	137	7	
10	85	21.2	17.2	130	4	before 2725 g)
5	90	21.2	19.4	126	8	) + 226
10	100	21	18.7	120	3	after 3011 g)
5	105	21.1	19.2	117	9	)
10	115	21.1	19.2	108	5	)
5	120	21.1	20.3	103	10	) consumption : 561 bars/hr
10	130	21.2	20.4	93	3	)
5	135	21.2	21.4	90	10	) release of automatic
10	145	21.6	21.4	80	5	) throughput 1 to 3 times
5	150	21.4	21.7	75	13	) per minute
10	100	21.6	21.2	62	3	)
5	165	21.7	21.7	59	18	)
10	175	21.8	21.1	41	4	)
5	180	21.8	22	37	6	) 7 bars/min
1	181	21.7	21.5	30		velocity : 30 km/hr

ANNEX 7

FENZY M - Ice Water

Wearer : MULLER from PCS - two hours

12 April 1971

Time		Temperatures		O_2		
single	cumu-lative	milieu	Fenzy			
0		21.4	15	200 bars		
10	10	22,5	14.6	185	5	ice water
5	15	22,6	14.1	180	5	before 1400)
10	25	22.9	14.6	173	7	lung control) 700
5	30	22.2	16.2	168	5	after 700)
10	40	22.4	18.2	159	9	Soda cartridge (U)
5	45	23	19.6	154	5	ice water as above
10	55	22.2	18.1	147	7	temperature = +8°2
5	60	22.4	21.8	142	5	lung control
10	70	22.8	20	138	4	
5	75	22.6	20.4	134	4	
10	85	22.5	20.2	128	6	
5	90	22.2	21.1	125	3	
10	100	22	21.4	119	6	
5	105	22.4	22.2	117	2	
10	115	22.8	23.4	110	7	
5	120	22.1	23.2	108	2	
3	123	22.2	23.6	90		39 automatic throughput pulses velocity : 30 km/hr 02 6 bars/min

ANNEX VIII

IMPLEMENTATION OF RECOMMENDATIONS OF THE MINES SAFETY AND HEALTH COMMISSION (AS AT 1.1.1972)

The recommendations, assessments, principles and reports prepared by the Mines Safety Commission since the beginning of its activities and distributed to the Governments and other interested bodies in accordance with its terms of reference, for further action or for information, can usefully be classified in five groups according to their date of issue :

A - recommendations set out in the 1st and 2nd Reports of the Mines Safety and Health Commission covering 1957-60, implementation of which was reported upon in the 3rd Report as at 1.1.1966 and in the 5th Report as at 1.1.1968,

B - recommendations set out in the 3rd Report of the Mines Safety and Health Commission covering 1961-65, implementation of which was reported upon in the same report as at 1.1.1966 and in the 5th Report as at 1.1.1968,

C - recommendations set out in the 4th Report of the Mines Safety and Health Commission covering 1966, implementation of which was reported upon in the 5th Report as at 1.1.1968,

D - recommendations set out in the 5th and 6th Reports of the Mines Safety and Health Commission covering 1967-68, implementation of which was reported upon in the 7th Report as at 1.1.1970, and

E - recommendations set out in the 7th and 8th Report of the Mines Safety and Health Commission covering 1969-70, implementation of which is reported upon for the first time in this the 9th Report as at 1.1.1972.

The following symbols are used in the tables :

C : The national regulations are already in accordance with the recommendations

C' : The recommendations have not been embodied in regulations, but have been implemented de facto

NRC : New regulations in accordance with the recommendations have been drawn up and issued

NRP : The preparation of new regulations in accordance with the recommendations is in hand

E : The preparation of new regulations is being studied

? : There is uncertainty regarding the steps to be taken

A : The national authorities have abstained from bringing their regulations into line with the recommendations.

To ensure a certain degree of uniformity with regular reports on the measures taken, the following survey shows not only those recommendations which aim at modifying regulations and to this end are indicated by the letters used for the purpose, but also those which need not be implemented by means of regulations or laws. These latter call for other modes of application.

The situation with regard to implementation of the above-mentioned recommendations and proposals is indicated, with explanatory notes, in the following tables.

A - Regular report on the implementation of the Mines Safety and Health Commission's Recommendations published in the 1st and 2nd Reports

I.- TECHNICAL ASPECTS

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
A.- ELECTRIFICATION												
I - Recommendations regarding elimination of oil from underground electrical equipment (1st Report of Mines Safety Commission, p. 7 (German text)												
2a) Resistances installed underground should not contain any combustible oil. (Exceptions are allowed for the starting-up resistances of large motors driving water pumps)	C	C	C	C	NRC	C	C'+ NRP	C'+ NRP	C'	C'	C	C
b) Condensers and transformers installed underground must not contain either combustible oil or dielectric substances which can give off noxious gases	C	C	C	C	NRC	C	C'+ NRP	C'+ NRP	C'	C'	NRP	NRP
- Otherwise effective measures should be taken against the dangers to workers caused by the use of these devices	C	C	C	C	NRC	C	C'	C'+ NRP	C'	C'	NRP	NRP
c) Switches and relays, used underground and operating on voltages below 1.100 V, must not contain any flammable oils	C	C	C	C	NRC	C	C'+ NRP	C'+ NRP	C'	C'	NRP	NRP
d) Protection of workers against dangers involved in the use of switches and relays, which work on voltages above 1,100 V and contain flammable oil	C	C	C	C	NRC	C	C	C	C	C	C	C
3. Recommendation to continue research into the manufacture of low-oil or oil-less HT switchgear and protective relays which can give riskfree service in gassy pits.	*(1)* A	*(1)* A	*(2)* –	*(2)* –	*(3)* C'	?	C'	C'	*(2)* –	*(2)* –	NRP	NRP
Recommendation to begin detailed investigation into the degree of increased safety which can be achieved, when prescribing an explosion-proof housing for normally spark-producing components only, and a design of the "increased safety" type for all other equipment.	C	*(1)* A	*(2)* –	*(2)* –	NRC	C	*(4)* E	*(4)* E	C	C	NRP	NRP
4. Extending the use of low-oil or oil-less HT switchgear and oil-less HT protective relays at points where there is no gas risk.	C	*(1)* A	C	C	NRC	C	C'	C'	C	C	E	E
II - Recommendations for shotfiring leads (2nd Report of Mines Safety Commission, p. 10)												
2. Recommendations for all shotfiring leads												
- Every conductor mustbe provided with at least one good-quality insulation.	C	C	C	C	NRC	C	C	C	C'	C'	C	C
- All connections must be properly insulated	C	C	C	C	NRC	C	C	C	C'	C'	C	C

(1) cannot be laid down in inspectorate regulations;
(2) not applicable;
(3) devices with satisfactory characteristics exist; the conditions of application must be specified;
(4) approval regulations have been issued for equipment in the "increased safety" category, but the type of protection is left to the individual firms;
(5) with regard to the approval of certain high-voltage switches.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
- Every shotfiring lead must have the appropriate degree of flexibility.	C	C	C	C	NRC	C	C'	C'	C'	C'	C	C
- The conductors must be of such cross-sectional area that they do not occasion an excessive voltage drop.	C	C	C	C	NRC	C	C'	C'	C'	C'	C'+ NRP	C'+ NRP
- The shotfiring leads must be made up and laid so that the risk of any fault current, resulting from contact with metal objects, is reduced.	C	C	C	C	NRC	C	C	C	C	C	NRP + C	C
- Before any shotfiring operation in particular workings and before the simultaneous firing of a fairly large number of shots, the ohmic resistance of the circuit must be measured.	C	C	C	C	NRC	C	C	C	C	C	C	C'
a) Temporary shotfiring leads												
- Careful inspection before each firing.	C	C	C	C	NRC	C	C	C	C'	C'	C'	C'
- Regular and thorough testing by an expert either at the surface or in an underground workshop.	C	C	C	C	NRC	C	C	C	C'	C'	C'	C'
A thorough checking must consist of at least :												
- a careful inspection of the lead over its whole length;	C	C	C	C	NRC	C	C	C	C	C	C'+E	C'+E
- measurement of the insulation between the two conductors, if the lead consists of a cable or rubber-covered lead;	C	C	C	C	NRC	C	C	C	C	C	C'	C'
- measurement of the ohmic resistance of the lead	C	C	C	C	NRC	C	C	C	C	C	C	C
b) Permanent shotfiring leads												
- Regular and thorough checks by an expert.	C	C	C	C	NRC	C	C	C	C'	C'	*(1)* –	*(1)* –
- Written record of every thorough check, with the date.	*(2)* A	*(2)* A	C	C	NRC	C	C'	C	C	C'	*(1)* –	*(1)* –
3. Further recommendations for permanent and temporary shotfiring leads used in gassy mines												
- The shotfiring leads must fulfil conditions which ensure sufficient safety with regard to :												
a) mechanical strength and in particular tensile, bending and abrasion strength;	C	C	C	C	NRC	C	C'	C'	NRP	NRP	C+C'	C+C'
b) electrical insulation;	C	C	C	C	NRC	C	C'	C'	NRP	NRP	C+C'	C+C'
c) impermeability (to moisture) of the insulation and the sheathing.	C	C	C	C	NRC	C	C'	C'	NRP	NRP	C'+ NRP	C'+ NRP

(1) not applicable;
(2) seems unnecessary and would increase administrative work.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
Recommendation that checking standards which correspond to the conditions be laid down.	C	C	C	C	NRC	C	*(1)* –	*(1)* –	NRP	NRP	E	E
4. Supplementary recommendations for permanent shotfiring leads used in gassy pits												
- Permanent leads should be so arranged that, as far as possible, damage during firing of the shots or from other causes is avoided.	C	C	C	C	NRC	C	C'	C'	C'	C'	*(1)* –	*(1)* –
- If the shotfiring lead consists of two separate conductors, these should be arranged arranged sufficiently far apart and in such a way that inspection is possible	C	C	C	C	NRC	C	C'	C'	C'	C'	*(1)* –	*(1)* –
- In shafts and dipping roads, the leads must have an adequate mechanical strength	C	C	C	C	NRC	C	C	C	C	C	C'	C'
III - Recommendations regarding the protection of underground distribution networks against the danger of causing electric shocks (2nd Report of the Mines Safety Commission, p.13)												
I. The following recommendations refer only to the MT networks defined below; Medium Tension (MT) : the normal voltage range for working equipment used underground with three-phase A.C. (between 380 and 1,100 V). These networks should fulfil all the recommendations set out below.												
These recommendations refer neither to the HT networks, nor to voltages which are lower than the medium-tension range and are used for particular purposes (lighting, drilling apparatus, telephone installations, etc.) for which some easing of the restrictions may be allowed. Overhead wire networks with bare trolley wires are also excluded.												
II. Protection against the risk of electric shocks												
A - First order precautions (Protection against direct contact with a live phase)												
1. Every chance contact with a live phase should be avoided as far as possible by laying the conductor out of the workmen's reach, by interposing effective barriers, by sheathing the phase or by insulating it.	C	C	C	C	C	C	C	C	C	C	C	C
2. The cables and leads used in medium-tension underground networks should be mechanically protected either by means of a metal armouring connected to the pilot lead, or by a flexible envelope of the best possible design.	C	C	C	C	C	C	C	C	C	C	C + NRP	C + NRP
- Leads without metal armouring must be electrically protected by separate or common protective screens, which trip safety devices in the event of a fault.	C	C	C	C	C	C	C	C	C	C	NRP	NRP
3. Only trained men should be allowed to open the housings of accessible live parts (medium-tension voltage range)												

(1) not applicable.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
and this only under conditions which have been clearly laid down in advance.	C	C	C	C	C	C	C	C	C	C	C	C
4. The repair and maintenance of the electrical equipment should be entrusted only to trained personnel	C	C	C	C	C	C	C	C	C	C	C	C
B - Second order precautions (Equipotential connection between conductive parts of the installation)												
1. All underground networks must be provided with an equipotential connection between the conductive (not live in normal operation) components of the installation and the other metal elements connected thereto, such that its conductance is sufficient to prevent the occurrence, between any two points accessible to a workman simultaneously, of a voltage higher than the weak voltage.	C	C	C	C	C	C	C	C	C	C	NRP	NRP
2. This equipotential connection (protective lead) must ensure electric connection between the conductive elements of the installation over the whole length of the network. It must be maintained in satisfactory condition and must be inspected as often as is necessary to ensure this.	C	C	C	C	C	C	C	C	C	C	NRP	NRP
3. The above-mentioned equipotential connection (protective lead) must be earthed to at least one point of the network via an earth connection of the lowest possible resistance.	C	C	C	C	C	C	C	C	C	C	NRP	NRP
4. This earth connection must be combined with the star-point earth connection, if a star-point is employed	C	C	C	C	C	C	NRP	NRP	C'	C'	NRP	NRP
C - Third order precautions (Reduction of fault duration)												
1. Any fault current must be considered dangerous in underground medium-tension networks if, when the fault current flows through the protective lead and connected conductive components of the installation of earth, there is produced between any two points accessible to a workman simultaneously a voltage exceeding the level of a weak voltage, regardless of whether it occurs between parts of the installation or between such parts and earth.	C	C	C	C	C	C	NRP + C'	NRP + C'	C	C'	C	C
2. If the star-point of a network is earthed via a weak impedance or without any impedance, so that the presumed fault current is not restricted to a low value, then the network must be provided with safety devices which can at any time automatically isolate the damaged section of the network from the current source (or render it completely dead) before the fault current flowing through the protective lead and connected conductive components of the installation or earth reach a dangerous value	(1) –	(1) –	(1) –	(1) –	(1) –	(1) –	C+ NRP	C+ NRP	E	E	NRP	NRP

(1) not applicable, as only isolated circuits are used.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
- Since the complete or partial cutting-off of a line voltage can have serious effects on the current supply to important equipment, appropriate preventive measures should be taken. - Only when the line has been repaired or the fault eliminated, or at the direction of a specialist who has taken all necessary precautions, may that section of the network be brought under voltage again.	C	C	C	C	NRC	C	C+ NRP	C+ NRP	E	E	C	C
3. If the star-point of a network is insulated or earthed via some impedance, which restricts fault currents to a low value, the network must be fitted with supervising devices which are always in a state of readiness and which are capable :												
a) - either of checking the insulation of the various parts of the network and of indicating any damage they may have suffered or	C	C	C	C	NRC	C	C+ NRP	C+ NRP	E	E	NRP	NRP
- of automatically cutting off the damaged section of the network from its source of current (or rendering the entire network dead).	*(1)* C	*(2)* C	C	C	NRC	C	C+ NRP	C+ NRP	E	E	NRP	NRP
- If no automatic cut-off device is installed, the responsibility for cutting-off should be entrusted to an expert who can intervene as soon as the warning signal of the supervisory system is tripped or if the fault assumes major dimensions.	C	C	C	C	NRC	C	NRP	NRP	C'	C'	*(3)* -	*(3)* -
- If cutting-off has been necessitated by one of the two cases cited above, the restoration of current may be accepted only after repair of the line or elimination of the fault, or only at the direction of an expert official, who has taken all necessary precautions	C	C	C	C	NRC	C	NRP	NRP	C'	C'	C	C
- If no automatic cut-off device is installed, the rubber-covered leads of mobile machines should be fitted with an automatic device which renders them dead as soon as there occurs a fault current which is caused by damage to the external armour or by damage to the insulation of an individual phase;	C	C	C	C	NRC	C	C	C	C	C	NRP	NRP
b) - or of automatically cutting off the damaged section of the network from its source of current (or rendering the entire network dead) as soon as a double fault occurs leading to a dangerous fault current in the protective lead and connected parts of the installation.												

(1) must be carried out by 1.10.1971 in pits where there is a risk of firedamp;
(2) was carried out in workings where there is a risk of firedamp;
(3) not applicable, as only isolated circuits are used.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
- In this instance, the current may be switched on again only after the line has been repaired or the fault eliminated.	*(1)* –	*(1)* –	*(1)* –	*(1)* –	NRC	C	NRP	NRP	C'	C'	NRP	NRP
N.B. The comments on this Recommendation are given in the Second Report of the Mines Safety Commission, pp. 15/22.												
B. - MECHANISATION AND LOCOMOTIVES												
I - Recommendations regarding locomotive equipment (First Report of the Safety Commission, p.20 (German text)												
1. New locomotives must be equipped with fixed, rigid cabins which at all times give the driver a clear view along the roadway, ahead and behind, without any need for him to put his head out of the cabin. (Fixed cabins are understood to cover those forming a part of the structure or which can be removed only laboriously with special tools.)	C*(2)* A*(3)*	C*(2)* A*(3)*	C*(2)* A*(3)*	C*(2)* A*(3)*	NRC	NRC	C*(4)* E*(5)*	C*(4)* E*(5)*	C	C	C	C
2. The locomotives in service must be modified to meet this requirement,	C	C*(2)*	C	C	A	A	E	E	C	C	A	A
- locomotives which cannot be modified should gradually be withdrawn from service, within a period to be fixed by the responsible inspectorate, or	C	C	C	C	A	A	E	E	C	C	*(2)*	*(2)*
- only be used in roadways which are wide and high enough to eliminate accident risk.	C	C	C	C	C'	C'	E	E	A	A	*(2)*	*(2)*
3. For particular types of locomotive, or in certain circumstances, the responsible Inspectorate can grant exceptions from the above regulations, provided that safety regulations of equal stringency are laid down	C	C	C	C	NRC	NRC	E	E	A	A	C	C
II - Recommendations regarding the neutralisation of Diesel-engine exhaust fumes (First Report of the Safety Commission, p. 23 (German text)												
- General use of better starters	C	C'	E	E	E	E	?	?	?	?	C'	C
- Intensified research into improving combustion by the use of catalysts.	?	?	A*(6)*	A*(6)*	E	E	?	?	*(6)*	*(6)*	A*(6)*	A*(6)*
- Draw attention to the existence of this process	–*(1)*	–*(1)*	–*(1)*	–*(1)*	–*(1)*	–*(1)*	–*(1)*	–*(1)*	–*(1)*	–	–*(1)*	–*(1)*
- Continuation of the research into an automatic transmission system, which would make it possible to give Diesel engines a constant rpm.												
- Subsequent resumption of trials with the Houdry carbon monoxide purification process.	?	?	A*(6)*	A*(6)*	E	E	?	?	*(6)*	*(6)*	A*(6)*	A*(6)*
C.- FIRES AND UNDERGROUND COMBUSTION												
I - Recommendations regarding equipment for shafts in connection with the prevention of fires (First Report of the Safety Commission, p. 11 (German text)												

