

COMMISSION OF THE EUROPEAN COMMUNITIES

**15th Report
of the Mines Safety and Health Commission
for the year 1977**

BRUSSELS — LUXEMBOURG 1979

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INTRODUCTION

For several years, this report has been introduced by a brief review of the technical, economic and social aspects of the coal mining industry in order to put the safety and health factors in their proper perspective.

As a result of its wider terms of reference, the MSHC hopes to extend the scope of this review to cover all the extractive industries. A first step in this direction is made this year under item 1.2, dealing with just a small number of production and manpower aspects for a limited number of extracted minerals. Subsequent reports will cover the field more fully.

1.1. Coal mining activities

The statistics given below are drawn from the bulletin published by the Statistical Office of the European Communities on 20 January 1978 and from information supplied by the national mining authorities (see following table).

1.1.1. The situation in the coal mining industry in 1977 was characterized by a low level of demand and increased imports of coal, resulting in an appreciable growth in stocks of coal and coke-oven coke and a further fall in production.

Coal production - at 240.4 million tonnes - was 3 % lower than the previous year's figure of 247.7 million tonnes.

Thus the decline in coal production has continued, with only 240 million tonnes produced (220 million tonnes coal equivalent), well below the Council of the European Communities' 1985 target of 250 million tonnes.

The fall-off in demand for coal was similar to that in 1976 at more than 9 million tonnes. This was due to the fact that, despite an increase of 2.2 million tonnes in deliveries to power stations, the crisis in the steel industry caused a record decline of 11 million tonnes in deliveries to coking plants.

In general there was a decrease in the number of persons employed in all countries (a reduction of 2.3 % for the

| | Eur. 9 | D | F | I | B | U.K. |
|--|--------|--------|--------|-------|--------|--------|
| Production (Mio t) 1975 | 256,9 | 99,2 | 22,4 | 0,2 | 7,5 | 127,8 |
| " " 1976 | 247,7 | 96,3 | 21,9 | 0,2 | 7,2 | 122,2 |
| " " 1977 | 240,4 | 91,2 | 21,3 | 0,2 | 7,1 | 120,8 |
| Percentage change 1975/1976 | - 3,6 | - 2,9 | - 2,4 | - | - 3,2 | - 4,4 |
| Percentage change 1977/1976 | - 3,0 | - 5,3 | - 2,7 | - | - 2,3 | - 1,2 |
| Underground productivity - OMS in kg | | | | | | |
| 1976 | 3560 | 4153 | 2781 | - | 2524 | 3406 |
| 1977 | 3528 | 4139 | 2907 | - | 2717 | 3338 |
| Percentage change 1977/1976 | - 0,9 | - 0,3 | + 4,5 | - | + 7,6 | - 2,0 |
| Underground workers on books (1000) | | | | | | |
| Average 1976 | 331,8 | 105,8 | 38,1 | 0,2 | 17,7 | 169,7 |
| Average 1977 | 324,1 | 103,2 | 35,7 | 0,2 | 15,9 | 168,7 |
| Percentage change 1977/1976 | - 2,3 | - 2,5 | - 6,4 | - | - 10,2 | - 0,6 |
| 1) Number of working mines at the end of | | | | | | |
| 1976 | 322 | 43 | 27 | - | 12 | 240 |
| 1977 | 313 | 43 | 27 | - | 10 | 231 |
| Capacity abandoned in 1977 (in Mio t) | 0,8 | - | - | - | 0,2 | 0,6 |
| Pithead coal stocks (1000 t) at the end of | | | | | | |
| 1976 | 29,6 | 12,5 | 4,4 | 0,01 | 1,1 | 11,6 |
| 1977 | 32,8 | 17,1 | 5,0 | 0,01 | 0,7 | 10,0 |
| Percentage change 1977/1976 | + 10,6 | + 36,9 | +14,0 | - | - 35,2 | - 14,4 |
| Coke stocks held at coking plants at the end of | | | | | | |
| 1976 | 18,4 | 12,8 | 1,5 | 0,9 | 0,1 | 3,0 |
| 1977 | 21,2 | 15,2 | 1,4 | 0,9 | 0,1 | 3,6 |
| Percentage change 1977/1976 | + 15,7 | + 19,1 | - 10,0 | - 2,3 | + 4,3 | + 20,1 |
| 2) Percentage of output produced by mechanized means | | | | | | |
| Mechanized winning 1975 | 97,3 | 97,9 | 89,9 | - | 95,9 | 98,3 |
| 1976 | 97,7 | 98,4 | 86,9 | - | 97,9 | 98,6 |
| 1977 | 95,3 | 98,8 | 87,0 | - | 100 | 93,8 |
| Powered supports 1975 | 83,8 | 81,2 | 41,2 | - | 53,2 | 94,5 |
| 1976 | 86,9 | 86,3 | 41,7 | - | 56,5 | 96,5 |
| 1977 | 87,4 | 89,6 | 42,05 | - | 61,1 | 95,2 |