(1) not applicable;
(2) in the case of main-road locomotives, with the exception of "a clear view behind", which is difficult technically;
(3) no application made to gateroad locomotives, because the risk of accident is increased;
(4) for trolley locomotives;
(5) for other than trolley locomotives;
(6) the problem of the low CO content of Diesel engine exhaust fumes is solved by blocking the injection pump at a pumping capacity at which the CO content shows a marked rise.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
2. Steps to prevent any accumulation of grease and coaldust (First Report of the Mines Safety Commission, p. 15 (German text) and Report of the Conference, p. 54, No. 2, para. C.)												
- Skip-winding installations should as far as possible be sited only in upcast shafts;	C'	C'	(1) A	(1) A	E	E	A	A	C'	C'	C'	C'
- Equipment in new shafts should be of aerodynamic form;	C'	C'	C'	C'	E	E	E	E	E	C	C	C
- all suitable steps should be taken to avoid in every case any accumulation of dust to ensure that any such accumulation is removed.	C	C	C	C	NRC	C	C	C	C	C	C	C
3. Preferred siting of methane-drainage lines in upcast shafts (First Report of the Mines Safety Commission, p. 16 (German text) and Report of the Conference, p. 54, No. 3, Par. d)												
- This recommendation of the Conference applies particularly to pressure lines.	C	C	C	C	NRC	NRC	E	E	(2)	- (2)	C	C
4. Siting electric cables, compressed-air mains and gas-drainage pipes (First Report of the Mines Safety Commission, p. 16 (German text) and Report of the Conference, p. 54, No. 3, par. e)												
- electric cables and leads, compressed-air drains and gas-drainage pipes should not be sited in the haulage compartment :	C	C	C	C	NRC	NRC	E	E	C'	C'	C	C
- electric cables should not all be sited in the same shaft.	C	C	C	C	NRC	NRC	E	E	C'	C'	C	C
II - Guiding principles for fighting mine fires by sending down water (Second Report of the Mines Safety Commission, p. 26)												
1. Installation												
a) At the top of every shaft reaching to the surface there must be a device which can send down at least 50 litres of water per minute and per square metre of shaft cross-section.	C	C	C	C	NRC	E	E	E	E	E	C	C
b) This device must be installed in such a way that the supply of water can at no time be seriously affected by drawing-off or flowing-away of water at other points.	C	C	C	C	NRC	E	E	E	E	E	C	C
c) The water pipes and the spray jets must be set in such a way that they are protected from frost.	C	C	C	C	NRC	E	E	E	E	E	C	C
d) The damming device or devices must be set outside the shaft-top building in such a way that they can be operated at any time. They must be marked by means of an instruction plate.	C	C	C	C	NRC	E	E	E	E	E	C	C
2. Fires in down-cast shafts												
a) Immediate measures												
- It is essential to indicate in the fire-fighting plan the maximum amount												

(1) all skip-winding equipment still in use is installed in downcast shafts;
(2) no methane-drainage lines in service.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
of water which can be sent down each of the downcast shafts, without creating additional dangers for the workers by its effects on the ventilation.	A(1)	A(1)	A(2)	A(2)	E	E	E	E	E	E	C	C
- the damming device which can be operated at this stage must not release more than this prescribed quantity of water.	A(3)	A(3)	A(2)	A(2)	E	E	E	E	E	E	C	C
- until the leader of the rescue operations has issued his instructions and as long as there has been no reversal of ventilation, water may be sent down only by opening the damming device prescribed for this purpose.	A(3)	A(3)	A(2)	A(2)	E	E	E	E	E	E	C	C
b) Measures to be taken on the instructions of the leader of rescue operations												
- the leader of the rescue operations must therefore decide - taking into accont all the circumstances - either to send down an increased quantity of water - or must he give orders that reversal of the ventilation be brought about or encouraged.	A(2)	A(2)	A(2)	A(2)	E	E	E	E	E	E	C	C
- to facilitate the reversal of the ventilation in the burning downcast shaft, once this has been opened and the main fan stopped, water can be sent down the upcast shaft.	C	C	C'	C'	E	E	E	E	E	E	C	C
- if reversal of the ventilation has already occurred - either as a result of the upward current produced by the heat of the fire or deliberately - downcast shafts should be treated as though they were upcast shafts.	C	C	C'	C'	E	E	E	E	E	E	C	C
- if the calculated water quantity appears to be too small to extinguish the fire immediately, or to hinder its spread, additional precautions must be worked out and laid down in the fire-fighting plan :												
- simultaneous supply of water down all downcast shafts,	A(2)	A(2)	A(2)	A(2)	E	E	E	E	E	E	C	C
- partial shutting-off of the burning shaft at surface level,	A(4)	A(4)	A(4)	A(4)	NRC	NRC	E	E	E	E	C	C
- shut underground fire-doors, etc.	A(4)	A(4)	C	C	E	E	E	E	E	E	C	C
3. Fires in upcast shafts												
- in upcast shafts, water may be sent down only on the instructions of the leader of the rescue operation.	C	C	C	C	E	E	E	E	E	E	C	C
- as long as there are still any workers in the pit, only so much water may be sent down as will allow the fumes of the fire to continue to be extracted whilst the water is falling.	C	C	C	C	E	E	E	E	E	E	C	C
Note. A commentary and examples (with diegrams), regarding the calculation of the effect of falling												

(1) there are doubts as to the practicability of the Recommendation; minimum water quantities are laid down;
(2) not suitable for inclusion in regulations;
(3) there are doubts as to the practicability of the Recommendation;
(4) not suitable for inclusion in regulations; must be decided separately in each case;

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
water on the ventilation are given in the Second Report of the Mines Safety Commission, pp. 29-50.												
III - Recommendations for the sealing-off by dams of mine fires and underground combustion (Second Report of the Mines Safety Commission, p. 53)												
Introductory remark												
The following Recommendations are not binding. They are not intended to give Inspectorates "ready-made" regulations; on the contrary, it remains for the competent authorities to decide how these Recommendations are to be applied as regulations, circulars or service instructions.												
These Recommendations refer only to the actual fighting of the fire or combustion; they do not refer to the measures to be taken as a matter of priority to rescue men following the outbreak.												
A - When a mine fire has broken out or underground combustion developed, it is indispensable to take the necessary preparatory steps for any later sealing-off by dams which may be necessary while the direct firefighting operations are still going on.												
- In the event of sealing-off by dam becoming necessary, as a general rule the first stoppings to be erected must be advance dams.	C	C	C	C	NRC	NRC	C'	C'	C'	C'	C	C
These advance dams are in fact the real subject of the present Recommendations.												
B - Structure and erection of the advance dams												
1. If there is no risk of explosion *(1)* :												
a) to make the advance dams themselves as air-tight as possible and to create the closest possible seal between the dam and the surrounding walls;	C	C	C	C	NRC	NRC	C'	C'	E	C	C	C
b) there is nothing against shutting off first of all the intake air.	C	C	C	C	NRC	NRC	C'	C'	E	E	C	C
2. If there is a risk of explosion :												
a) - to have at all times the most precise information possible regarding the degree of explosion risks in the fire zone;	C	C	C	C	NRC	NRC	C'	C'	E	E	C	C
- it may be necessary to provide the men constructing the advance dams with fireproof clothing;	C	C	C	C	E	E	C'	C'	E	C'	C	C
b) - to ensure that the advance dams are as air-tight as possible; to ensure that they are strong enough to resist an explosion;	C	C	C	C	NRC	NRC	C'	C'	E	C'	C	C
c) - to ensure that for the entire period during which the stopping is being erected, there is sufficient ventilation of the fire zone to counter as far as absolutely possible the formation of an explosive gas mixture;	C	C	C	C	NRC	NRC	C'	C'	E	C'	C	C

(1) for the assessment of the risk, see chapter A - II a), p. 52.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
d) - to ensure that all suitable measures are taken to reduce as far as possible the effects of any explosion which may occur; (dust barriers, stone-dusting or water trough barriers);	C	C	C	C	NRC	NRC	C'	C'	E	C'	C	C
e) - to the greatest possible extent, the dams on the intake and return sides should be sealed simultaneaously;	C	C	C	C	NRC	NRC	C'	C'	E	C'	C	C
- only the number of workers and members of the staff strictly necessary for this work should stay behind;	C	C	C	C	NRC	NRC	C'	C'	E	C'	C	C
- as soon as the dams have been sealed, the danger area must be completely evacuated.	C	C	C	C	NRC	NRC	C'	C'	E	C'	C	C
C - The final dams must be durable, built of brick or concrete under the protection offered by the advance dams.	C	C	C	C	NRC	NRC	C'	C'	E	C'	C	C
Note : Additional details to the foregoing Recommendations are given in a Commentary (Second Report of the Mines Safety Commission, pp. 53/58).												

II.- HUMAN FACTORS

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
A.- RECOMMENDATIONS REGARDING MEDICAL EXAMINATION (SECOND REPORT OF THE MINES SAFETY COMMISSION, p. 79)												
I - Pre-Entry Medical Examinations												
- All applicants for employment at collieries should undergo a pre-entry medical examination.	C	C	C	C	C	C	C	C	C	C	C	C
- This must establish that the applicant shows no symptoms rendering him unfit for such employment.	C	C	C	C	C	C	C	C	C	C	C	C
The pre-entry medical examination must include :												
- a general examination												
- such special examination as may be deemed necessary for the purpose.	C	C	C	C	C	C	C	C	C	C	C	C
- The examinations effected must include, as regards the chest, a radiograph or radiophotograph of format not smaller than 70 x 70 mm;	C	C	C	C	C	C	C	C	C	C	C	C
- the latter to be supplemented if need be by a standard-format (1 : 1) radiophotograph;	C	C	C	C	C	C	C	C	C'	C'	C	C
- The nature of these examinations and	C	C	C	C	C	C	C	C	C'	C'	C	C
- the practical details, together with	C	C	C	C	C	C	C	C	C'	C'	C	C
- the criteria on which the doctor should base his findings,	C	C	C	C	C	C	C	C	C'	C'	C	C
- should be defined by medical experts.	C	C	C	C	C	C	C	C	C'	C'	C	C
- In the case of recruitment for work, whether below or above ground, where the worker will be exposed to a dust hazard, the examination must show a normal pulmonary image.	C	C	C	C	C	C	C'	C'	C'	C'	C	C
- The concept of normal pulmonary image must be defined by medical experts.	C	C	C	C	C	C	C'	C'	C'	C'	C	C
- These are to be regarded as minimum medical recommendations.												
- The points concerning the number and type of examinations to be carried out,												
- the effecting of radiological examinations												
- the definition of the normal pulmonary image												
- are subject to review in each country												
- whenever this is felt to be appropriate in the light of progress in medical and radiological knowledge												
- working conditions, and												
- preventive measures.												
II - Special Examinations												
1. The object of special medical examinations should be to establish - taking into account, according to circumstances, the opinions of - the training	C	C	C	C	NRP	NRP	C'	C'	E	E	C	C

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
- vocational-guidance and applied psychology	C	C	C	C	NRP	NRP	C'	C'	E	E	C'	C'
- and other services concerned a worker's fitness for certain specific occupations.	C	C	C	C	NRP	NRP	C	C	C	C	C	C
2. Such examinations are essential in the case of jobs												
- which, either in themselves or owing to the conditions under which they are performed, involve a special hazard to the worker himself or to others as regards health and/or safety,	C	C	C	C	NRP	C	C	C	C	C	C	C
- which involve special health or safety requirements,												
- or which demand particular physical aptitudes or characterological qualities.	C	C	C	C	NRP	C	C	C	C	C	C	C
3. No attempt has been made here to list in full the cases in which special examinations are necessary, this being left to the competent authorities in each country. Examples include :												
- winding enginemen,												
- staple pit enginemen,												
- motormen (drivers of locomotives, mobile haulers and surface vehicles),												
- workers assigned to hot workings,												
- all those employed on cage handling.												
III - Routine examinations during employment												
A - Periodic health checks												
- The object here is to establish whether the subject is still fit for duty,	C	C	C	C	C	C	C	C	C	C	C	C
- to detect any symptoms of occupational disease at the earliest possible stage,	C	C	C	C	C	C	C	C	C'	C'	C	C
- where appropriate to help supervise the subject's health generally.	C	C	C	C	C	C	C	C	C'	C'	C	C
- All personnel should undergo such check-ups at intervals	C	C	C	C	C	C	C	C	C	C	C	C
- The interval is fixed at two years.	C	C	C	C	C	C	C(1)	C(1)	C(2)	C(2)	C	C
- The interval is reduced for workers under 21.	C	C	C	C	C	C	C(3)	C(3)	C	C	NRP	NRP
- The interval should be considered as a maximum figure.	C	C	-(4)	-(4)	-(4)	C	C	C	C	C	C	C
This interval can also be reduced :												
- if the state of health of a worker indicates that such a reduction is desirable;	C	C	C	C	C	C	C	C	C'	C'	C'	C'
- in relation to the type of work performed;	C	C	C	C	NRP	C	C	C	E	E	C	C
- because of the nature of the place at which the work is being done.	C	C	C	C	NRP	C	C	C	E	E	C	C

(1) the interval is one year;
(2) article 648 of Inspectorate Regulations provides for an interval of one year;
(3) for workers under 18 years;
(4) not applicable.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
B - Medical examinations on specific occasions												
1. In the case of reassignment												
- Workers whom it is proposed to assign to jobs involving hazards not previously taken into account for the man concerned should be re-examined.	C	C	C	C	NRP	C	C	C	E	E	C	C
2. Medical examination following absence from work												
- Where a man's return to work after an illness or accident involves risk to the safety of himself or others, he may be subjected to a special examination,	C	C	C'	C'	NRP	C	C	C	E	E	C'	C'
- the type and extent of which should be fixed in each case according to the circumstances.	C	C	C'	C'	NRP	C	C'	C'	E	E	C'	C'

B - Regular Report on the implementation of the Mines Safety and Health Commission's Recommendations published in the Third Report

I - TECHNICAL ASPECTS

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
I - Recommendations regarding the protection of underground electrical networks against fire and firedamp-explosion risks (Doc. 1156/61/4)												
1. Recommendations regarding the protection of underground electrical networks against fire risk												
A - First-order precautions - avoidance of fire risk												
1) Avoidance of excessive heating of cables in normal use by providing adequate conductivity. Avoidance of unforeseen local heatings by the use of suitable designs and by proper supervision.	C	C	C	C	C	C	C	C	C	C	C + NRP	C + NRP
2) Reduce the possibility of faults and short-circuits occurring between conductors, or between conductor and earth, by adequate insulation or proper spacing of the conductors.	C	C	C	C	C	C	C	C	C'	C'	C + NRP	C + NRP
B - Second-order precautions - protection against the effects of a heating or a fault												
1) Use of heat-stable insulations.	C	C	C	C	C	C	NRP	NRP	C'	C'	C + NRP	C + NRP
2) Use of protective sheathing for equipment and for cables, made of flame-resistant and non-propagating material.	C	C	C	C	NRC	C	C(1)	C + NRP	C + NRP	C'	C + NRP	C + NRP
- Use of oil as a non-conductor only if no fire risk for the workers is involved.	C	C	C	C	NRC	C	C	C	C'	C'	C + NRP	C + NRP
3) Accumulations of flammable or combustible materials and pipelines for combustible gases should be sited well away from electrical equipment.	C+C'	C	C+C'	C	C	C	C'+ NRP	C'+ NRP	C'	C'	C + NRP	C + NRP
C - Third-order precautions - measures regarding the network												
1) Automatic protection of networks against abnormal overloads.	C	C	C	C	C	C	C	C	C	C	C + NRP	C + NRP
2) Automatic protection of networks against short-circuit; these protective devices must be able of handling the maximum short-circuit current at their point of installation.	C	C	C	C	C	C	NRP	NRP	C'	C	C + NRP	C + NRP
Selecting and regulating of these devices in relation to the minimum short-circuit current which can occur at the end of the section they protect.	C	C	C	C	C	C	NRP	NRP	C'	C'	C + NRP	C + NRP
3) Steps to give effective protection against low-current faults, which might get past the above-named protec-												

(1) with respect to armoured cables.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
tive devices and cause dangerous heatings.	C(1)	C(2)	C	C	NRC	C	C	C	C'	C'	C'+ NRP	C'+ NRP
2. Recommendations for the protection of underground electrical networks against firedamp-explosion risks												
A. First-order precautions - prevention of accumulations of firedamp												
1) The firedamp content at the site of the electrical apparatus must be kept within the limits prescribed by the Inspectorate.	C	C	C	C	C	C	C	C	C	C	C	C
2) The ventilation situation must be checked before any new installation or extension of electrical equipment.	C	C	C	C	C	C	C	C	C'	C'	C'+ NRP	C + NRP
3) There must be a thorough investigation of the possible consequences of any alterations in working method, of ventilation or gas omission, which might cause problems in the vicinity of electrical equipment.	C	C	C	C	NRC	C	C	C	C'	C'	C'	C'
B. Second-order precautions - protection against ignition												
1) In gassy workings : use of electrical equipment which is permitted by the Inspectorate only under its own specified conditions.	C	C	C	C	C	C	C	C	C	C	C + NRP	C + NRP
2) The electrical equipment must be installed, used, supervised and main tained in such a way as to keep it flameproof.	C	C	C	C	C	C	C	C	C	C	C + NRP	C + NRP
All cables must be of adequate mechanical strength.	C	C	C	C	C	C	C	C	C	C	C + NRP	C + NRP
All cables must be installed and maintained without damage.	C	C	C	C	C	C	C	C	C	C	C	C
C. Third-order precautions - cutting off the circuit												
1) Networks must be designed and installed in such a way that any fault current which may arise between phase and earth is reduced to a low value or quickly cut off.	C(1)	C	C	C	NRC	C	C	C	C	C	C + NRP	C + NRP
2) A protective relay, preferable automatic, must be provided against between-phase faults and earth faults.	C(1)	C	C	C	NRC	C	C	C	C	C	C'+ NRP	C'+ NRP
3) Precautions must be taken to avoid accidents when faults are being sought or dealt with.	C	C	C	C	NRC	C	C	C	C	C	CC'+ NRP	CC'+ NRP
4) Protection must be given to leads without metallic sheathing, and to those which supply movable machines, by means of individual or collective screens which bring a protective device into operation if a fault occurs.	C	C	C	C	NRC	C	C	C	C	C	C'+ NRP	C'+ NRP
5) If the firedamp content rises above the prescribed limit, all the sections of the network involved must be cut off.	C	C	C	C	C	C	C	C	C	C	C	C
Issuing instructions to maintain in operation certain machines which provide ventilation.	C	C	C	C	C	C	C	C	C	C	C+C'	C+C'

(1) must be carried out by 1.10.1971 in pits where there is a risk of firedamp;
(2) was carried out in workings where there is a risk of firedamp.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
Restarting only when the firedamp content has fallen below the permissible value, and only on the orders of a trained person.	C	C	C	C	NRC	C	C	C	C	C	C + NRP	C + NRP
Supplementary precautions for pits liable to sudden outbursts of gas												
1. Risk of damage by particles projected by an outburst of gas												
- The threatened zones in which projection can occur should not be electrified.	A	A	C	C	NRC	C	C(1)	C(1)	C(2)	C(2)	A	A
- The electrical equipment and cables should be protected against heavy blows.	A	A	C	C	C	C	C	C	C(2)	C(2)	C	C
- The electrical equipment should be designed to give adequate robustness.	A	A	C	C	C	C	C	C	C(2)	C(2)	C	C
2. The risk of firedamp concentrations												
- Increased ventilation	C'	C'	C'	C'	C'	C'	C	C	C(2)	C(2)	C	C
- Use of remote-indicating methano-meters or ventilation-fault detectors which can cut off the threatened section of the network.	C'	C'	C'	C'	E	C	C	C	C(2)	C(2)	C + NRP	C + NRP
- Relaxation shot-firing only after all equipment has been switched off.	C'	C'	C'	C'	NRC	C	C	C	C(2)	C(2)	-	-
3. Supplementary electrical precautions												
a) Preferable use of a starpoint earthed via a strong impedance, e.g. by means of an insulation detector.	C	C	C	C	NRC	C	C'+ NRP	C'+ NRP	C(2)	C(2)	NRP	NRP
b) Quickest possible automatic protection of the network against all insulation faults, even if formed by resistances between phase and earth.	C(3)	C	C	C	NRC	C	C	C	C(2)	C(2)	C + NRP	C + NRP
II - General guidelines for the opening-up of sealed-off fire areas (Doc. 1304/3/64)												
I. GENERAL							(4)	(4)				
Special reasons for opening-up a district sealed-off after a fire :												
- recovery of bodies - salvage of material - recovery of roadways and workings - reduction of the sealed-off area - inspection of the district, and, if necessary, - direct fire-fighting.												
The following hazards can arise from reopening a sealed-off district :												

(1) the use of electricity is forbidden in pits liable to sudden outbursts of gas, excepting for lighting and shot-firing. Exceptions can, however, be approved by the senior mining engineers : when using armoured cables, telephone installations and methanometers in intake airways- provided that no damage is likely to occur as a result of a gas outburst - and also in main return airways.

(2) No pits liable to sudden outbursts of gas. However, in pits or parts of mines which are considered to be liable to sudden outbursts of gas, the use of electricity, excepting for lighting purposes and portable lamps, must be authorized by a senior mining engineer, subject to the observance of all other measures, precautions or restrictions which might be included in the authorization such as for example the above-mentioned recommendations.

(3) must be carried out by 1.10.1970 in low-tension networks.

(4) the opening-up of fire areas is carried out on the responsibility of the manager, who prepares a reopening plan - taking into account the scale and type of fire and the ventilation situation in the fire area - in collaboration with the Main Rescue Station. The action plans of the Main Rescue Stations very largely embody the guidelines laid down in Doc. 1304/3/64.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
- release of CO, foul air and hot damp air, - explosion of firedamp or fire gas, where the fire is not yet extinguished, - recrudescence of the fire, which need not necessarily occur immediately, but even after some time has elapsed. Recrudescence of the fire can occur only when fresh air reaches the seat of the fire, so that with all operations involved in reopening a fire area it is of prime importance to inspect the individual air currents constantly.	C	C	C	C	C	C	C'	C'	C'	C'	C'	C'
All places suspected of having been seats of fire or heatings must be ascertained with the utmost speed.	NRP	NRP	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
II. BASIC RULES												
Sealed-off districts may be reopened only after the competent authorities have been notified or have given their permission.	C	C	C	C	C	C	*(1)* C	*(1)* C	*(1)* C	*(1)* C	C'	C'
Before opening commences, gas samples must be taken from the fire area, at each stopping and from all sampling pipes.	C	C	C	C	C	C	C'	C'	C	C	C'	C'
The gas samples are analysed and the results assessed from the point of view of explosion risk in the sealed-off area and the state of the seat of the fire.	C	C	C	C	C	C	C'	C'	C	C	C'	C'
The cooling-off time of the seat of the fire must be taken into account.	NRP	NRP	C	C	C'	C'	C'	C'	C'	C'	C'	C'
If possible, the sealed-off district should be inspected before any air is circulated or any operations are started.	A	A	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
Before opening commences, a plan should be drawn up jointly with the Main Rescue Centre.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
This plan must cover the following points : - the method, - nature, scope and order of operations, - direction and supervision, - checking of the ventilation system and of the composition of the air, - communications, - preparation of material, - evacuation, prohibition of access to and remanning of endangered workings, - deployment of the Rescue Team, - connection and disconnection of electrical equipment and cutting-off the supply of electricity in both equipment and part of network concerned, - opening and closing of the compressed air, water and methane-drainage pipeline valves, - re-sealing of the fire area in emergency.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
The method to be adopted for reopening sealed-off districts depends on the presence or otherwise of - non explosive gaseous mixtures which remain non-explosive on dilution with air, - non-explosive gaseous mixtures which may become explosive on dilution with air, or - explosive gaseous mixtures. Fire areas may be opened at one point or at several points. In the latter case, a												

(1) applies only to the opening-up of fire areas after particularly large fires.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
continuous direct circulation of air is automatically established and the fire area is permeated with fresh air. An examination should be made of the effects of the opening of the area on the ventilation system of the pit as a whole and within the fire area.	C	C	C'+C	C'+C	C'	C'	C'	C'	C'	C'	C'	C'
A sealed-off district may be reopened by - breaching one or more stoppings (with or without the use of an air-lock), or - cutting a new entry into the fire-area. Before opening a sealed-off area, provision should be made for immediate reclosure if necessary.	C	C	C	C	C	C	C'	C'	C'	C'	C'	C'
Stoppings may be opened only on the instructions of the manager underground and under the constant supervision of personnel appointed by him.	C	C	C	C	C'	C'	C	C	C	C	C'	C'
Workings, into which the opening of a stopping may release toxic gases or foul air, or where there is a risk of explosion, must be evacuated and put out of bounds to personnel before opening.	C	C	C	C	C'	C'	C	C	C'	C'	C	C
Since conditions in the district, the state of the seat of the fire and the risk of gas explosion may change during the opening operation the composition of the fire gases or fumes must be checked at regular intervals.	C	C	C	C	C	C	C	C	C'	C'	C'	C'
The kind and number of samples and the points at which they are to be taken should be fixed in advance.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
In doing so, the possibility of gas accumulations forming should be allowed for. (In general, the formation of gas layers is fostered by low air velocities and differences in temperature.)	C	C	C	C	C'	C'	C'	C'	C'	C	C	C
Where a stopping is opened in the knowledge that a fire is not yet extinguished, or where the fire is revived as a result, the area in question must be resealed at once, if the composition of the fire gases or fumes changes in such a way that an explosion hazard might arise.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
With non-explosive gas mixtures in the fire area, this is necessary only if extinguishing operations seem unlikely to succeed.	C	C	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
It is the responsibility of the Rescue Team to open and inspect fire areas, even after they have been ventilated.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
On the intake side, breaching of stoppings need not be carried out by the Rescue Team provided that no gas hazard is to be reckoned with.	C	C	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
When deploying the Rescue Team, allowance should be made for the adverse climatic conditions which are likely to obtain at any point where they may be employed.	C	C	C	C	C'	C'	C	C	C'	C'	C	C
III. OPENING-UP SEALED-OFF DISTRICTS CONTAINING NON-EXPLOSIVE GAS MIXTURES												
1. Opening-up one side only A sealed-off district containing non-explosive gas mixtures may be opened on one side even if the fire is not yet extinguished.												

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
It must first be established whether the remaining stoppings and seals are sufficiently air-tight and that there is no risk of releasing fire gases, in particular carbon monoxide in other parts of the working, which may be connected with the fire area.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
If the stopping to be opened is on the return side, special attention should be paid to the release of CO or of other toxic or dangerous gases or foul air.	C	C	C	C	C	C'	C	C	C'	C'	C'	C'
The decision as to whether to carry out operations in the fire area without ventilation air or with auxiliary ventilation depends on the purpose of the reopening of the area, the expected duration of the Rescue Team's operations and the possible hazards involved. Auxiliary ventilation is especially desirable for extended operations within the fire area.												
a) Working without ventilation air, especially behind an airlock, has the advantage of eliminating the risk of reviving the fire. When carrying out extinguishing operations without ventilation air and under unfavourable air conditions, it is advisable first to set up water sprinklers or nozzles and to put these into operation only after the Rescue Team has left the fire area.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
b) If auxiliary ventilation is used, it should preferably be by suction.	C	C	(1) A	(1) A	C'	C'	C'	C'	(2)	-(2)	C'	C'
It is advisable to isolate the fire area ventilated by an auxiliary fan from the non-ventilated section by means of an auxiliary stopping if the seat of the fire is situated in the non-ventilated section.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
2. Opening on two sides to establish a circulation of air round the sealed-off area												
A sealed-off area containing non-explosive gas mixtures may be ventilated only if it is likely that the fire is extinct	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
While ventilation is being established, a Rescue Team wearing breathing apparatus may enter the fire area to examine conditions within it and to extinguish any fires.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
IV. REOPENING OF SEALED-OFF DISTRICTS CONTAINING GAS MIXTURES WHICH MAY BECOME EXPLOSIVE ON DILUTION WITH AIR												
1. Opening on one side only												
A sealed-off area containing gas mixtures which may become explosive on dilution with air may be opened on one side only, even if the fire is not yet extinguished.												
It is, however, essential to install a tight airlock in front of the stopping to be opened, so as to ensure an effective air seal	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'

(1) experience hitherto has shown that blowing auxiliary ventilation is preferable, to ensure that no explosive gases are sucked in by the auxiliary fan.

(2) the use of blowing auxiliary ventilation is preferred.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
It must first be checked whether the remaining stoppings and seals are sufficiently air-tight and that there is no risk of releasing fire gases, in particular carbon monoxide, into other parts of the workings which may be connected with the fire area.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
If the stopping to be opened is on the return side, particular attention must be paid to the possibility of releasing CO, CH_4 or foul air	C	C	C	C	C'	C'	C	C	C'	C'	C'	C'
All operations must be carried out without ventilation air.	C	C	C	C	C'	C'	C	C	C'	C'	C'	C'
There must be continuous sampling and evaluation of the results of analysis to check whether the gas mixture remains non-explosive.	C	C	C	C	C'	C'	C	C	C'	C'	C'	C'
For extinguishing operations, see section III.1.												
If the size of the sealed-off area is to be reduced, a new explosion-proof stopping must be erected. In order to be able to erect this stopping under tolerable climatic conditions and possibly without wearing breathing apparatus, auxiliary ventilation may have to be provided.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
For this purpose, an auxiliary stopping must first be erected and sealed in an unventilated atmosphere. (Before constructing the main stopping, it should be considered whether to erect several successive auxiliary stoppings, according to the possible hazards.)	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
The section of roadway thus recovered must then be ventilated by an auxiliary fan so as to create suitable air conditions for the erection of the main stopping.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
When starting up the auxiliary ventilation, it must be remembered that the gas mixture becomes explosive on dilution with air. It is therefore esential to ensure that there is no source of ignition in the workings to be ventilated.	C	C	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
In addition, it is essential to make certain that the fan used cannot cause any risk of ignition.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
Before starting up the auxiliary ventilation, all workings likely to be exposed to the hazards of fire gases or explosions must first be evacuated and access thereto prohibited.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
Electrical equipment must be cut off from the power supply.	C	C	C	C	C	C'	C'	C'	*(1)* C'	*(1)* C'	C'	C'
In addition, the ventilation must, as far as possible, be regulated so that no explosive gas mixtures can be released over long distances.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'

(1) special attention is drawn to the fact that the fan must be switched off.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
For this purpose, the quantity of air circulated should, if necessary, be increased.	C	C	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
2. <u>Opening on two sides to establish a circulation of air through the fire area</u> This method of opening automatically results in the formation of a through air-current in the open district, but not necessarily in other parts of the district. The method can be used only if there are no remaining signs of fire in the district.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
In addition, a period long enough for the seat of the fire to cool off must have elapsed since the estimated time of extinction.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
If possible, the Rescue Team should carry out an inspection in an unventilated atmosphere.	A	A	C	C	C'	C'	C'	C'	C'	C'	C'	C'
Failing this, the results of the snuffle pipe tests should be used to determine the condition of the seat of the fire.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
Furthermore, it should be considered in such cases whether the method described in section IV.1 might not be preferable	NRP	NRP	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
In each case, it is essential to check the likelihood of a recrudescence of the fire during ventilation, by means of fire gas samples.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
This applies particularly in the case of a much-branched district.	C	C	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
Before ventilating the fire area, all workings exposed to the hazards of fire gases or explosions of fire gases or fire-damp when the stopping is opened must be evacuated.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
All electrical installations in these workings must be cut off from the power supply.	C	C	C	C	C	C	C'	C'	C'	C'	C'	C'
On safety grounds, it is advisable to open the return stopping first.	NRP	NRP	C	C	C'	C'	C'	C'	C'	C'	C'	C'
After the Rescue Team has withdrawn to less dangerous zones, the intake stopping should be opened.	NRP	NRP	C	C	C'	C'	C'	C'	C'	C'	C'	C'
When ventilating the fire area, the quantity of air and the content of inflammable gases in the air-current circulating through the fire area, and in the current into which it subsequently flows, should be checked.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
The two air-currents should be mutually adjusted in such a manner as to ensure that no explosive mixture of gases is present over long distances after their junction.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
Access to the fire area is prohibited until it has been ventilated.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
V. OPENING OF FIRE AREAS CONTAINING EXPLOSIVE GAS MIXTURES Sealed-off districts may not be re-opened, either on one side or on two sides, if the presence of explosive gas mixtures behind the stoppings is established.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
VI. OPENING OF FLOODED FIRE AREAS The composition of the air in fire areas flooded to extinguish the fire must be checked after draining.	C	C	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
In workings with solid coal, allowance must be made for the increased hazard of spontaneous ignition after drainage. Where fire areas have been isolated by local flooding instead of by stoppings, the rules mentioned in section I to V should be observed, insofar as applic-able, when opening a district.	C	C	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
VII. REMANNING OF FIRE AREAS After ventilating a fire area, workings may not be manned until a Rescue Team has established that all workings are free of noxious gases.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
If the fire area is merely being re-duced in size, workings free of noxius gases may be manned only when the remainder of the fire area has been sealed-off by permanent stoppings.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
III - Guidelines for the construction of advance fire stoppings from plaster (doc. 4928/63/2) In all cases where it is possible and advantageous, the erection of plaster stop-pings to seal off fires and heatings is recommended.												
Is this process applied in practice as laid down in the guidelines contained in the report?	(1) NRP	(2) NRP	C	C	yes	yes	(3) yes	(3) yes	E	E	E	E
Is the application of this process prescribed by regulations?	NRP	NRP	C	C	no	no	no	no	no	no	E	E
Is this process applied in practice in a man-ner differing from the principles laid down?	NRP	NRP	yes	yes	no	no	no	no	no	no	E	E
Is the application of this modified process prescribed by regulations?	NRP	NRP	yes	yes	no	no	no	no	no	no	E	E
IV - Fourth report on specifications and testing conditions relating to fire-resistant fluids used for power transmission Part II - Specifications and test conditions (pp. 19 onwards) Article 1 - Conditions of authorisation 1. Fire-resistant fluids for hydraulic power transmission and hydraulic control, before												

(1) *formulation of guidelines relating to fire stoppings and sealings; the section "fire stoppings made of bending materials" is equally applicable to advance fire stoppings.*
(2) *the construction of advance stoppings against will be the subject of new regulations when the fire-fighting directives are revised.*
(3) *the choice of means is, however, left to the mine-manager.*

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
being used in mine workings, must be given a certificate of approval.	C	C	C	C	C'	C'	C'(1) +E(2)	C'(1) E (2)	E	E	E	E
This certificate must indicate that the product has been subjected to the following tests :												
a) Laboratory tests (articles 3 - 7)												
aa) to determine criteria of flammability (article 3, p. 22)	C	C	C	C	C'	C'	C'E	C'E	E	E	E	E
bb) to determine health criteria (article 4, p. 23)	C	C	C	C	C'	C'	C'E	C'E	E	E	E	E
cc) to determine technical criteria (article 5, p. 23)	C	C	C	C	C'	C'	C'E	C'E	E	E	E	E
b) Long-term tests during normal operations (article 8, p. 27)	C	C	C'	C'	C'	C'	C'E	C'E	E	E	E	E
2. These tests are carried out under an authorised body.	C	C	C	C	C'	C'	C'E	C'E	E	E	E	E
3. Authorisation for use underground should be dependent on presentation of the certificate mentioned in 1. above.	C	C	C	C	C'	C'	C'E	C'E	E	E	E	E
Article 9 - Withdrawal of approval												
At the request of the authorised body, the permitting authority may withdraw the approval for the fluid to be used in mine workings.	C	C	C	C	NRP	C'	C'E	C'E	E	E	E	E
V - Report on the electro-magnetic examination of winding rope (doc. nr. 8470/64/2).												
Steps taken to develop electro-magnetic testing methods and results obtained.	C'3	C(4) (3)	-(5)	C'	C'(3)	C'(3)	C'(3)	C'(3)	?	(6)	C'	C'
VI - Report on the use of accelerometers to test winding installations doc. 3725/1/61, p. 9 (German text).												
Tests with accelerometers should be continued on a large scale.	C'	C'	-(3)	C'	-	-	-	-	E	E	C'	C'
Use of accelerometers should be extended.	C'	C'E(7)	-(3)	-(3)	-	-	-	-	E	E	C'	C'
VII - Recommendation regarding the consulting of foreign experts in the case of rescue operations connected with major mining accidents (doc. 4364/61/3).												
In certain serious mining accidents advice requested by the leaders of the rescue operation from qualified foreign experts in mine-rescue matters.												
The heads of Mine Rescue Stations are provided for this purpose with a plan containing the most important addresses and information needed.	C'(8)	C'(8)	C'(8)	C'(8)	C'(8)	C'(8)	C'(8)	C'(8)	C'	C'	C'(8)	C'(8)
This plan should be constantly kept up-to-date.	C'(8)	C'(8)	C'(8)	C'(8)	C'(8)	C'(8)	C'(8)	C'	C'	C'	C'(8)	C'(8)

(1) in the Charbonnages de France register, the Mines Safety Commission Recommendations have been taken into account.
(2) the question of drawing up a new regulation is being examined by the competent authority.
(3) trials to improve electro-magnetic testing methods are underway.
(4) electromagnetic monitoring is required in the special case of cables consisting of flat wires in multiple layers.
(5) measurements are taken in individual cases.
(6) electromagnetic examination of cables is not compulsory.
(7) the formulation of rules regulating acceleration measurements in certain cases is being examined.
(8) the main First-Aid Stations are in touch with the main Rescue Stations in the Community countries.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
VIII - Report on firedamp-proof electrical equipment for nominal voltages above 1,100 volts (doc. 2400/64/1)												
1. What use has been made of the information contained in this report, and, in particular, to whom was it distributed?	Since, to all intents and purposes, only low-oil or oil-less switch-gear is being used up to the present in new plant no special use has been made of the information. It is for this very reason that no further research is being envisaged.		The information has been distributed to the department responsible for electrical equipment at the Technical Supervision Centre for mining equipment. No such research carried out in the Saar.		NRP - With regard to approval of these H.T. switchgear units.		NRP - Revision of the General regulations regarding use of electricity underground, especially in gassy pits, is in hand.		Nominal voltages over 1.100 volts forbidden.		NRP - Brought to the notice of all pits.	
2. The Workings Party has noted that, in the Community countries, research into the development of low-oil or oil-less H.T. switchgear having the correct characteristics for use in gassy pits is being continued. What is the present position regarding this reserach and what data have been obtained to date?												
3. The Working Party has noted that oil is being used in respect of relays, and that research would be needed to reduce or eliminate the use of oil. What research is being carried out to this end?	*(1)*	*(1)*	*(2)*	*(2)*	?	?	NRP	NRP	*(3)*	*(3)*	*(2)*	*(2)*
4. This Report notes that switchgear specialists are trying to use less - or even no - oil with voltages above 1,100 volts and that, in particular, oil-less switchgear with separate poles, and low-oil switchgear, were being more and more widely used in most countries, at least for new plant. These observations were deduced from practice during 1960 - 1962. What have been the trends since then?	*(4)*	*(4)*	*(5)*	*(5)*	*(4)*	*(4)*	NRP	NRP	*(6)*	*(6)*	*(5)*	*(5)*

(1) trials with oil-less relays are underway.
(2) no research of this kind is being carried out.
(3) see above.
(4) this trend continues.
(5) not applicable.
(6) cf. p. IX, 33.