Sources: Eurostat statistical telegram 20.1.1978

1) Mining authorities

Community in total), whilst there was a slight fall in the output per manshift of 0.9 %, remaining at about 3.530 tonnes per shiftworked.

1.1.2. General review of underground accidents in coal mines

This year the analysis can cover the whole of the Community of Nine, the number of hours worked being 577.59 million, compared with 587.60 million in 1976.

1.1.2.1. Accidents resulting in an absence from work of between 4 and 20 days numbered 57.526, giving a frequency rate (number of accidents into number of hours worked) of 99.59, compared with 100.94 in 1976, i.e. a 1,34 % decrease.

1.1.2.2. Accidents resulting in an absence of between 21 and 56 days numbered 23 779, giving a frequency rate of 41.17, compared with 42.10 in 1976, i.e. a 2.21 % decrease.

1.1.2.3. Accidents resulting in an absence of more than 56 days numbered 6 637, giving a frequency rate of 11.49, compared with 11.74 in 1976, i.e. a 2.13 % decrease.

1.1.2.4. There were 116 fatal accidents (including one group accident with 7 fatalities), compared with 170 such accidents in 1976 (including two group accidents with 18 fatalities).

The frequency rates were :

- 0.201 as against 0.300 in 1976, i.e. a 33 % decrease (including the group accidents) ;

- 0.189 as against 0.259 in 1976, i.e. a 27 % decrease (excluding the victims of group accidents).

1.1.2.5. The total number of accident victims (i.e. fatalities plus casualties resulting in at least four days' absence from work) was 88 058, giving a frequency rate of 152.45, compared with 155.07 in 1976 - a 1.69 % decrease

1.2. Other mineral-extracting industries

As the responsibilities of the MSHC had been extended to all mineral-extracting industries on 27 June 1974, it was natural that the customary review of coal mining activities should be supplemented by a report on the other mineral-extracting industries. The MSHC agreed on the desirability of this step on 27 October 1977. It asked the Secretariat to try to compile initial data on these industries for inclusion in the 15th Report, being well aware of the difficulties involved in drawing up one or more tables containing the same standardized data for the other mineral-extracting industries as for the coal-mining sector.

For these industries there is no universal statistical survey at international or even national level which covers all the technical-economic, social and safety aspects already included in the review of the coal-mining industry. The Community statistics published by Eurostat on the mineral-extracting industries relate only to certain substances and include no data on the workforce except in the case of coal and steel.

The Working Party on Common Accident Statistics discussed these Eurostat data and decided that despite their shortcomings they could be used as an initial basis for an attempt at an outline to be published in the present Report, as there was no time for the authorities of the Member States to obtain data on items other than those covered, albeit very incompletely, by the Eurostat statistics.

For these reasons it was decided that the fields to be covered this year were as follows :

- coal, lignite, oil, natural gas ;
- iron ore, bauxite, copper, lead and zinc ores ;
- potash salts, rock salt ;
- marble, slate, foundry and other industrial sands, alluvial sands and gravel.

The Working Party was aware that this initial outline would fail to include materials which in certain countries were comparatively important either in terms of volume (limestone, chalk, hard and crushed stone, clay, gypsum etc.) or in technical or economic terms despite a generally low level of production (fluorspar, graphite or uranium ore, which has been omitted because it does not fall within the remit of the MSHC).

The Working Party also decided that the following information should be provided this year : type of workings (deep mining, open cut mining or boreholes), number of production units or undertakings, output and workforce employed to obtain this output.

The competent mining authorities provided the relevant information for all mineral-extracting industries in certain countries but not in all.