II - HUMAN FACTORS

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
Recommendations on the fixing of climatic limits (the unabridged text is reproduced in doc. 3034/4/62)												
1.1 The basis is the American effective temperature (° eff basic scale).	C	C	C	C	C'	C'	(1) E	(1) E	NRP	NRP	C	C
Air velocities above 3 metres/sec should be considered as only 3 metres/sec in determining the American effective temperature.	(2) C	(2) C	C	C	C'	C'	–	–	NRP	NRP	C	C
1.2 The temperature data must be given so as to make possible a comparison on the basis indicated under 1.1.	C	C	C	C	C'	C'	–	–	NRP	NRP	C	C
1.3 The climatic limits determined shall be maximum values.	C	C	C	C	–	–	–	–	NRP	NRP	C	C
More favourable climatic values for the workers shall remain unchanged.	C	C	C	C	–	–	–	–	NRP	NRP	(3) –	(3) –
1.4 There will be further investigation into the effectiveness and accuracy of the various climatic indices.	–	–	–	–	–	–	–	–	NRP	NRP	(3) –	(3) –
2. Determination of a maximum climatic value												
2.2 Work on location is forbidden in working places where the temperature exceeds 32° eff A (basic scale), excepting the cases named in 2.3 and 2.4.	C	C	C	C	–	–	(4) E	(4) E	NRP	NRP	C	C
2.3 An exception can be made to the ban on working on location in temperatures above 32° eff A (basic scale) if the competent authority has given permission and the workers in question have been medically examined.												
In this case the following conditions must also be fulfilled :	(5) C	(5) C	C	C	–	–	–	A	NRP	NRP	C	C
2.3.1 The responsible authority can only issue permission for a fixed period and for given working operations.	C	C	C	C	–	–	–	–	NRP	NRP	C	C
2.3.2 The work must be carried out under medical supervision.	C	C	(6) C	(6) C	–	–	–	–	NRP	NRP	C	C
Guidelines must be worked out, in collaboration with medical experts, covering the medical examination envisaged under 2.3.	C	C	–	–	–	–	–	–	NRP	NRP	C	C
2.3.3 Work must not continue uninterrupted for more than one hour. A suitable break must then be arranged in a better "climate".	C	C	C	C	–	–	–	–	NRP	NRP	C	C
The duration of uninterrupted working time, as well as the duration and frequency of the breaks and the climatic range in which this break is spent, as also all other necessary provisions are to be laid down in writing by the competent authority together with the responsible doctor before the work begins.	C (7)	C (7)	C	C	–	–	–	–	NRP	NRP	C	C

(1) climatic values only have to be determined in certain very exceptional cases.
(2) 3,5 metres/sec.
(3) not applicable.
(4) working points where the temperature reaches 28°C are considered as particularly hot (without this being an absolute maximum value).
(5) for mine rescue personnel.
(6) medical supervision obligatory.
(7) laid down generally in the mine rescue plans.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
2.3.4 Acclimatised persons must be chosen. Persons over 40 years of age should not be put to this work.	C	C	-	(1) C	-	-	-	-	NRP	NRP	C	C
Persons under 21 and over 45 years of age must not be put to this work.	C	C	(2) C	(2) C	-	-	-	-	NRP	NRP	C	C
2.4 An exception can also be made to the ban on working on location in temperatures above 32° eff A (basic scale) if danger threatens or in special circumstances calling for immediate action.	C	C	C	C	C'	C'	C	(3) C	NRP	NRP	C	C
In such case, however :												
2.4.1 The competent authority and the responsible doctor must be immediately informed.	C	C	C	C	C'	C'	-	-	NRP	NRP	C	C
2.4.2 This work must be performed as soon as possible under the conditions listed in 2.3.1 to 2.3.4.	C	C	C	C	C'	C'	C'	C'	NRP	NRP	C	C
3. Climatic range between 32° eff A and 28° eff A (basic scale)												
3.1.1 Only persons shown by medical examination to be suitable can be employed in this climatic range.	A	A	C'	C'	-	-	C	C	NRP	NRP	C'	C'
The medical examination must pay particular attention to the heart and to blood circulation.	A	A	C'	C'	-	-	C	C	NRP	NRP	C'	C'
Persons continually employed in this climatic range must be examined medically at least once a year.	A	A	-	-	-	-	C	C	NRP	NRP	C'	C'
In addition, the following provisions apply :												
3.1.2 As soon as a working-point reaches a temperature above 28° eff A (basic scale) the competent authority must be informed in writing.	A	A	C (4)	(4) C	-	-	-	-	NRP	NRP	C	C
3.1.3 The length of stay in the climatic range between 30° and 32° eff A (basic scale) is restricted to 5 hours, and in the range between 28° and 30° eff A (basic scale) to 6 hours.	A	A	C (5)	(5) C	-	-	-	-	NRP	NRP	C	C
	C	C	C	C	C'	C'	-	-	NRP	NRP	C	C
3.1.4 For work in a climatic range between 28° and 32° eff A (basic scale) a method of payment corresponding to these conditions must be applied to eliminate any overloading.	A (6)	A (6)	A (6)	A (6)	-	-	C	C	NRP	NRP	C'	C'
3.1.5 The provisions quoted in 3.1.3 and 2.1.4 apply to all persoms who, during one shift, have to work more than half the time of that shift in one of the climatic ranges mentioned above.	A	A	C	C	-	-	-	-	NRP	NRP	C'	C'

(1) only required for rescue work.
(2) no provision made for excluding persons below 21 years of age from exceptional hot work.
(3) ... ban on work on location in excessively high temperatures ...
(4) if 30° eff A (basic scale) is reached or exceeded, the Mines Inspectorate must be informed.
(5) six hours.
(6) must be arranged by tariff, outside the intervention of the Mines Inspectorate.

C - Regular report on the implementation of the Mines Safety and Health Commission's Recommendations published in the Fourth Report

HUMAN FACTORS

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
I. Recommendations on the psychological and sociological factors affecting safety (3rd report of the Mines Safety Commission, p. 425)												
1. Measures which will make it possible for workmen to recognise dangers and to carry out their work in such a way that these dangers are avoided												
1.1 Recognising dangers												
1.1.1 Before starting work in a district, a section of a working or a workingpoint and before any planned major change in the manpower deployment or in working conditions, it is important to check all the safety precautions to meet any dangers to be encountered.	C	C	C	C	C'	C'	C	C	C'	C'	C'	C'
1.1.2 During the work, regular reports on the following points must be prepared on the basis of the safety conditions which have to be observed under continuous supervision :												
a) changes in operating conditions									*(2)* C'	*(2)* C'		
b) accidents or incidents					*(1)* C	C			C'	C'		
c) dangerous situations encountered during work	C+C'	C+C'	C+C'	C+C'	*(3)*	*(3)*	C'	C'	C'	C'	C'	C'
The data brought together in these reports should be systematically assessed with a view to improving or adapting the safety precautions in force.	C+C'	C+C'	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
1.1.3 After the work has been finished, the data assembled on the basis of daily experience should be used to prepare a report of experience which should at least include information regarding the winning methods used,	C'	C'	C'	C'	*(4)*	*(4)*	C'	C'	*(5)*	*(5)*	C'	C'
the dangers which have arisen and the precautions taken to deal with them,	C'	C'	C'	C'	*(4)*	*(4)*	C'	C'	C'	C'	C'	C'
together with any accidents, incidents and dangerous situations which have occurred during the working operations.	C'	C'	C	C	*(4)*	*(4)*	C'	C'	C'	C'	C'	C'
	C'	C'	C	C	*(4)*	*(4)*	C'	C'	C'	C'	C'	C'
1.2 Making known the dangers to all concerned												
1.2.1 Before starting work in a district, a section of a working or a workingpoint or in the event of a major change in the operating conditions, it is advisable to arrange a discussion between representatives of the management, supervisory staff and members of the safety services as well as the workers concerned or their representatives, in order :												
- to inform each individual with regard to the work envisaged												
- to study in detail the work to be carried out												

(1) no report is drawn up, verbal or written instructions given to the personnel concerned.
(2) as regards the pattern of work and not actual operations as mentioned in the text.
(3) such situations are discussed at management or supervisor level, no report is drawn up.
(4) no report is drawn up although account is taken of experience gained.
(5) not only when work is finished but in any case either weekly, monthly or annually.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
- to settle upon the method of work	C'	C'	C'	C'	(1)	(1)	(2) C'	(2) C'	C'	C'	C'	C'
1.2.2 The workers concerned should be informed by the most appropriate means of the method of work chosen.	C	C	C	C	C'	C'	C	C	C'	C'	C'	C'
1.2.3 During the execution of the work, the management and the supervisory staff should refer to the regulations and instructions to be observed as often as necessary to counteract the effects of habit.	C	C	C	C	C'	C'	C	C	C'	C'	C'	C'
1.2.4 If it is considered necessary to issue new safety instructions, these should be brought regularly to the notice of every worker concerned.	C	C	C	C	C'	C'	C	C	(3) C'	(3) C'	C'	C'
1.2.5 Reports made by each of the workmen regarding dangerous situations which arise during the work should be brought to the notice of the management staff.	C	C'	C	C	C'+C	C'+C	C'	C'	C'+C	C'+C	C	C
1.3 Instruction in the manner in which the work is to be carried out without danger												
1.3.1 Every worker assigned to underground work must be able to show that he has :												
- a general training as an underground worker;	C	C	C	C	(4) C'	(4) C'	C'	C'	(5)	(5)	C	C
- a special training for the work to which he is to be assigned;	C	C	C	C	C'	C'	C'	C'	(5)	(5)	C	C
- the necessary additional training to cover the special working conditions at the point where he will work.	C	C	C	C	C'	C'	C'	C'	(5)	(5)	C	C
1.3.2 Should there be a change in the work or in the working conditions, the necessary additional training must be provided.	(6) C'	(6) C'	C	C	C'	C'	C'	C'	C'	C'	C'	C'
1.3.3 Instruction in safety precautions is to be considered as an integral part of vocational training.	C	C	C	C	C'	C'	C'	C'	C'	C'	C'	C'
1.4 Supervision to check that safety regulations are observed during work												
1.4.1 During the work, the safety consitions must be subject to continual supervision.	C	C	C	C	C	C	C	C	C'	C'	C	C
1.4.2 The duty to see that safety regulations are observed, and the responsibilities resulting from this duty, fall upon the management and supervisory staff.	C	C	C	C	C	C	C	C	C	C	C	C
1.4.3 The supervision, which must be exercised with authority, should in its every-day action seek to improve the training and education of the workmen on the basis of daily experience, and should give rise to fines or penalties only in very serious or repeated cases of infringement.	C'	C'	C'	C'	C'+ (7)	C' (7)	C'	C'	C'	C'	C'	C'
2. Training the management and supervisory staff in the matter of safety												

(1) this takes place at engineer or supervisor level, or even at Safety Committee level, but not at meetings where all the people mentioned are present.

(2) workers' safety representatives may give their opinion and submit their observations in the form provided for in the labour legislation.

(3) by means of service instructions issued by the management of the mine, or of service notes issues by departmental heads and supervisers.

(4) convention of the Joint National Mines Commission.

(5) systematic training courses were provided up to 1963. After 1963, no new staff were engaged and therefore apprenticeship and training are only provided where new machinery and equipment is introduced.

(6) laid down by the responsible authorities for particular cases, otherwise generally included in the enterprises manual.

(7) concerns the last part of the sentence: "... and should give rise ...".

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
2.1 General												
2.1.1 Steps must be taken to ensure that the supervisory staff does not change posts frequently	C'	C'	*(1)* A	C'	C'	C'	C'	C'	?	C'	C'	C'
2.1.2 The vocational training should be adapted to the particular features of the staff member's task and his responsibilities, and in particular to the requirements of his place in the hierarchy of management or supervisory staff.	C'	C'	C	C	*(2)* C+C'	*(2)* C+C'	C'	C'	C+C'	C+C'	C'	C'
2.1.3 The transition from one grade to another should be possible for a given person only after he has actually proved to have the required knowledge and skill.	C'	C'	C	C	C'	C'	C'	C'	*(3)* C'	*(3)* C'	C'	C'
2.2 Guidelines for the vocational training of the management or supervisory staff												
2.2.1 The management and supervisory staff must have an adequate knowledge of :												
- the safety regulations;	C	C	C	C	C'	C'	C	C	C'	C'	C	C
- the safety precautions to be taken;	C	C	C	C	C'	C'	C	C	C'	C'	C	C
- the available safety equipment and its use;	C	C	C	C	C'	C'	C	C	C'	C'	C	C
- the instructions in force for the different vocational groups whose work they are called upon to supervise, and the instructions for the exercise of activities at the working points for which they are responsible.	C	C	C	C	C'	C'	C	C	C'	C'	C	C
2.2.2 The management and supervisory staff must be able :												
- to point out in a suitable way to the workers under their orders the dangers associated with their work;	C'	C'	C	C	C'	C'	C	C	C'	C'	C'	C'
- to instruct these workers as to how best to carry out the work in order to avoid these dangers.	C'	C'	C	C	C'	C'	C'	C'	C'	C'	C'	C'
2.2.3 The management and supervisory staff should be trained in how to issue instructions.	C'	C'	C'	C'	*(4)* C'	*(4)* C'	C'	C'	*(5)* C'	*(5)* C'	C'	C'
2.2.4 Special attention must be paid to the continual further training of all management and supervisory staff.	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
2.2.5 The management and supervisory staff must both :												
- account for and report on the execution of their work, and	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
- account for and report on all accidents and other notable incidents which have occurred during the working period at the points for which they are responsible.	C	C	C'	C'	C'	C'	C'	C'	C	C	C'	C'
2.2.6 The management and supervisory staff must be able :												
- to draw up accident reports correctly;	C	C	C'	C'	*(6)* C'	*(6)* C'	C'	C'	C'	C'	C'	C'
- to assess and use the data in these reports;	C'	C'	C'	C'	*(6)* C'	*(6)* C'	C'	C'	C'	C'	C'	C'
- to study and establish the causes of accidents;	C'	C'	C'	C'	*(6)* C'	*(6)* C'	C'	C'	C'	C'	C'	C'

(1) cannot be laid down in the form of a regulation.
(2) for the shotfirer.
(3) by limited competition in the E.N.E.L. (Ente Nazionale per l'Energia Elettrica)
(4) for the management staff. No systematic training in management for other grades.
(5) this is not considered as a subject for training. Preference is given to constant supervision of the staff.
(6) for the management staff. For supervision staff in certain cases only.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
- to work out means to avoid accidents;	C'	C'	C'	C'	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C'	C'
- to receive the training necessary to this end.	C	C	C'	C'	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C'	C'
2.3 Staff responsible for training												
2.3.1 The staff responsible for the training activities set out in paragraphs 1.3 and 2 must be numerous enough and must have available the necessary means and time to carry out their task properly.	C	C	C	C	C'	C'	C'	C'	*(2)*	*(2)*	C'	C'
2.4 Drawing up of an accident report; training of staff responsible for filling in such reports												
2.4.1 The accident report must, taking into account all the appropriate human and technical factors, give all necessary information and in particular :												
- the circumstances, the consequences of the accedent, the causes,	C	C	C	C	C	C	C'	C'	C'	C'	C'	C'
- the precautions proposed to avoid similar accidents	C	C	C	C	C	C	C'	C'	C'	C'	C'	C'
2.4.2 Each of these items of information referred to in point 2.4.1 must be capable of formulation as an answer to a clear and precise question.	C	C	C	C	C	C	C'	C'	C'	C'	C'	C'
2.4.3 The breakdown and layout of the form used for accident reports must clearly show which questions have to be answered by each of the members of the staff contributing to the preparation of the reports.	C'	C'	C	*(3)* C'	C	C	C'	C'	C'	C'	C'	C'
2.4.4 There must be sufficient room on the form for supplementary remarks or sketches which may be provided by the person or persons concerned.	C'	C'	C	*(3)* C'	C'	C'	C'	C'	C'	C'	C'	C'
2.4.5 Each of the persons contributing to the preparation of the report must be informed with regard to :												
- the importance of each question,	C	C	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
- the way to provide correct answers to the questions.	C	C	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
2.4.6 Practical instruction should be provided to draw the attention of the employees concerned to the consequences of omissions, neglectful or unclear answers to the questions.	C'	C'	C'	C'	*(4)*	*(4)*	C'	C'	*(2)*	*(2)*	C'	C'
2.4.7 Systematic attention should be paid to ensure that the answers are complete, accurate and precise.	C	C	C'	C'	C	C	C'	C'	C'	C'	C'	C'
2.4.8 The accidents reports referred to in this chapter are to be drawn up for the sole purpose of accident prevention.	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
2.5 Appointment and promotion of management or supervisory staff												
2.5.1 Care should be taken to ensure that there is available an adequate number of management or supervisory staff possessed of the requisite skills both in the technical and safety fields.	C+C'	C	C	C	C+C'	C+C'	C'	C'	C+C'	C+C'	C'	C'

(1) for the management staff. For supervision staff in certain cases only.
(2) systematic training courses were given up to 1963. After 1963, no new staff were engaged and therefore apprenticeship and training are only provided where new machinery and equipment is introduced.
(3) the form used by the professional mining organisation does not comply entirely with this provision.
(4) does not exist.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
2.5.2. The selection of this staff is the responsibility of the employer, who must at least inform the competent authority of the persons entrusted with supervision of working operations, together with the necessary data justifying the selection.	C	C	C	C	C	C	*(1)* C	*(1)* C	C+C' *(2)* A	C+C' *(2)* A	C	C
2.5.3 To ensure a selection which promises success, there should be laid down the minimum requirements for appointment to a post in one of these categories, either by direct appointment or by promotion, together with the certificates and other documents which are the necessary requisite for such an appointment.	C'	C'	C	C	*(3)*	*(3)*	C'	C'	*(4)* C	*(4)* C	C	C
2.5.4 The competent authority should be in a position to check the knowlegde and skills of the management or supervisory staff - both from the human and technical points of view - should this authority consider it necessary, at least in the case of a major failure or of repeated failures in the performance of duties.	C	C	C	C	*(5)* C	*(6)* C	A	A	A	A	C	C
3. Usefulness of psycho-technical examinations												
3.1 On assignment												
3.1.1 It is recommended that the application of a relatively simple psycho-technical examination upon assignment should be developed as far as possible, in order to :												
- determine the general intellectual level of the candidate;	*(6)* C	C'	C	C	*(7)* C'	*(7)* C'	C'	C'	*(8)* C+C'	*(8)* C+C'	C'	C'
- to exclude those candidates whose intellectual level lies below a pre-determined minimum.	C	C'	C	C	*(7)* C'	*(7)* C'	C'	C'	*(8)* C'	*(8)* C'	C'	C'
3.2 Before the exercise of specific duties												
3.2.1 In every instance, the workmen who are to be made responsible for the execution of particular working operations. - with which there is associated a particular responsibility in respect of collective safety or - which call for particular intellectual or personality characteristics should be subjected to a special psycho-technical examination to determine whether they have the capacities required for this activity.	*(6)* C	*(6)* C	*(9)* C+E	*(9)* C+E	*(10)* C'	*(10)* C'	C'	C'	E	E	C	C
3.2.2 The competent authority must, in co-operation with the representatives of the employers and employers, keep up to date the list of work for which those special examinations are to be prescribed and, to this end, should list												

(1) the managing director of the mine informs his chief engineer of the name of the departmental head in charge of technical matters.
(2) as regards the reasons for the choice.
(3) does not exist in practice.
(4) the law lays down a provision concerning the academic qualifications of directors and departmental heads.
(5) for the shotfirers.
(6) psycho-technical examinations are required for certain duties only (winding-enginemen, locomotive drivers). Other enterprises have these types of examination for other duties.
(7) this ceased when recruitment was discontinued.
(8) cf. 2) on previous page.
(9) for winding-enginemen and locomotive drivers.
(10) ceased when recruitment was discontinued.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
the duties which have been shown by experience to call for such tests and for which such tests can in practice be carried out.	*(1)* C	*(1)* C	E	E	*(2)*	*(2)*	A	A	E	E	C'	C'
3.3 Before any promotion of a worker to a supervisory post												
3.3.1 Before the promotion of any workman to a supervisory post, a suitable psycho-technical examination must be carried out.	*(3)* A	*(3)* A	*(3)* A	*(3)* A	*(4)* C	*(4)* C	C'	C'	E	E	C'	C'
3.4 Principles underlying the various psycho-technical examinations												
3.4.1 The psycho-technical examinations listed under 3.2 and 3.3 should, as far as possible, aid the vocational specialisation of the worker in question.	C	C	C	C	C'	C'	C'	C'	*(5)*	C'	C'	C'
3.4.2 The management must lay down the criteria which have to be met by the candidate on assignment, or later, when directed to special tasks,	*(6)* C	*(6)* C'	E	C+ E	C'	C'	C'	C'	C'	C'	C'	C'
and must seek the advice of psychologists when so doing.	*(6)* C'	*(6)* C'	E	C+ E	C'	C'	C'	C'	C'	C'	C'	C'
3.4.3 The psychologist's assessment will be valid only for a restricted period and must be compared with the assessments of the vocational behaviour of the person in question.	*(6)* A	*(6)* C'	E	C+ E	*(4)* C'	*(4)* C'	C'	C'	E	E	C'	C'

(1) cf. 6) on previous page.
(2) does not exist.
(3) eligibility for promotion within the supervisor grade is determined during the vocational training laid-down by the responsible authorities.
(4) when there was in fact a psychological department.
(5) systematic training courses were given up to 1963. After 1963, no new staff were engaged and therefore apprenticeship and training are only provided when new machinery and equipment is introduced.
(6) psycho-technical examinations are required for certain duties only (winding-enginemen, locomotive drivers). Other enterprises have these types of examination for other duties.

GENERAL REMARKS ON IMPLEMENTATION BY ITALY

It should be noted that, pursuant to Article 23 of the Mining Regulations in force, the subject referred to above has been included in the collective agreements.

The Italien coalmines, which as is well known, are only worked in the Sulcis (Sardinia) coalfield, have been for some time placed under the control of the "Ente Nazionale per l'Energia Elettrica (E.N.E.L.)", since their total production is intended for the Porto Vesme (Cagliari) thermal plants. The staff in these mines benefit from the guarantees given by the collective agreement apllicable to workers in the electricity sector, which is among the most favourable collective agreements at present in force in Italy. In particular, this agreement excludes piecework and, consequently a negative answer should be given to the questionnaire as regard the application of the recommendation concerned or, in any case, the latter should be considered as not complying with the de facto situation.

For the sake of covering all contingencies, however, it was considered advisable to include the rather improbable possibility of new coalmines being opened, which are not directly linked with the production of electrical energy, and to answer the questionnaire on the basis of the collective agreement of 13 May 1967 which is applicable in the mining industry.

It should also be noted that, from page VIII, 41 onwards of the questionnaire concerned, the symbol "C" and other symbols used in the answer refer to clauses of the collective agreement mentioned above and not to standards codified in the form of legislation or regulations.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
II. Recommendations as to principles to be observed in view of the possible influence of payment at piece rates on safety in coalmines (4th report of the Mines Safety and Health Commission, Annex IV)												
1. Piecework arrangements	*(1)*	*(1)*										
1.1 Minimum age; medical examinations												
1.1.1 To be assigned to piecework, a miner must												
- be not less than 18 years of age	C	C	C	C	C	C	NRP	C	*(2)* C	*(2)* C	C	C
- have underground a medical examination to establish his fitness for such work.	*(3)* C	C	C	C	C	C	C	C	*(2)* C	*(2)* C	C	C
1.1.2 Similar examinations must follow at regular intervals.	*(3)* C'	C'	*(4)* C	*(4)* C	C	C	C	C	*(2)* C	*(2)* C	C	C
1.2 Make-up of piece rates												
1.2.1 Written particulars of the operations to be performed must be given to the men concerned, including such information as is needed to calculate the amount payable therefor.	*(5)* C'	*(5)* C'	C'	C'	C'	C'	C	C	C'	C'	C'	C'
1.2.2 In the interests of safety, the piecework arrangement employed must either												
- provide that operations of importance to safety shall be paid on a separate basis, or	-	-	-	-	C'	C'	-	-	C'	C'	C'	C'
- contain equivalent financial safeguards for the proper execution of such operations.	*(5)* C'	*(5)* C'	C'	C'	C'	C'	C'	C'	C'	C'	C'	C'
1.2.3 In the event of its being found necessary to carry out safety operations not expressly provided for, this must not be allowed to affect the pay of the man or men concerned.	*(5)* C'	*(5)* C'	C'	C'	C'	C'	C	C	C	C	C	C
1.3 Fixing of norms and of rates payable therefor												
1.3.1 The men must have the right to discuss the fixing of piecework norms and rates with the employer.	*(5)* C'	*(5)* C'	C'	C'	C'	C'	C	C	C	C	C	C
1.3.2 If agreement is not reached, the men or their representatives must have the right to start conciliation proceedings under 4 below.	*(5)* C'	*(5)* C'	C'	C'	C'	C'	C	C	*(7)*	*(7)*	C	C
1.4 Forms of piecework												
1.4.1 One-man piecework should preferably be permitted only where the operations concerned are not of a nature to allow any other form of piecework.	*(6)* A	*(6)* A	C'	C'	?	?	C'	C'	C'	C'	C	C
1.5 Determination of the norm												
1.5.1 The norm must be determined in accordance with:												
the amount of time actually available during a normal shift;	*(5)* C'	*(5)* C'	C'	C'	C'	C'	C	C	C'	C'	C	C
the amount of work the men can fairly be expected to perform during this time, having regard to the working conditions;	*(5)* C'	*(5)* C'	C'	C'	C'	C'	C	C	E	E	C	C

(1) Questions relating to pay cannot be dealt with by the responsible authorities. Such questions are settled by means of collective agreements.
(2) pursuant to the Mining Regulation and to the provisions relating to young workers.
(3) all workers are subjected to medical examinations when taken on and to similar examinations at regular intervals.
(4) periodic X-ray examinations (every 15 months at most). Periodic clinical examination only where signs of pneumoconiosis are detected or on medical advice.
(5) settled by collective agreement.
(6) for certain operations, one-man piecework is considered by both sides to the agreement as the most appropriate type of remuneration.
(7) the collective agreement does not provide for conciliation procedures, although such procedure exists and the Ministry of Labour and Social Security acts as an arbitrator (whose decisions are not binding).

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
the amount of time required to perform the operations properly.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	C'	C'	C	C
1.6 Calculation of the end wage												
1.6.1 The basis and mode of calculation must be sufficiently simple for any worker to be able to work out for himself the sum due to him for a given period.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	C'	C'	C'	C
1.7 Performance in piecework												
1.7.1 Regulations should be laid down requiring that periodic checks be carried out on the amounts of work performed for the purpose of determining the wages payable therefor,	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	C'	C'	C	C
and that the findings be duly notified to the men concerned.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	C'	C'	C	C
1.7.2 Particulars must be supplied to the men of all additions and deductions affecting the amount of the end wage, together with details as to how these were calculated.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	C'	C'	C	C
2. Changes in conditions at the workplace												
2.1 A piecework arrangement may be terminated or amended if the employer and the men are agreed that genuine difficulties warranting this course have been objectively found to exist.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	C'	C'	C'	C'
Failing such agreement, the men must have the right to ask nevertheless that the arrangement be terminated or amended forthwith.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	C'	C'	C	C
2.1.1 If the men cannot be paid at piece rates for so long as the difficulties persist, they must be paid a proper wage appropriate to their grade.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	*(2)* C	*(2)* C	C	C
3. Managerial and supervisory staff												
3.1 In the interests of safety, extra supervision must be provided in workings where men are employed on piecework.	C'	C'	C'	C'	?	?	C'	C'	C'	C'	C'	C'
3.1.1 Since failure to carry out safety operations in good time can result in particular hazards, the supervisory personnel must give the men strict and relevant instructions to this effect, and check regularly to see that these are carried out.	C'	C'	C'	C'	C	C	C	C	C'	C'	C	C
3.2 Payment of managerial and supervisory staff												
3.2.1 Since managerial and supervisory staff are responsible not only for the organisation and smooth running of operations, but also for the safety of the men engaged in them, they should as a rule be paid out on a basis independent of the ups and downs of production.	*(3)* A	*(3)* A	C'	C'	C	C	C	C	C	C	C'	C'
They may be granted production or output bonuses provided they have at the same time a sufficient financial incentive to devote the necessary attention to safety.	*(3)* A	*(3)* A	C'	C'	C'	C'	C	C	C	C	C'	C'
4. Settlement of disputes												
4.1 There sould be a conciliation system for dealing with any disputes arising between manage-												

(1) settled by collective agreement.
(2) the collective agreement guarantees minimum pay and ancillary allowances.
(3) cannot be subject of Mines Authority prescriptions. Settled according to area.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
ment's and men's representatives with regard to piecework arrangements or their implementation.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	*(2)*	*(2)*	C	C
4.1.1 The conciliation system should operate by means of a board on which employers and workers are equally represented, and which should approach disputes in the light of the present recommendations.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	*(2)*	*(2)*	C	C
4.1.2 The fact that proceedings of this kind are pending must not affect the terms of employment of the men concerned,	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	C'	C'	C	C
who must continue to be entitled to a fair wage appropriate to their grade.	*(1)* C'	*(1)* C'	C'	C'	C'	C'	C	C	C	C	C	C

(1) settled by collective agreement.
(2) systematic training courses were given up to 1963. After 1963, no new staff were engaged and therfore apprenticeship and training are only provided when new machinery and equipment are introduced.

D - Regular Report on the implementation of the Mines Safety and Health Commission's Recommendations published in the Fifth and Sixth Reports

TECHNICAL ASPECTS

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
VENTILATION												
Practical conclusions on the application of the theory of stabilisation of ventilation (sixth report of the mines safety and health commission - Annex III)												
1. Supervision of ventilation												
The supervision of ventilation in a mining system requires an overall view, and should therefore be entrusted to a single man specially appointed, having at his disposal all the necessary means for carrying out his task.	C'	C'	C	C	C'	C'	(1) C	(1) C	C	C	C	C
2. Fundamental factors in ventilation												
Apart from a regular inspection and analysis of ventilation conditions in mines, ventilation officials require to have data on												
- the actual characteristics of the main and auxiliary ventilation fans,	C	C	C	C	C'	C'	(2)	(2) C'	C'	C'	C	C
- the order of magnitude of the aerodynamic effect of natural ventilation in summer and winter,	C+ NRP	C+ NRP	C	C	C'	C'	C'	C'	C'	C'	C	C
- the potentials of the intersections (at least the main ones).	C	C	C	C	E	E	(3)	C' (3)	C'	C'	C	C
3. Additional representations of ventilation systems												
In order to obtain a precise picture of the overall structure of ventilation systems and to reveal possible instabilities, it would be advisable when necessary to have, in addition to the regulation diagrams, representations of other types, such as, for example :												
a) a representation of the whole of the mine workings in perspective (isometric or any other equivalent system);	C	C	C	C	E	E	(4)	C' (4)	C'	C'	C	C
b) a diagram without any topographical information	C' (5)	C'	C'	C' (5)	C'+E	C'+E	(3)	C' (3)	C'	C'	C	C
4. Characteristics of ventilation												
The representations mentioned in conclusion No. 3 should make available all the data necessary for the understanding of analysis of ventilation, particularly :												
a) at the measuring points												
- the air quantities	C	C	C	C	NRC	NRC	C	C	C	C	C	C
- the direction of the airflow	C	C	C	C	NRC	NRC	C	C	C	C	C	C
- the methane content	C	C	C	C	NRC	NRC	C	C	C	C	C	C
- the temperatures	C	C	C	C	NRC	NRC	(6)	(6)	C	C	C	C
- the pressures (at least at the principal intersections)	C	C	C	C	E	E	C'	C'	E	E	C	C

(1) in every colliery with over 500 workers the engineer responsible is also assisted by a supervisor who ensures application of the ventilation measures. In each coalfield an engineer has been specially entrusted with studying the application of the ventilation stabilisation theory adopted by the Mines safety and health commission.
(2) applies to recent ventilators, but not to old ones.
(3) these are being carried out.
(4) applicable to some coalfields, but not all.
(5) carried out by means of network plans in ventilation calculations made by electronic computers.
(6) headlines for the evaluation of pressure measurements are now being drafted.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
b) in addition												
- the lengths and average cross-sections of the roadway	C+C'	C+C'	C	C	E	E	C'	C'	C	C	C	C
- the calculated resistances	C'	C'	C	C	E	E	C'	C'	E	E	C	C
- the angles of inclination, particularly at the ends of the inclined and vertical section	C	C	C	C	E	E	C'	C'	C'	C'	C	C
- the positions of the air doors and control doors, and of the barriers	C	C	C	C	E	E	C	C	C	C	C	C
5. Inspection of ventilation conditions												
In each mine, there should be a systematic analysis of the ventilation system, at least once a year and after any major modification of the system, in order to detect any probable cases of instability under the normal operating conditions	*(1)* C+ NRP	*(1)* C+ NRP	C	C	E	E	*(2)* E	*(2)* E	C'	C'	C	C
In addition, cases of instability which may be caused by the introduction of additional aeromotive sources, or the changing or elimination of the existing aeromotive sources, should also be examined.	*(3)* C+ NRP	*(3)* C+ NRP	C'	C'	E	E	*(2)* E	*(2)* E	E	E	C	C
6. Informing the personnel												
Taking into account the importance of ventilation for the whole of the underground workings, each responsible person should be informed of ventilation conditions within his own field.	C	C	C	C	E	E	C	C	C'	C'	C	C
Furthermore it is essential that separate meetings should be held once a year at least, as well as after any major modification in the ventilation system, at which the colliery ventilation engineer will explain the ventilation conditions obtaining at the pit, together with any modifications which have recently been made, in the presence of :												
a) the management officials, the technical departments, the chief of the rescue team and the officials responsible for ventilation;	C'	C'	C	C	E	E	C'	C'	E	E	C	C
b) the local officials, each in respect of his own speciality	C'	C'	C *(4)*	C *(4)*	E	E	C	C	E	E	C	C
On these occasions, attention should be drawn to districts where instabilities are already likely in normal conditions and, in particular cases of instability which make the occurrence of a fire likely.	C'	C'	C'	C'	E	E	C'	C'	E	E	C	C
7. Exercises on plans												
Once a year at least, the management or the competent mining authority should organise an exercise on plans covering measures to be taken in the event of an underground fire. This should be attended by the mine owner or his representative, the ventilation engineer and the competent officials responsible for the organisation of fire fighting and rescue operations.	*(5)* C'	*(5)* C'	E	E	E	E	*(6)*	*(6)*	E	E	C	C

(1) not systematically recorded.
(2) now being studied by the users.
(3) headlines for the evalution of pressure measurements are now being drafted.
(4) this instruction is not usually given at separate meetings.
(5) will be regulated by the fire-fighting plan.
(6) these will be organised after implementation of the Budryk plan, but the ventilation officials and the rescue centres already contact each other from time to time.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972	1.1. 1970	1.1. 1972
8. Position of regulation doors When doors are necessary for regulating ventilation they should be placed as near as possible to roadway junctions, taking into account other requirements, in order to facilitate access in smoky conditions.	*(1)* A	*(1)* A	*(2)* A	*(2)* A	E	E	*(3)*	*(3)*	C'	C'	C	C
9. Measures and equipment for slowing-down ventilation In all collieries, devices for rapidly slowing-down ventilation in order to stabilise it shall be installed in all intake airways, subject to exceptions to be previously determined, after each roadway junction or branch, and as near as possible to it.	*(4)* A	*(4)* A	C	C	E	E	*(5)*	*(5)*	C'	C'	C	C
10. Instructions to officials in the event of underground fire Apart from the usual provisions regarding the obligation to attack any seat of a fire in order to extinguish it as soon as possible, and to inform the officials and management without delay, there should be instructions to officials laying down the other measures to be taken in the event of a mine fire in order to slow down ventilation so as to avoid an increase in the air supply to the seat of the fire.	*(6)* A	*(6)* A	*(7)* A	*(7)* A	E	E	*(8)*	*(8)*	E	E	C	C
11. Instructions to management officials in the event of underground fire No decision to modify the ventilation is to be taken by the management staff with a study being made of the consequences, by means of application of the theory of the stabilisation of ventilation, and with the help of plans and ventilation schemes which have previously been prepared in respect of all the possible causes result from the fire or from the structure of the mine (ventilation by multiple fans etc.).	C'	C'	*(7)* A	*(7)* A	E	E	*(9)* C'	*(9)* C'	C	C	C	C

(1) owing to the different local conditions a uniform regulation would be unsuitable.
(2) the decision is to be taken by the head of the fire-fighting unit.
(3) as soon as possible, but not automatically.
(4) experience has shown that it is more convenient to have a central store of materials for constructing regulation doors.
(5) now being studied by the users.
(6) the ventilation must be not modified except on the express order of the officials in charge.
(7) the decision is to be taken by the leader of the fire-fighting unit.
(8) not supervisors level but the chiefs of rescue teams and the rescue centres.
(9) to be specified after implementation of the Budryk plan.