The Secretariat has not combined these data in a single Community table in order to avoid unjustified comparison of figures which have not been compiled on the same basis. The statistics are therefore presented separately for each country in a form which includes some supplementary information that is available. As the 1977 data for certain countries were not yet to hand in July 1978 they have, as an exceptional measure, been replaced by the 1976 data to avoid any delay in publication of this Report.

The tables are appended as Annex 10.

The MSHC emphasizes that these tables are not exhaustive or comparable. It has decided that this rough outline is to be included in the 15th Report on the grounds that despite its shortcomings it gives some impression of the scale of mineral-extracting activities other than the coal-mining industry.

The Working Party on Common Accident Statistics has been instructed to devise a more exhaustive and uniform statistic for subsequent reports.

1.3. General activities of the Mines Safety and Health Commission

1.3.1. Meetings held

The Mines Safety and Health Commission met on 23 March, 5 July and 27 October 1977, preparatory meetings of the Restricted Committee being held on 22 March, 4 July and 27 October 1977. Celebrations to mark the 20th anniversary of the founding of the MSHC were held on 22 and 23 November 1977. The working parties and their committees of experts met on 38 occasions ; many of these were preceded by meetings of editorial committees.

Thanks to the assistance of a national expert mining engineer, meetings were held at normal intervals, despite the restriction imposed on the appointment of a principal administrator.

1.3.2. Group accidents

1977 saw one group accident (i.e. an accident resulting in the death or injury with eight weeks' absence from work of at least 5 victims). On 27 October, a conveyor belt fire at the 'Schlängel und Eisen' Mine at Herten (Federal Republic of Germany) resulted in the death of a miner and of six rescue workers. The circumstances surrounding this accident were discussed by the MSHC on 6 April 1978, and the Working Party on Rescue Arrangements, Mine Fires and Underground Combustion and its Committee of Experts on Fire-resistant Conveyor Belts and Other Long Items of Plant also studied the matter without delay. A report will be published in the 16th Report of the MSHC.

1.3.3. Decisions of the Mines Safety and Health Commission

At its meeting on 23 March 1977, the MSHC approved the following five reports and requested that they be published as annexes to the 14th Report to ensure more rapid dissemination.

- 1.3.3.1. The 9th report on mine rescue services, a bi-annual report for the use of rescue officers, giving the addresses of mine rescue services' coordinating agencies, their available manpower and apparatus and the main established techniques as at 31.12.1975 (Annex 6 to the 14th Report).
- 1.3.3.2. A report on the "Use of filter self-rescuers in European coal mines - Part II. Maintenance and Training" (Annex VII to the 14th Report).
- 1.3.3.3. A memorandum on the "Neutralization of mine fires by the injection of nitrogen" (Annex VIII to the 14th Report).
- 1.3.3.4. "Notes for guidance on the measures to be taken to stabilize ventilation in the even of open fires underground (except in shafts)" (Annex IX to the 14th Report).
- 1.3.3.5. A "First report on ignitions of firedamp by power loaders and heading machines" (Annex X to the 14th Report).

The first four reports presented by the Working Party on Rescue Arrangements, Mine Fires and Underground Combustion (cf. Chapter 2.1.) were submitted to the governments of the Member States for information in accordance with Articles 3 and 6 of the MSHC' terms of reference.

The fifth report, presented by the Working Party on Ventilation, Firedamp and Other Mine Gases (cf. Chapter 2.8.), includes not only information aimed at improving safety, but also research proposals which the MSHC is asking the governments of the Member States to encourage in accordance with Articles 1 and 4 of its terms of reference.

In addition, at its meeting on 5 July 1977, the MSHC adopted the following two reports :

- 1.3.3.6. "Strata reinforcement by bolting, dowelling and injection techniques in European coal mines", drawn up by the Working Party on Strata Control and Stability of Ground (cf. Chapter 2.10.). This document was submitted to interested parties for information and to the governments of the Member States in accordance with Articles 1 and 4 of the MSHC's terms of reference (Annex VII to the present report).

1.3.3.7. "Recommendations on the installation of water barriers as protection against dust explosions underground". This proposal was submitted to the governments of the Member States to improve safety in coal mines in accordance with Article 1 of the MSHC' terms of reference and for action in accordance with Article 4. (Annex VI to the present report).

1.3.4. Decision on safety signaling in coal mines

At its meeting on 23 March 1977, the Mines Safety and Health Commission continued its examination of the proposal for a Council Directive on safety signs at the workplace, which it had begun on 2 December 1976 (cf. item 1.2.6. of the 14th Report), following a request from the Consultative Committee of the ECSC. The MSHC took note of the report drawn up by a sub-committee appointed to examine the proposal, which had met on 27 January 1977.

After a lengthy discussion, the following motion was submitted to the Commission of the European Communities ;

"The Mines Safety and Health Commission

- recognises the necessity of having in the near future a standard system of safety signs for the activities within its jurisdiction ;
- considers that the proposal for a directive submitted to it should be adapted to the activities within its jurisdiction ;
- undertakes to submit to the governments, in accordance with Articles 1 and 4 of its terms of reference, as soon as possible and within 18 months at the latest, a proposal for implementation based on the directive ;
- requests therefore that the extractive industries within its jurisdiction be exempted from implementing the directive."

The Council of Ministers adopted the proposal for a directive on 25 July 1977 and exempted coal mines from the terms of the directive.

On 5 July, the Mines Safety and Health Commission took note of this decision and decided that the conditions specified in the motion of 23 March 1977 should be respected, that is to say, a proposal for safety signaling arrangements for coal mines would be drawn up on the basis of the directive within 18 months. These proposals will be submitted to the governments of the Member States in accordance with Articles 1 and 4 of the MSHC's terms of reference.

The MSHC will appoint a small ad hoc committee for this purpose, the members of which will have the power to take decisions on behalf of their delegation to the MSHC.

- 1.3.5. A round table discussion between the IOSEWR (International Organization for the Study of the Endurance of Wire Ropes) and the MSHC' Working Party on Winding Engines, Ropes and Shaft Guides was held in Luxembourg on 4 and 5 November 1977 and the results of this meeting are set out in Chapter 2.2.
- 1.3.6. Extension of the responsibilities of the Mines Safety and Health Commission
 - 1.3.6.1. The extension of the responsibilities of the MSHC took on its first concrete form with the extension of the scope of subjects already dealt with in some of the working parties to cover other extractive industries, notably the iron-ore mining industry. These subjects included strata control and ventilation and firedamp, and involved experts from these other extractive industries.
 - 1.3.6.2. The only new working party formed as a result of this extension of responsibilities - the Working Party on Oil, Gas and Other Materials Extracted by Borehole - was concerned largely with the "blowout" on 22 May 1977 at the Ekofisk Platform in the Norwegian Sector of the North Sea. Because of the potential danger to personnel from an accident of this kind, the MSHC requested that priority be given by the new working party to the prevention of blowouts and approved the creation of an ad hoc group of specialists to study this question (cf. Chapter 2.11).

1.3.7. 20th anniversary of the founding of the Mines Safety and Health Commission

The MSHC's 20th anniversary was marked by a congress held on 22 and 23 November 1977 in the New Theatre in Luxembourg. The Chairman of the MSHC, Mr Vredeling, was unable to attend and sent his apologies.

The congress was attended by some 300 people, and the chair was taken by Dr Recht, Mr Degimbe, Mr Medaets and by Mr Coppe, a former President of the High Authority of the ECSC.

Other participants included the Luxembourg Minister of Employment, Mr Berg, and the Lord Mayor of Luxembourg, Mrs Colette Flesch (who welcomed the participants), Mr Walker, the Minister of State at the Department of Employment and Mr Eadie, the Under-Secretary of State at the Department of Energy, several Secretaries of State, the President of the ECSC Consultative Committee, Mr Ackerman, and numerous leading figures from the mining world.

Nine speeches were made by leading representatives of the national mining authorities, the mining industries and the workers' organizations, most of whom were members of the Mines Safety and Health Commission.

After Mr Vinck had paid tribute to Mr Paul Finet, the former Chairman of the MSHC, Mr Leclercq, the present Secretary, traced the history and activities of this body created by the Council of Ministers of the ECSC in 1956 following the Marcinelle (Belgium) disaster of 8 August 1956, which had resulted in the deaths of 262 miners and had caused great concern among miners everywhere and evoked the sympathy of the public at large. Mr. Leclercq said that the MSHC was one of the finest expressions of the ECSC's humane and socially concerned outlook.