E - Regular report on the implementation of the Mines Safety and Health Commission's Recommendations published in the 7th and 8th Reports

I. TECHNICAL ASPECTS

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972	
I. Use for foamed urethane												
Opinion on the use underground of foamed urethane in coal mines (7th Report of the Mines Safety and Health Commission, annex VI)												
The Mines Safety and Health Commission considers it desirable that the producers of the foamed urethane plastic should further develop the compound at present available in such a way that, while retaining unchanged the positive properties which it now has, it satisfies the requirement set out in the Commission's opinion.												
Are there any regulations governing the use underground of foamed urethane ?	*(1)* yes		E		NRP		no		no		*(2)* no	
II. Plaster stoppings												
Opinion on the construction of plaster stoppings using the hydromechanical process (doc. 3481/3/69); instructions for construction (8th Report of the Mines Safety and Health Commission, annex V)												
Is this recently developed process in use ?	yes		C		C'		*(3)* yes		E		no	
Is its use governed by any regulation?	yes *(4)*		C		no		no		no		-	
III. Cables supplying mobile machines and their electrical protection												
Recommendations arising out of the "Report adopted by the Mines Safety and Health Commission on 20 June 1969 on the characteristics and electrical protection of cables supplying mobile machines (coal cutters, loading machines, etc.) used underground in coal mines in the various Community countries" *(5)* (8th Report of the Mines Safety and Health Commission, Annex IX)												
(*) See 7th Report of the Mines Safety and Health Commission, Annex V.												
The Mines Safety and Health Commission recommends that electrical equipment supplying current to mobile machines should meet the following minimum requirements :												
A. Power should automatically be cut off cables supplying mobile machines in the following cases :												
a) phase to phase faults	C		C'		C		C'+ NRP		C'		yes	
b) faults between phase and earth	C		C'		C		C+NRP		C'		yes	
c) faults between phase and polarised screen	C'		C'		C		C'+ NRP		C'		*(5)*	
d) faults between conductor or polarised screen and earth;	C		C'		C		C'+ NRP		C'		*(5)*	
e) breaking of the monitoring circuit	C		C'		C		C'+ NRP		C'		yes	

(1) the use underground of liquid plastic products requires the approval of the Oberbergamt. Approval has so far only been granted for its use in rock consolidation. Its use for coating surfaces is not permitted.
(2) for use only after prior study.
(3) under trial.
(4) directives for the construction of stoppings of 21.4.71 - 18.13.1 II - 1.
(5) there is no polarised screen.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972	
B. The electrical installations defined above should be designed in such a way that any fault arising in the cable cannot result in unintentional starting of machines connected to the supply.	C'		C'		C		C'+ NRP		C'		yes	
C. CI or CB insulation monitors and BS safety blocks not automatically monitored should incorporate a device which monitors their operation and integrity, They should also have a fault-indicating device.	C'		C'		C		C'+ NRP		E		yes	
D. The BS safety block should be arranged so that the supply cable cannot become live again after power has been cut off due to a fault.	C'		C'		C		C'+ NRP		E		yes	
E. The monitoring circuit should not give rise to any risk of igniting firedamp.	C'		C'		C		C'+ NRP		C		yes	
F. The earth conductors should be symmetrically arranged.	C		C'		*(1)* A		C'+ NRP		E		*(2)* yes no*(3)*	
G. Finally, the Mines Safety and Health Commission recommends that :												
1. The power to a cable supplying a mobile machine should be cut off when the first fault between phase and screen (polarised screen or earth conductor) appears and,	C		C'		C		C'+ NRP		C'		yes	
2. In view of the present state of the art it suggests the use of cables provided with screens (polarised screens or earth conductors) of one of the types described in annex V, page 13 of the 7th Report of the Mines Safety and Health Commission except types A^2, B^2, D^2.	C		C'		C		C'+ NRP		E		yes	
3. These cables should be used in conjunction with the following devices :												
- protection by means of current intensity appropriate to the length and cross-section of the cables;	C		C'		C		C'+ NRP		E		yes	
- a permanent insulation monitor (CI or CB);	C		C'		C		C'+ NRP		E		yes	
- a safety block incorporated in the gate-end box.	C		C'		C		C'+ NRP		E		yes	

(1) yes, but on condition that this measure is extended to the whole network which is practically impossible.
(2) before the screens
(3) before the additional mass conductors.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972	
I. DUST CONTROL												
Recommendation embodying directives of suppressing dust concentrations in underground workings (8th Report of the Mines Safety and Health Commission (Annex VI)												
With due regard to the basic principles set out and, in particular, to the need for the different dust control processes to be combined to suit locally prevailing conditions, the dust control methods should be applied in accordance with the directives of the recommendation, namely :												
I. FACES												
1) Coal winning												
1.1. - Seam injection	C		C		C'		C		E		-	
- Is any attention paid to the degree of efficiency of the different processes suggested ?	C		C'		C'		C'		-		yes	
1.2. Spraying	C		C		C'		C		C		yes	
2) Stowing												
a) in general :												
2.1. Prior sprinkling of the soil	C'		C		?		C		C		yes	
2.2. Prior sprinkling of the site to be stowed	C'		C		?		C		C'		yes	
b) when hydraulic stowing is employed												
2.3. specific consumption of ventilated air maintained at the lowest possible level	C'		C		C'		C'		C'		yes	
2.4. use of soil of fine mechanical composition and sufficiently humid to prevent subsequent fissuring during transport and forced ventilation	C'		C		C'		C'		C'		yes	
2.5. prevention of air stagnation in the stowage zone when tipping the goaf	C'		C'		C'		C'		C'		yes	
3) Caving												
3.1. Seam injection	C		C		C'		C		E		yes	
3.2. Spraying	C		C		?		C		C'		yes	
II. SHAFTS AND ROADWAYS												
4) Drilling of mine chambers (shot holes)												
4.1. Wet drilling, dry dust extraction	C		C		C'		C		C'+C		yes	
5) Shotfiring												
5.1. Use of wet tamps or gelatine pastes, supplemented by previous sprinkling of the floor and sides of the roadways and the dirt resulting from previous shots.	(1) C		C		C'		C		C		yes	
5.2. Use of water screen where wet tamps cannot be used	(1) C		C		E		C		E		(2) yes	
6) Loading of excavated material												
6.1. Abundant and systematic sprinkling of excaveted material	C'		C		C'		C		C		yes	
7) Machine drivers												

(1) only wet tamps are used.
(2) water screen are always used.

Recommendations by the Commission	N.R./Wph.		Saar		Belgium		France		Italy		Nether-lands	
	1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972		1.1. 1972	
7.1. Suitable distribution of the dust extraction and ventilation flow rates so as to keep the dust against the drivage front at the maximum distance away from the machine operators	C'		*(1)* A		E		C'		C'		-	
7.2. Purification of the dusty air before it is diluted in the general ventilation system	C'		*(1)* A		E		-		C'		-	
8) Various rock working operations												
8.1. Use of wet mechanical picks	C'		*(2)* A		C'		-		C'		yes	
9) Various material handling operations												
9.1. Arrangements for withdrawal, transfer, tipping and loading (e.g. determining the minimum height of fall, ensuring that materials are completely tipped out at loading and unloading points).	C'		C		E		C		C		yes	
9.2. Use of additional products ensuring or maintaining surface wetting	C'		*(3)* A		E		-		C		no	
II. ORGANISATION OF SERVICES												
Recommendation on the organisation of special services responsible for the inspection of dust conditions in underground workings (8th Report of the Mines Safety and Health Commission, Annex VII)												
The Commission recommends the following methods of operating :												
1. The management of each pit shall appoint from among its staff a person who shall be responsible for dust control and is not directly concerned with production and output.	C		C		C'		C'		C'		yes	
2. The said person, and any assistants, shall be responsible for dust control operations, any improvements required, and dust sampling.	C		C		C'		C'		C'		yes	
3. Dust is to be sampled in all working places. The frequency and location of sampling or measurement will depend on the hazards to which the men are exposed. The results of measurements are to be recorded in accordance with the standards laid down in the various countries and made available to the appropriate administrations and the mine's medical department.	C		C		C		C'		C		yes	
4. A department belonging the company coalfield shall assemble the results of measurements, be responsible for training persons in charge of dust control operations in each mine, and work out and co-ordinate instructions for use by the latter.	C		C		C'		C'		C'		yes	
5. The special services belonging to the company or coalfield shall keep in touch with the relevant technical and medical departments so as to take any precautions needed for reducing inadmissible dust concentrations or moving staff following the results obtained during the periodical medical examinations.	C		C		C		C'		C'		yes	

(1) appropriate measures cannot be taken in view of the type of machine used hitherto.
(2) the pneumatic picks did not stand the test.
(3) spraying is sufficient, the use of additives is not necessary.

ANNEX IX

POLICY STATEMENT ON THE DELETERIOUS EFFECTS OF DUST-BINDING PROCESSES USING SALINE PASTES AND POWDERS UPON ELECTRICAL PLANT UNDERGROUND

(Adopted by the Mines Safety and Health Commission on 28 June 1971)

CONTENTS

I - Introductory remarks

After the Luisenthal disaster which occurred in 1962, the competent authorities of the German Federal Republic once again began to study the neutralization or binding of coal dust deposits using solutions of hygroscopic salts, to be applied in conjunction with explosion barriers, as a means of halting the propagation of coal dust explosions as quickly as possible.

The salts used are calcium or magnesium chlorides, the solution of which is dependent on the temperature and moisture content of the air, the type of coal concerned, etc.

The salt solutions, to which agents are added, are made into a paste with a gelatinous base. The paste is spread to a thickness of 3 to 4 mm onto the walls, roofs and floors of roadways (saline paste process). This adhesive paste can bind approximately its own weight of dust before being exhausted. Its effectivness can be prolonged either by spreading a new layer of paste or by spraying on a lye containing a wetting agent or by spreading onto the paste a calcium chloride powder containing a wetting agent *(1)*.

Powders of this kind can, under certain conditions, be used without a paste base layer (saline powder process).

The effectiveness of hygroscopic salts as dust binders in preventing the propagation of coal dust explosions was demonstrated at the Tremonia experimental pit in Dortmund. In 1969 the use of dust binders was made compulsory for coalmines in the Federal Republic, but this regulation only applies to gateroads located 60 metres in front of, or behind the face. Twenty metres may remain untreated at material loading and transfer points *(2)*. Roadways in which coal dust deposits are not liable to be blown up into the air (wet workings) are also exempted.

It was found in practice that the application of these dust binders in German mines *(3)* caused trouble in electrical plant, and this prompted the Mines Safety and Health Commission, at its meeting on 14-15 February 1966, to instruct the Working Party on Electrification to study the deleterious effects of saline moisture and dust binding processes using saline pastes and powders on electrical equipment used underground.

The Working Party on Electrification has evaluated the results of the tests and service trials described below, after a number of consultations, particularly at the test laboratories and service trial locations.

An interim report was submitted to the Mines Safety and Health Commission on 17 November 1967.

The present document is the final report on the investigations which the Working Party was instructed to carry out. It is based on the final results of the tests and service trials described below; it also contains additional information supplied by the German Delegation.

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(1) See References, item 1.
(2) See References, items 4 and 5.
(3) See References, item 3.

II - Short description of tests and service trials

1. Laboratory tests carried out by SILEC at Montereau (France)

Samples of various types of sheathing for electrical cables supplying mobile machines were immersed for six months in saline solutions and saline pastes of varying concentrations, and changes in the most important properties of the sheathings were measured *(1)*.

2. Tests carried out at the Tremonia experimental pit in Dortmund

These tests were conducted with financial assistance from the Commission of the European Communities.

Electrical plant comprising various types of equipment and power supply arrangements was exposed to the effects of saline pastes and powders for 27 months under varying stress and maintenance conditions, simulating those applying in operational service. The condition of the insulation of the entire equipment was automatically monitored and recorded, and functional tests were made daily on individual pieces of apparatus *(2)*.

3. Report on hygroscopic salts in service trials at collieries in North-Rhine-Westphalia

The Technischer Überwachungsverein Essen has prepared a short report in the effects of hygroscopic salts as coal dust binders on electrical plant underground *(3)*, which demonstrates the dangers arising and possible means of overcoming them.

III - Results of tests and service trials and a general survey of the effects of hygroscopic salts on electrical plant

1. Results of tests and service trials

The tests conducted by SILEC in Montereau have shown that the mechanical properties of sheathings for cables supplying mobile machines do not suffer any deleterious effects from immersion in certain saline solutions. The same is not true of their electrical resistivity. Low conductivity sheathings made of a material based on synthetic rubber are an exception. They are used internally in leads and would only occasionally come into contact with saline solutions, if the outer sheating was damaged.

In the Tremonia trials only two failures occurred as a result of insulation defects. These trials showed that the deleterious effects of processes based on hygroscopic salts are largely dependent on the penetration of saline moisture even into the tiniest tears and cracks. The presence of wetting agents favours this penetration and the conductivity of the saline moisture itself is enhanced by the presence of chlorides. The flame-proofing of the electrical power plant is not affected under normal maintenance conditions.

The use of hygroscopic salts underground did not cause any major damage to electrical plant, but certain difficulties arose, especially in connection with defective cables and leads. The pits endeavoured to remedy this by improving the electrical equipment and by adopting a number of operational measures.

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(1) See References, item 2.
(2) See References, item 1.
(3) See References, item 3.

2. General survey of the effect of hygroscopic salts on electrical plant

The Working Party sets out below the effects recorded on different parts of electrical appliances.

(a) Effects on casings

The most noticeable effect was on gaskets and clearances, shaft bearings and, in particular, fastenings (bolts, etc.). The saline solution penetrate by capillary action and promotes the formation of rust, particularly on nut and bolt threads.

(b) Effect on components housed inside casings

No deleterious effects were observed during the tests and service trials on components. It should be pointed out, however, that the addition of wetting agents favours the penetration of conductive moisture.

(c) Effect on cables and leads

Outer sheathings, screens and the insulating sheathings of conductors remain practically unaffected by saline solutions. The saline solution cannot penetrate undamaged cables and leads. But even the tiniest cracks facilitate penetration by saline moistures and this, depending on the design of the cable, can cause faults between conductors, earth leakage and hence power failures or short circuits.

IV - Measures to control deleterious effects

The Working Party sets out below measures which may reduce these effects to an acceptable minimum.

Electrical appliances should, as far as possible, be installed in areas which are not treated with hygroscopic salts *(1)*.

1. Measures concerning electrical appliances

Casings and marker plates on them should be made of corrosion resisting material or alternatively, the surfaces of the casings should be well protected by galvanizing phosphate coating or primer.

Threads and gaskets, and the surfaces of flame-proofed appliances, should be protected by a non-corrosive grease with a low vapour pressure, for exemple a fluorinated reasin-based grease. Inlets for cables and lines should be effectively sealed using some impermeable material.

2. Measures concerning cables and leads

Armouring should be protected by galvanizing and a suitable plastic should be used to protect sheathings. If the leads to mobile machines are exposed to the effects of hygroscopic salts, it should be remembered that the Recommendation of the Mines Safety and Health Commission of 26th June 1970 is applicable *(2)*. Automatic tripping in the event of insulation failures should be guarenteed immediately a fault occurs.

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(1) See page 5, fifth paragraph and footnote (2).

(2) Comments and Recommendations arising out of the Report adopted by the Mines Safety and Health Commission on 20 June 1969 on "the Characteristics and Electrical Protection of cables supplying mobile machines (coal-cutters, loading machines, etc.) used underground in coalmines in the various Community countries" (Doc. No. 1145/3/70).

3. Measures concerning the use of dust binders and the maintenance and inspection of electrical plant

It is advisable to provide protective casings for electrical appliances, apart from cables and leads, used in areas to be treated with hygroscopic salts. The direct spraying of electrical appliances with hygroscopic salts should be avoided.

Effective cooperation between the electrical engineering department and the department concerned with the use of dust binding processes is essentiel Electrical plant inspection should be intensified.

V - Conclusions

The use of hygroscopic salts certainly has deleterious effects on electrical equipment but these effects should not be exaggerated. They can be controlled by the following means :

(1) use of electrical equipment in perfect condition,

(2) special measures to protect electrical equipment,

(3) precautions to be taken during the application of hygroscopic salts,

(4) effective inspection procedures,

(5) general use of insulation monitors, which ensure automatic tripping immediately a fault occurs,

(6) good cooperation between the electrical engineering department and the department concerned with the use of dust binding processes.

The benefits of using hygroscopic salts to prevent the propagation of coal dust explosions outweigh the disadvantages of these processes with regard to electrical equipment, and the disadvantages should not be regarded as an obstacle to their use.