This tripartite organization, assisted by 20 working parties and committees of experts, had an extremely good record. It had submitted some 500 recommendations to the governments of the Member States, and most of these recommendations were either incorporated into national regulations or applied in

practice and had contributed to improving the safety situation in coalmines, as shown by the statistics of group accidents which had been drawn up since 1958.

There had been a great deal of effective and beneficial collaboration between representatives of governments, employers and workers in the safety field, a field which had been extended in 1974 to cover all the extractive industries. As Mr Koch pointed out, all the extractive industries would be able to benefit from the experience and the work of the MSHC, although every industry would still be faced with certain problems peculiar to itself. Mr Lintzen examined the specific problems of the iron-ore and potash mining industries, Mr Galati did the same for hot workings and sub-lagoon mining, and Mr de Korver went into the problems of prospecting for and extracting gas and petroleum, with particular reference to the North Sea gas and oilfields.

Blowouts such as the Ekofisk incident of April 1977 highlighted the risks run by the workers on drilling platforms.

Another hazardous occupation was that practised by divers, whose mortality rate was running at something like 1 % per annum.

Dr Amoudrou said that the problem of dust in coalmines was still a live issue despite all the progress that had been made in this field. The problem kept cropping up again as new techniques - such as powered supports - were introduced. As Mr Galati pointed out, the situation could be complicated by the presence of radon.

Messrs Dunn, Harnisch and Medaets went into the repercussions of new techniques planned for the new generation of mines on the health safety of miners. Looking forward to the future, Mr Dunn discussed the question of fully automated mines, and Mr Harnisch went into the question of coal-getting by means of high-power water jets in inclined and irregular seams. A third paper by Mr Medaets dealt with the gasification of coal in situ in places where - because of the great depth, in particular - conditions were inhuman, not to say impossible.

Future prospects looked good so long as the organization and work of the Mines Safety and Health Commission kept pace with the scope of the new problems and enabled it to deal satisfactorily with the risks inextricably linked with the introduction of modern technology.

The congress showed that the work of the MSHC had been remarkably effective over the past 20 years and that this work was far from being completed, and indeed would not be completed while the extraction of minerals underground continued to jeopardize the health and safety of workers.

SECTION II2. Activities of the working parties2.1. Chapter A - Rescue arrangements, mine fires and underground combustion

2.1.1. The Working Party and its committees of experts held 25 meetings as follows :

Working Party : 2 meetings on 8 March and 7 November 1977 ;

Committee of Experts :

- Fire-resistant conveyor belts and other long items of plant : 3 meetings of technical experts, 2 meetings of medical experts and 5 meetings of the editorial committee ;
- Fire-resistant fluids : 2 meetings ;
- Filter self-rescuers : 3 meetings ;
- Stabilization of ventilation in the event of fire below ground : 1.

2.1.2.1. The tangible results of the activities of this Working Party were the 4 decisions of the MSHC taken on 23 March 1977 dealing with rescue arrangements and set out above under items 1.3.3.1., 1.3.3.2., 1.3.3.3. and 1.3.3.4. These reports were published as annexes to the 14th Report (for 1976) to ensure more rapid dissemination. Having been drawn up in 1976, they were discussed in detail in the previous Report.

2.1.2.2. The Working Party examined a first report on the accident which occurred on 27.10.1977 at the Schlängel and Eisen Mine, where a fire on a steel cord conveyor belt resulted in the deaths of a miner and 6 rescue workers.

It also continued its examination of the lessons to be learned from the accident which occurred on 30 September 1976 in the No 5 shaft of the Freyming-Merlebach Colliery, when 16 volunteer fire-fighters were killed by an explosion.

2.1.3. The following work - which was reported on in Chapter 2.1. of the 14th Report for 1976 - continued and reached the following stages :

2.1.3.1. Work completed by the Working Party

2.1.3.1.1. The report on the tests comparing textile-carcass conveyor belting carried out in 1976 was completed. These tests showed that the two quality tests set out below are sufficiently accurate to be reproducible from one testing centre to another. They are the subject of document No 142/5/77 which will be presented to the Mines Safety and Health Commission in 1978, but which is available as from now from the MSHC Secretariat.