REFERENCES

To draw up this report, the Working Party had the following documentation at its disposal *(1)* :

1. Final report of the Versuchsgrubengesellschaft mbH Dortmund on research project 6251/-81/01/001 : "Utilisation of hygroscopic salts to protect against dust and explosions in coalmines". (Doc. No. 816/69 : Effects upon electrical plant, see pages 9/10, 97/98, 101-109, 115/116);

2. Final report from SILEC in Montereau on "Laboratory tests on the effect of saline pastes on the sheathings of cables supplying mobile machines used underground". (Doc. No. 2453/69);

3. Short report by the Technischer Überwachungs-Verein Essen e.V. of 3 March 1969 on the effects of hygroscopic salts for coal-dust binding on electrical plant underground. (Doc. No. 806/1/69);

4. Extract from the Mining Regulations for Coalmines of the North-Rhine-Westphalia Chief Inspectorate of Mines of 20 February 1970 (§ 219, par. 2 concerning dust binding processes (Doc. No. 2970/1/70);

5. Circularized instructions issued by the North-Rhine-Westphalia Chief Inspectorate of Mines of 14 April 1967 - 112.40/1163/67 concerning dust binding processes (Doc. No. 2971/1/70);

6. Extract from the Mining Regulations on electrical plant issued by the North-Rhine-Westphalia Chief Inspectorate of Mines of 20 February 1970 (Provisions relevant to the application of dust binding processes) (§ 5 (1), § 56 (1); § 75 (2); § 85 (1). (Doc. No. 2972/1/70);

7. Memorandum on the use of "Montan" calcium chloride powder, published in August 1967 by the Dust and Silicosis Control Centre of the Steinkohlenbergbauverein, Essen (Doc. No. 2976/70).

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(1) These documents are available free of charge in German and French from the Secretariat of the Mines Safety and Health Commission, 29, rue Aldringen, Luxembourg.

ANNEX X

COMPARISON OF SAFETY PROVISIONS CONCERNING ELECTRIC TROLLEY LOCOMOTIVES UNDERGROUND AND, IN PARTICULAR, POSSIBILITIES OF REDUCING THE INCIDENCE OF TROLLEY SPARKS

(Adopted by the Mines Safety and Health Commission on 28 June 1971)

Comparison of safety provisions concerning electric trolley locomotives underground and, in particular, possibilities of reducing the incidence of trolley sparks.

The Working Party on Electrification was given a mandate by the Safety and Health Commission to study the above subject following a firedamp explosion on 14 December 1962 in the Adolf Pit at Merkstein in the Aachen coalfield. The firedamp originated in a secondary ventilation roadway in which the ventilator had been out of service for some time, and had seeped through into a haulage roadway in which electric trolley locomotives are used *(1)*.

The following documentation was obtained in order to carry out these instructions :

(1) Laws and regulations concerning trolley locomotives, compiled by the International Labour Office, Geneva 1955 (Doc. 3707/68).

(2) Conditions under which exemptions may be granted to the prohibition on the operation of electric trolley locomotives in coal mines in the Netherlands (Doc. 58/69) and in France (Doc. 2048/69).

(3) Provisions concerning the operation of electric trolley locomotives in coal mines in the Federal Republic of Germany (Doc. 131/69).

(4) Regulations governing the operation of electric trolley locomotives in coal mines in Italy (Doc. 134/69).

(5) Luxembourg mine regulation concerning locomotive haulage (Doc. 402/69).

(6) Belgian regulations on the operation of electric trolley locomotives (Doc. 2285/69 and A.R. 5.9.1969; Moniteur belge 30.12.1969).

Comparison of the above regulations in application in the various countries will show that the main hazards they seek to control, where the operation of electric trolley locomotives is concerned, are :

(1) the firedamp explosion hazard,

(2) the fire hazard,

(3) the electrocution hazard.

Devices or regulations are applied in the Community countries and Great Britain to prevent the electrocution hazard. These consist of making the trolley wire inaccessible to personnel either by placing it out of their reach or by providing some form of contact guard *(2)*.

With regard to the risk of firedamp explosions, the measures provided in the documents mentioned above show that the prevention of this risk is mainly based on the prevention of firedamp and its accumulation along haulage roadways where trolley locomotives are used.

The measures mentioned above are also applicable to the reduction of the fire hazard. In addition, fire-resistant materials are used for supports in haulage roadways for trolley locomotives and special measures are taken in installing the overhead wires.

The working party has also studied a new curreat collection-system (Kindermann) designed to eliminate sparking *(3)*. In this system, the overhead lines are almost complete-

(1) See item 1 in the References;
(2) See item 2 in the References;
(3) See items 3 and 4 in the References.

ly enclosed by PVC-"channels" (PVC-tubing with a slit along the underside). Current is collected by spiral collectors which slide along these channels. This increases the contact area and reduces sparking.

This system has not yet been tried out in practice. The Working Party is of the opinion that no method exists to date which ensures that there will be no sparking.

After comparing the measures applied in the individual countries of the Community and in Great Britain, the Working Party considers the following to be especially worthy of note :

(i) ventilation stability in trolley locomotive roadways;

(ii) imposition of a minimum ventilation speed;

(iii) keeping the CH_4 content within the regulation limit (0,25% in Great Britain, 0,3% in Germany and Italy, 0,5% in Belgium, France and the Netherlands);

(iv) maintaining a protection zone around trolley locomotive roadways in which no winning operations should be carried out;

(v) prohibiting the connection of air outlets, especially from secondary ventilation circuits, with trolley locomotive roadways unless effective measures are adopted to prevent the maximum firedamp content from being exceeded or unless the power supply is automatically cut off when this limit is exceeded.

These measures are not all apllied in all of the countries. Since they fall mainly within the field of ventilation and winning the Working Party does not feel competent to determine the extent to which they should be standardized.

REFERENCES *(1)*

1. Final report on the firedamp explosion at the Adolf pit in Merkstein, 14.12.1962 (Doc. 583/1/63).

2. Guarding the overhead wire against accidental contact in trolley locomotive roadways (Doc. 591/69) by Lothar Gebhardt, Dipl. Ing., Steinkohlenbergbauverein, Essen (published in the 1958 Annual Report of the Technischer Überwachungs-Verein Essen).

3. A new design of current collector for electric trolley locomotives operating underground (Doc. 2049/1/69, annexe) by Oberbergrat a.D. Dr. Jur. Herhard Kindermann, Recklingshausen (published in the Glückauf-Forschungshefte, No. 6, PP 369/71, Essen, December 1965).

4. Firedamp protection for electric locomotives by Dr. Gerhard C. Kindermann (Doc. 2049/1/69 annex) (published in the Gewerkschaftliche Rundschau, No. 2 1969).

(1) This documentation, together with the documents listed on page X, 3 under points 1 - 6, are available in French and German free of charge from the Secretariat of the Mines Safety and Health Commission, 29, rue Aldringen, Luxembourg.

ANNEX XI

REPORT AND CONCLUSIONS
ON OVERVOLTAGES CAUSED BY LIGHTNING

(Approved by the Mines Safety Commission at its
Plenary Session of 25th Januarv 1972)

CONTENTS

On the 25th January 1972 the Mines Safety and Health Commission adopted the present document with the following remarks :

The Mines Safety and Health Commission considers that this report and conclusions cannot take the form of a recommendation, because implementation of the proposals depends to a large extent on local conditions. For this reason these proposals cannot as they stand be embodied into the national regulations. Moreover, examination of this problem has made it clear that it is less important for the deep coal-mines of Western Europe, than for iron-ore mines or other metalliferous mines and opencast quarries or drift mines at least as far as the danger of spontaneous detonation is concerned.

The measures outlined for protecting the electrical circuits are generally applicable to all underground workings.

The Mines Safety and Health Commission decided when adopting this document to send it - for appropriate action according to the circumstances - to the various national mining authorities to all interested parties in the coal-mining industry and to all other sectors of the extractive industries, who also come under the aegis of these same national mining authorities.

1. Introduction

The authority for this study emanates from the firedamp and dust explosion which occurred at Mainsforth Colliery, (Durham, Great Britain) on the 30th August 1963 *(1)*. This explosion fortunately did not cause any injuries, but resulted in various cases of damage in the underground workings as well as to electrical and other equipment (conveyors, etc.).

The explosion occurred in a development heading which formed an extension of the main intake airway in the East Winning District, at a depth of some 170 metres, and 2,200 metres from the pit bottom. The auxiliary fan which normally ventilated this heading had been stopped during the holiday period, i.e. for about one week before the incident. Although the emission of methane was normally low, it would seem that sufficient gas had been able to accumulate during this period to form an explosive mixture. Those charged with carrying out the enquiry into the causes of this explosion concluded that the lightning had probably struck the overhead 20 kV lines supplying the colliery and that the overvoltage had been transmitted from this line down to the underground equipment.

The explosive methane mixture had become ignited simultaneously in several places, very probably by the electrical discharges emanating from the metallic sheathing of the cables and other metal objects forming part of the main earthing system of the colliery which, as a result of the lightning stroke, had become charged with respect to earth and other conductors such as pipe ranges and tub tracks.

The electrical installations were subjected, as a result of the lightning, to the following failure or damage conditions :

1) at the surface, the electrical supply to the colliery failed immediately after the lightning stroke, and electrical gear a long way away from the mine was damaged;

2) underground, electrical equipment (apparatus, transformers, earthing circuits) had undergone arcing and suffered damage which indicated that high overvoltages had occurred.

In the execution of its task, the Working Party on Electricity has assembled a series of documents listed in the annexed list of references.

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(1) See item 1 in the references.

Documents 3 and 4 mentioned in these references deal with the transmission of current due to the energy of lightning transferred through the ground. Documents 1 and 5 cover the transmission of the currents due to the energy of lightning carried by the conductors in the electric mains system. Document 2 deals with the transmission of the energy of the lightning by standing electromagnetic waves in the free spaces in the underground workings or in the drifts.

In the light of the preceding remarks, one can draw up the following classification of the possible effects of atmospheric discharges in the underground workings (see also diagram 1 annexed) :

A. Lightning striking the surface electrical installations and transmission via the electric supply lines to the underground equipment;

B. Lightning striking any point at the surface of the mine and transmission through the ground or by metallic masses;

C. Lightning striking in the immediate vicinity of the surface opening of a shaft or drift and transmission by electromagnetic waves in the underground roadways.

Protective measures against these effects are enumerated in the following chapters.

2. Lightning striking surface electrical installations and transmission along the electric supply lines to underground installations

2.1 General remarks

A direct lightning stroke on the surface electrical installations or an indirect transmission by induction can result in the following phenomena resulting from the overvoltage caused in the mains system :

- failures in the electrical supply system of the mine;
- damage to the electrical equipment;
- overvoltages and shock waves in the ground via the earthing points of the equipment.

The known protective measures do not completely eliminate these risks, but do to a large extent make it possible:

- to prevent the lightning from directly striking the electrical supply system or electrical equipment at the colliery surface;
- to guard against its effects.

2.2 Protective measures

The possible protective measures to be applied at the surface *(1)*, which are enumerated hereafter, are not exhaustive and others could no doubt be envisaged :

2.2.1 The lines connecting the distribution transformers to the underground electric mains system should be by means of buried cables. This method should also be used if possible for the lines which connect the distribution transformers to the sub-stations;

2.2.2 The distribution transformers and the substations should be installed in Faraday cages or, if this is not possible, protection should be provided

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(1) These protective measures should for the most part already be prescribed in the regulations, standards and circulars with respect to protective measures against lightning at the surface.

against overvoltages in primary and secondary circuits and, if necessary, at the neural points.

2.2.3 Protection should be provided against overvoltages at the connections between overhead lines and buried cables.

2.2.4 Use should be made of safety earth conductors (connected to the earth electrode of the lightning conductor) in the overhead sections of the distribution system.

2.2.5 The earth electrode(s) for the lightning conductors should be separate from the earth electrode(s) of the underground masses, unless there is no reason to fear a dangerous rise in potential in the system. (Case where the earth electrodes exhibit a resistance with respect to the ground such that currents of an intensity of the order of 10^5A do not give rise to high current densities.)

3. Lightning striking any point at the surface and transmission through the ground by metallic bodies

3.1 General remarks

The currents which are transmitted through the ground and through the metallic masses and which result either from a lightning stroke, hitting the ground, or which goes to ground after striking the electrical installations, (see Chapter 2.1) generally constitute a danger to the underground workings which is greater the shallower these workings lie. In consequence, the risk is very much greater for drift mines and for shallow mines than for the great majority of the Western European Coal-mines, where the workings are fairly deep.

Moreover, the surface ground is generally a good conductor, at least in the plains, where most of the coal-mines of Western Europe are located, and generally the conductivity is further increased by the networks of piping and rail tracks. In consequence, the depth of penetration of the currents due to lightning into these zones is generally slight. These currents mentioned above can cause explosions of firedamp, fires or premature discharge of detonators. The first two dangers are less marked than the latter, since a methane explosion or a fire presupposes the formation in the underground workings of sparks of sufficient energy to cause ignition, whereas the premature discharge of detonators, although requiring fairly high local potential differences or a sufficiently high induction current in the shotfiring line, can occur without sparks being formed.

The high potential differences caused by the energy liberated by lightning occur at discontinuities in the lines of current in the ground, e.g. at the heading face in drifts or in underground roadways, precisely at the point where detonators connected by a shotfiring line are generally used. The low energy required to set off these detonators and the possibility of an earth fault in the shotfiring line constitute the conditions which favour the premature discharge of the detonators by reason of the local potential differences, but the necessary energy can also be induced into the shotfiring line by the intermediary of the metallic structures which are conducting the current caused by the lightning stroke.

The Working Party on Electricity has been informed of a certain number of cases of premature discharge of detonators, but does not know of any case of a methane explosion caused by currents due to lightning passing through the ground; the Working Party therefore concluded that it could here restrict itself to the investigation only of the risk of premature discharge of detonators.

In order for current from lightning to penetrate the ground the following factors are important *(1)*.

1) the nature of the ground;

2) the nature of the lightning current;

3) the situation of the underground workings and of the drifts with respect to the point of the lightning stroke and the path which the current due to the lightning may be expected to follow.

3.2 Nature of the ground

In mountainous regions (hard rocks with relatively high specific resistances) the depth of penetration of the lightning energy and the intensities of the field to be expected are much greater than in the plains (softer rocks exhibiting a relatively low specific resistance, lower level of the water table) and in the extreme case, for the same frequency of lightning strokes, the depth of penetration can be ten times greater and the intensities of field even one hundred times greater *(2)*.

In industrial areas, the conductivity of the surface layers is increased by the presence of various systems of piping and by rail tracks, and as a result the depth of penetration is reduced.

The possible effect of the stratification of a mass of ground, containing strata of differing conductivity, on the distribution in depth of the currents due to the lightning stroke has been touched upon only incidentally in item 3 of the references, page 2. Some study has been made in detail of the possible effect of discontinuities in the stratification *(3)*, but it would seem that a detailed examination of this question falls outside the scope of this report.

3.3 Nature of the currents

The lightning current is an impulse which can be broken down into a series of superimposed frequencies, i.e. into a carrier frequency of high amplitude and a number of other frequencies of lower amplitude.

In order to analyse the consequences of a lightning stroke, the values of the various frequencies and their share in the amplitude must be taken into account. Berger, Fourestier and Schwenkhagen *(4)* refer to an "equivalent frequency" of lightning of the order of 10^4 Hz. For this frequency they indicate depths of penetration which are almost identical to the values quoted by Pavelka *(5)* for the same frequency.

3.4 Situation of underground workings and drifts with respect to the point at which the lightning strikes and to the expected path of the current caused by the lightning

The symmetrical and spherical distribution of the charge starting from the point of impact of the lightning stroke, which can be expected in a homogeneous

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(1) References items 3 and 4.
(2) References item 3, page 2 and item 4, page 8.
(3) References item 3, page 20.
(4) References item 3, pages 5, 9 and 20.
(5) Pavelka (references item 4, page 5) does not seem to make this assumption, and the penetration values which he indicates for frequencies of 10^2 and 10^3 Hz - which are considerably greater than the values mentioned for the frequency 10^4 Hz - would therefore, according to Berger, Fourestier and Schwenkhagen (4) be of only theoretical significance.

medium, may be appreciably modified by the shape and situation of the underground workings or drifts within the region of flow of the currents caused by the lightning stroke.

A lightning stroke at the entry of a drift is particularly dangerous *(1)*. In this case, practically all the current due to lightning penetrates into the drift, which determines the path of the current (needle effect), and is conducted along the drift. The percentage of current due to the lightning which reaches the face in the roadway then depends particularly on the extent to which the current is diverted to earth by the metallic structures along the length the roadway. Setting up a screen at the entry to the drift makes it possible to divert the major part of the lightning current before it even enters the drift itself.

3.5 Summary of observed phenomena

To sum up, lightning constitutes a danger during shotfiring operations in underground workings at relatively shallow depths where the overlying strata are bad conductors and primarily where the surface conductivity is low; a high degree of conductivity at the surface reduces this risk, According to the documents which have been assembled, it would seem that in the worst case, the depth of penetration can be as much as 500 metres assuming an equivalent frequency of 10^4 Hz. This value is indicated for ground consisting entirely of granite. For entirely calcareous ground, the value is 150 metres and for humus ground the value quoted is 50 metres *(2)* . Drift coal-mines and underground mines at a depth of only a few hundred metres can therefore be endangered. The protective measures set out in paragraph 3.6 should therefore be applied in their totality. The geological conditions of the coal-mines of Western Europe make it seem unlikely that a greater depth of penetration could occur.

3.6 Protective measures

The following list of protective methods which may be applied is not exhaustive *(3)*.

3.6.1 In respect of the construction of the colliery installations :

a) Lightning conductors should be mounted on high buildings; surface metallic structures and earth connection(s) should be bonded to all the metallic masses other than those of the electrical installations *(4)* over as wide an area as possible.

b) The earth electrodes should be of a nature such that the surface conductivity is increased, that the current density of the earth electrode is reduced and, as a consequence, the possible intensities of field are kept low.

c) Screens should be set up at the surface entrances to underground workings and these screens should be connected to the earth bonding of (a) above.

d) In drift workings and where there is a particular danger (difficult earthing conditions at the surface, shotfiring at shallow depth), the metallic parts *(5)* of the underground installations should be insulated

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(1) References item 3, page 2.
(2) References item 3, page 2.
(3) These protective measures should for the most part already be prescribed in the regulations, standards and circulars with respect to protective measures against lightning at the surface.
(4) References item 4, page 12, point a).
(5) References item 4, page 13, point b).

from those at the surface. (The interposed insulating elements should be installed at surface openings as well as at the shaft insets at various levels.)

e) The metallic parts of the underground installations should be interconnected (equipotential connections) and multiple earth connections should be made *(1)*. Thus, e.g. the track rails should be interconnected and connected to the other conducting objects parallel to the tracks such as metal pipes, etc.

f) All metallic structures of supports: rail tracks, ranges of piping and tubing should be interconnected over a certain distance before they reach the working; this is a means of reducing the density of the lines of force in the discontinuities in the ground constituted, e.g. by underground roadways or by drifts, since a preferred path for the current is set up in in this way *(2)*.

g) It is true that removing the rails in the vicinity of the working before shotfiring would be a very effective protective measure, but the practical difficulties of applying this technique make it of only slight interest.

3.6.2 Protection of shotfiring lines

The various measures to be applied can be grouped under two headings *(3)* :

a) for gassy or non-gassy mines with a depth less than 100 metres :

very careful insulation of shotfiring lines, detonator wires and all connections, with respect to the ground and metallic masses;

b) for non-gassy mines at a depth less than 100 metres, as a precaution additional to that mentioned under a) :

use of detonators of very low sensitivity (HI).

3.6.3 Storm warning

This precaution is very effective for drift mines and for shallow mines *(4)*, but it is to be considered only as an additional precaution, supplementing the protective measures already described.

4. Lightning striking in the immediate vicinity of the surface outlet of a shaft or drift and transmission by electromagnetic waves in the underground roadways

This mode of propagation of the energy of the lightning stroke was indicated by MARINOVIC *(5)* as being a possible explanation of the premature discharge of detonators which had caused an accident in a mine in Yugoslavia.

This is a hypothesis which in the opinion of the Working Party had not previously been put forward to explain the propagation of the energy due to a lightning stroke in underground workings *(6)*.

The Working Party on Electricity considered that it was not necessary to examine this hypothesis in particular detail, since the precautions envisaged for the first two cases (Chapters 2 and 3), and particularly the installation of screens at the surface outlets of underground workings, are equally effective against the risk of a lightning stroke in the immediate vicinity of the outlet.

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(1) See references item 4, page 13, point c).
(2) See references item 3, page 3.
(3) See references item 3, page 10 et seq.
(4) See references item 3, page 22.
(5) See references item 2.
(6) Marinovic expressly states in his paper (footnote 1 on page 4, paragraph 4, that he had not been able to find any similar explanation in technical literature on the subject.

5. Conclusions

The explosion which occurred on the 30th August 1963 at Mainsforth Colliery was attributed lo lightning; this explosion gave rise to the present study.

The ignition which occurred there was probably due to electrical discharges between the conducting bodies connected to the main earthing system and the various masses at earth potential.

According to the point of impact of the lightning stroke and the mode of propagation of the energy, the Working Party on Electricity envisaged three types of lightning stroke :

1. lightning striking surface electrical installations and transmission along the electric supply lines for underground equipment;
2. lightning striking any point at the surface and transmission through the ground and by metallic bodies;
3. lightning striking in the immediate vicinity of the surface opening of a shaft or drift and transmission by electromagentic waves in the underground roadways.

In the three cases, there is at least theoretically a risk of a methane explosion, of fire or of premature discharge of detonators and interruptions of service.

In the first case, all the risks mentioned above can to a large extent be eliminated by a series of precautions to be taken at the surface of the mine - adapting them to the conditions of each particular case - consisting in particular of the use of buried supply lines; surrounding the sub-stations by Faraday cages or protecting them against overvoltages at the inlet and outlet points; safety cables on the overhead lines; protections at the connections of these lines to the buried sections; separating the earth conductor lines of the lightning conductors from the earthing conductors for the underground masses.

In the second case, there is a theoretical presence of a risk of firedamp explosion, fire and premature discharge of detonators. But the Working Party considers that in this case only the risk mentioned last is of practical significance, and this is the case solely in shallow underground workings where the overlying ground is a bad conductor. This is particularly true of drift mines and mines at a depth less than 100 metres. The preventive measures listed below are therefore intended to guard against this danger (premature discharge of detonators). It must, however, be pointed out that the preventive measures required to do this comprise those which are indispensable for dealing with the other two dangers.

The Working Party on Electricity underlines that, among the measures which must be applied in this case, as may be necessary, are :

a) At the surface :

- careful siting of the lightning conductors, with earthing electrodes which reduce the current densities;
- setting up at the outlets of underground workings screens which are connected to earthing electrodes;
- further, where there is a particular risk in drift mines, the metallic masses of underground equipment must be insulated from those installed at the surface.

b) Underground :

- installation of equipotential connections between the metallic masses, principally between the rail tracks and the adjacent ranges of piping, with multiple earthing points;
- this precaution should also be extended, before the entry to the working, to the elements of the powered supports, in order to create preferred paths for the current;

- if possible (this measure is difficult to apply) the rail track should be removed in the vicinity of the working itself before shotfiring.

c) In respect of shotfiring technique :

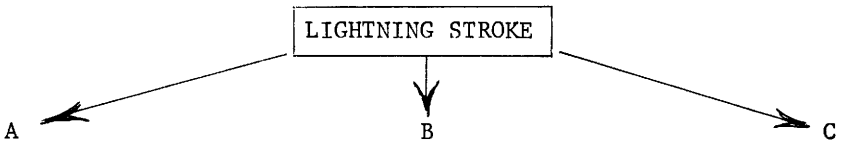
- for all workings less than 100 metres depth, there should be very careful insulation of the shotfiring lines, detonator wires and connections, with rescpect to the ground and the metallic masses;
- in addition, solely for non-gassy mines, use should be made of detonators of very low sensitivity (also known as "high intensity" detonators);
- finally, as a supplementary but effective precaution, arrangements should be made for a storm warning.

In the third case, it should be pointed out that the mode of propagation by electromagnetic waves is hypothetical and, in the opinion of the Working Party, has never before been put forward in technical journals to explain the transmission of the energy from a lightning stroke into underground workings.

With this reservation in mind, the Working Party on Electricity emphasizes that the precautionary measures envisaged above for the two first-named cases still hold good for the risks associated with a lightning stroke in the vicinity of the outlet of a mine.

DIAGRAM 1

OVERVOLTAGES AND STRAY CURRENTS CONSEQUENT UPON ATMOSPHERIC DISCHARGES



A

Lightning striking surface electrical installations and propagating along the electric supply lines for underground equipment

Direct lightning stroke on the surface electrical installations

Indirect transmissions by induction effect

Possible effects :

- interruption in the supplies of electrical current to the mines;
- overvoltages and shock waves in the ground via the earthing connections of the electrical installations.

Protective measures :

As set out in Chapter 2.2.

B

Lightning striking any point at the surface and propagating through the ground and by metallic bodies

Possible effects :

- high potential differences occurring at the points of discontinuity of the current paths in the ground, e.g. at the heading face of drifts or underground roadways.

Protective measures :

As set out in Chapter 3.6.

C

Lightning striking in the immediate vicinity of the mouth of the shaft at the surface or at the outlet of a drift and propagating by electromagnetic waves in the underground roadways

Possible effects :

- induction of voltages.

Protective measures :

As set out in Chapters 2.2 and 3.6., and in particular the use of screens at the outlets.

REFERENCES

The following documents were used by the Working Party for the compilation of the present Report *(1)* :

1) Report on the explosion at Mainsforth Colliery Durham on August 30th, 1963 (doc. No 5771/67, provided by Mr. Fox) and additional information concerning this explosion (doc. No. 37/70, provided by Mr. Burkle);

2) N. Marinovic : "Influence of atmospherical discharges on underground areas" (doc. No. 2965/68 - a lecture given at the 12th International Conference of Mine-Safety Research Establishments, held from 11-15 September 1967 in Dortmund);

3) N. Berger, J.P. Fourestier, and H.F. Schwenkhagen : "Blitzschutz für elektrische Sprengzünder im Stollenbau" (doc. No 3663/68 - published in the Nobel Hefte, No 4, July 1959, Vol. 25);

4) J. Pavelka : "Schutz gegen die Möglichkeit des Eindringens atmosphärischer Entladungen in die Grubenbetriebe" (doc. No 3705/68 - published in "Rudy", Vol. 16, 1968, No 10, pages 342 to 345);

5) Report on the breakdown resulting from an atmospherical discharge at the Seruci Colliery (Italy) on 9 December 1967 (doc. No 586/69, provided by Mr. Maccioni);

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(1) This documentation, available in French and German (No 1) and 2) also in English), may be obtained free of charge from the Secretariat of the Mines Safety and Health Commission, 29, rue Aldringen, Luxembourg.

ANNEX XII

MOTION BY THE MINES SAFETY AND HEALTH COMMISSION ON THE SUBJECT OF CAMPAIGNS TO PROMOTE SAFETY IN MINES (ANNEX XII)

(passed at the plenary meeting of 26 March 1971)

"The Mines Safety and Health Commission, meeting in plenary session on 26 March 1971 in Luxembourg under the chairmanship of M. COPPE, unanimously passed the following motion :

In order to further the awareness of coal mines personnel, both at management and executive level and that of mining workers, of the need to prevent accidents chiefly due to human factors, the Mines Safety and Health Commission has decided to promote the organisation of safety campaigns in the various coalfields of the Community. The manner in which these campaigns are to be conducted has already been established by its Working Party on "Psychological and sociological factors in safety.

In order to carry out this project, which should be spread over a number of years, the Mines Safety and Health Commission seeks financial aid for its campaigns from the Commission of the European Communities to cover part of its expenditure. The first of these campaigns is to be held in all coalfields in the course of the next three years, on the predetermined subject of conveyor transport."

ANNEX XIII

BIBLIOGRAPHY OF THE WORK OF THE MINES SAFETY AND HEALTH COMMISSION

I - TECHNICAL PROBLEMS

A - Mine rescue

1. Organisation of mine rescue arrangements

- Report on tour of central rescue stations in the Community countries and Great Britain (First Report on the organisation of mine rescue services 1958/59) (2nd Report of the Mines Safety and Health Commission, Annex B, June 1961);

- Second Report on the organisation of mine rescue services 1960 (3rd Report of the MSHC, Annex V a, November 1966);

- Third Report on the organisation of mine rescue services 1961 (3rd Report of the MSHC, Annex VI a, November 1966);

- Fourth Report on the organisation of mine rescue services 1962 (3rd Report of the MSHC, Annex VII a, November 1966);

- Fifth Report on the organisation of mine rescue services 1963 and 1964 (3rd Report of the MSHC, Annex VIII a, November 1966);

- Sixth Report on the organisation of mine rescue services, 1965/66 (5th Report of the MSHC, Annex V, October 1968);

- Seventh Report on the organisation of mine rescue services, 1967/68, (7th Report of the MSHC, Annex IV, September 1970).

- Recommendations regarding the provision of advice from foreign experts in the case of major accidents (3rd Report of the MSHC, Annex III, November 1966);

- Communication links between the rescue base and the rescue team (3rd Report of the MSHC, Annex IV, November 1966);

- List of regulations and directives concerning the organisation of mine rescue services in the countries of the Community and the United Kingdom (Doc. 3845/1/70; to be published in the 9th Report of the MSHC).

2. Rescue equipment

- Interim report on the continued development of the CO-filter self-recuer (Doc. 1872/68/1, 10th October 1968);

- Results of the research carried out with financiel assistance from the Commission of the European Communities into the improvement of the physiological conditions for the wearing of breathing apparatus (8th Report of the MSHC, Annex IV, June 1971);

3. Research work at high temperatures

- Final report on research into the establishment of simple criteria for the selection of rescue team personnel for heavy work in high temperatures (3rd Report of the MSHC, Annex IXa, November 1966).

4. Rescue with borehole

- List of specialists for borehole rescue work and equipment available in Community countries (8th Report of the MSHC, Annex III, June 1971)

B - Fires and underground combustion

1. Shaft fires at great depth

- Recommendations on the equipment having regard to the prevention of open fires (1st Report of the MSHC, April 1959);

- Fighting of fires in shafts by bringing in water (2nd Report of the MSHC, page 24, June 1961);

- Final report on experiments with shaft fires carried out by the Experimental Roadway Association in Dortmund, with the financial aid of the High Authority, at Dorstfeld Colliery, Dortmund (3rd Report of the MSHC, Annex III a, November 1966);

- Explanatory notes and views of the Working Parties on Underground Combustion and Fires and Mine Rescue Organisation, and their expert sub-committees, concerning the final report of the Experimental Roadway Association, Dortmund, on the shaft fire experiment at Dorstfeld Colliery (3rd Report of the MSHC, Annex III b, November 1966).

2. Ventilation

- Study of the Group of Experts on Ventilation: Stabilisation of Ventilation in Pit Fires - investigation in the light of Prof. Budryk's theory (this study consists of two separate parts: the Report itself and Annex III to the 6th Report of the MSHC, September 1966);

- Practical conclusions of the application of the theory of stabilisation of ventilation (6th Report of the MSHC, Annex III, September 1969);

3. Fire stoppings (dams)

- Sealing-off of mine fires and underground combustion by dams (2nd Report of the MSHC, page 51, June 1961);

- Report on trials with explosion-proof dams carried out by the Experimental Road way Association in Dortmund at the request of the Safety Commission and with financial aid of the High Authority - Statement of policy regarding the erection of advance dams of plaster as a fire fighting measure (3rd Report of the MSHC, Annex I, November 1966);

- Final Report on trials with explosion-proof dams, carried out by the Experimental Roadway Association in Dortmund with the financial aid of the High Authority (3rd Report of the MSHC, Annex I a, November 1966);

- Instructions for the construction of plaster stoppings by the method developed by the Essen-Kray Main Rescue Station (3rd Report of the MSHC, Annex X a, November 1966);

- Instructions for the hydro-mechanical method of constructing plaster stoppings developed from the Central rescue station of the Saarbergwerke AG (8th Report of the MSHC, Annex V, June 1971).

4. Fire-resistant fluids

- Report on the establishment of criteria for fire-resistant fluids used for power transmission (hydraulic fluids) and on the tests to be carried out for that purpose (2nd Report of the MSHC, Annex A, June 1971);

- Second Report on specifications and testing conditions relating to fire-resistant fluids used for power transmission (3rd Report of the MSHC, Annex IV a, November 1966);

- Third Report on specifications and testing conditions relating to fire-resistant fluids for power transmission (pamphlet 10 October 1967);
- Fourth Report on specifications and testing conditions relating to fire-resistant fluids for power transmission (pamphlet 26th March 1971).

5. The reopening of fire areas

- Report on the opening of sealed-off fire areas and the rules applicable thereto (3rd Report of the MSHC, Annex II, November 1966);

- Study on the reopening of sealed-off fire areas by Bergassessor a.D.G. Lehmann (3rd Report of the MSHC, Annex II a, November 1966).

6. Use of urethane foam for sealing

- Opinion on the use underground of polyurethane foam in the coal mining industry (7th Report of the MSHC, Annex VI, September 1970).

C - Electricity

- Decision on the removal of oil from resistors, condensers, transformers, switches and relaysused underground (1st Report of the MSHC, April 1959);

- The use of non-flammable materials for the manufacture of electric cables and leads for underground use (2nd Report of the MSHC, page 5, June 1961);

- Requirements which must be met by electrical shotfiring leads (2nd Report of the MSHC, page 8, June 1961);

- Protection of the underground electrical network against the danger of electric shocks (2nd Report of the MSHC, page 11, June 1961);

- Report on investigations into the protection of underground electrical network against dangers arising from fires or from firedamp explosions (3rd Report MSHC, Annex VII, November 1966);

- Report on firedamp-proof electrical switchgear for nominal voltages above 1100 volts (3rd Report of the MSHC, Annex VIII, November 1966);

- Notes on the problem of heat transmission in an insulated conductor (3rd Report of the MSHC, Annex IX, November 1966);

- Report on characteristics and the electrical protection of power feed cables for mobile machines (cutters, loaders, etc.) used underground in the coalmines of the countries of the Community (7th Report of the MSHC, Annex V, September 1970);

- Comments and recommendations arising out of the report adopted by the Mines Health and Safety Commission on 20 June 1969 on the characteristics and electrical protection of cables supplying mobile machines (coal cutters, loading machines etc.) used underground in coalmines in the Community countries (8th Report of the MSHC, Annex IX, June 1971).

Bibliography

- Policy statement on the deleterious effects of dust-binding processes using saline pastes and powders upon electrical plant underground (9th Report of the MSHC, Annex IX, July 1972)

- Comparison of safety provisions concerning electric trolley locomotives underground and. in particular, possibilities of reducing the incidence of trolley sparks (9th Report of MSHC, Annex X, July 1972)

- Report and conclusions on overvoltages caused by lightning (9th Report of the MSHC, Annex XI, July 1972)

D - Winding ropes and shaft guides

- Report on the electro-magnetic examination of winding ropes (3rd Report of the MSHC, Annex VI, November 1966);

- Final report on electro-magnetic tests carried out with the financial aid of the High Authority in the Bochum Rope-testing Station (3rd Report of the MSHC, Annex XI a, November 1966);

- Report on the use of accelerometers for testing winding installations (3rd Report of the MSHC, Annex V, November 1966);

- Report on measurement and testing procedures for shaft- and roadway winding ropes and for guides for shaft- and roadway haulage installations (7th Report of the MSHC, Annex VII, September 1970).

E - Combustible dusts

- Report on work done on the neutralization of combustible dusts and dusts barriers (7th Report of the MSHC, Annex VIII, September 1970).

F - Mechanization

- Recommendations concerning the equipment of locomotives (1st Report of the MSHC, April 1959);

- Recommendations concerning the neutralization of exhaust gases from diesel engines (1st Report of the MSHC, April 1959).

II. HEALTH PROTECTION AND ENVIRONMENTAL FACTORS

- Explanatory notes to the recommendation on "Fixing of climatic limits" (3rd Report of the MSHC, Annex X, November 1966);

- Recommendation on "Fixing of climatic limits" (3rd Report of the MSHC, Annex XI, November 1966);

- Recommendation embodying directives on means of suppressing dust concentrations in underground workings (8th Report of the MSHC, Annex VI, June 1971);

- Recommendation on the organisation of special services responsible for the inspection of dust conditions in underground working (8th Report of the MSHC, Annex VII, June 1971);

- Statement on the need to reduce the dust concentration resulting from the use of coal-cutting and getting machinery and roadway drivage (8th Report of the MSHC, Annex VIII, June 1971);

III. HUMAN FACTORS

A - Medical problems

- Report on pre-entry and routine medical examinations and recommendations (2nd Report of the MSHC, page 74, June 1961);

- Colliery medical services in the countries of the Community and the United Kingdom (2nd Report of the MSHC, Annex C, June 1961).

B - Psychological and sociological factors in mine safety

- Report on the psychological and sociological factors affecting safety (3rd Report of the MSHC, Annex XII, November 1966);

- Recommendations on the psychological and sociological factors affecting safety (3rd Report of the MSHC, Annex XIII, November 1966).

C - Effects of remuneration methods on safety

- Report on the implications of payment at piece rates for mine safety (4th Report of the MSHC, Annex III, December 1967);

- Recommendations as to principles to be observed in view of the possible influence of payment at piece rates on safety in coal mines (4th Report of the MSHC, Annex IV, December 1967).

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