2.1.3.1.2. A report is nearing completion* on two tests to check the fire-resistant properties of textile-carcass conveyor belting. These two simple test methods - the Barthel burner test and the test to determine the critical oxygen index - enable a check to be kept on whether the quality of the belting has changed since the various types of belting were officially approved (approval having been given on the basis of drum friction and propane burner tests).

2.1.3.1.3. On the same subject, a report has been drawn up on the "Health hazards of conveyor belts". This report is presented in document No 1666/77 which is available as from now from the MSHC Secretariat.

The report sets out the conclusions reached by a committee of experts who have studied the effects on health of the fumes given off through the heating or combustion of conveyor belts or other plastic objects (such as airducts) used in mines. Only one country - the Federal Republic of Germany - makes use of a test which measures the efficiency of a filter self-rescuer on animals in the face of fumes

* Adopted by the MSHC on 6 April 1978 ; document No 1479/8/77 available from the MSHC Secretariat, Commission of the European Communities Directorate - General V, Directorate F, Jean Monnet Building, Plateau de Kirchberg, B.P. 1907, Luxembourg

generated in test apparatus to the scale 1 : 1,000. A study subsidized by the Commission of the European Communities has been commissioned from a testing centre to see whether the results of this test are really applicable to human beings.

2.1.3.1.4. On the subject of the stabilization of ventilation in the event of fire, the Working Party took note of document No 760/77, in which the experts, Messrs Champagnac and Stenuit, summarized the complicated scientific matter contained in their report "Stabilization of ventilation in gassy or non-gassy mine workings, particularly in the event of fire" (Document No 708/3/74) for the benefit of engineers responsible for mine ventilation. These documents Nos 760/77 and 708/3/74 are available from the MSHC Secretariat in French, German, English and Dutch (in the case of 760/77).

2.1.3.2. Work already referred to in earlier reports and under examination

2.1.3.2.1. The Committee of Experts on Fire-resistant Fluids continued its work on the harmonization of fluid flammability and toxicity tests.

- As far as fire-resistant fluids are concerned, the tests carried out by the Safety in Mines Research Establishment (SMRE) with the financial assistance of the Commission of the European Communities were aimed at developing a test apparatus and rigorous test conditions so that, by measuring the length of flame of the atomized jet in which was situated a burner flame, it would be possible to classify the fire-resistant properties of all the types of fluid, both those which passed the Continental test described in the 5th Report and the British test (SMRE document No 2488/77, available from the MSHC Secretariat).

- On the question of toxicity, the group of medical experts has continued its task of reviewing the tests set out in the 5th Report, and the work is now nearing completion. The group's proposals concern mainly the elimination of the goldfish test for measuring overall toxicity, the

adoption of a more accurate scale for measuring the irritant properties of the fluids, the elimination of the 200° C test for measuring the toxicity of the products of thermal decomposition and the adoption of a new scale of marking.

- Finally, CERCHAR and the University of Hamburg were commissioned to carry out a subsidized study of the toxicity of fluids injected into the skin at high pressure. A fatal accident (which, incidentally did not occur in a mine) drew the Working Party's attention to this danger.

2.1.3.2.2. The problem of withdrawing men from production faces served by long roadways in the case of a fire was again examined (Document No 4341/76 author : Mr Funkemeyer - available in f-d-e). Once again, the following problems were brought up :

- early detection of fires : priority should be given to the development of suitable detectors :
- automatic system of extinguishing fires at certain danger points (Document No 3709/77 - author : Mr L. Walker, - available in f-d-e);
- factors involved in the development of a fire, such as the speed of propagation of the fire, smoke and fumes, visibility and the effect of treating the wood : these were the subject of tests carried out in the Tremonia experimental gallery with the financial assistance of the Commission ;
- protection of miners endangered by smoke and fumes by withdrawal into culs-de-sac and pressurized shelters;
- oxygen giving self rescue apparatus.

2.1.3.2.3. The Working Party also took note of tests which had been carried out in France on self-contained selfrescue apparatus producing oxygen weighing 3 kg and giving about 1 1/2 hours' worth of oxygen.

2.2. Chapter B - Winding engines, ropes and shaft guides

- 2.2.1. Number of meetings : 9, 4 being plenary meetings (on 25.2., 28.3., 1.7., 4 and 5.10.1977) and 5 meetings of editorial committees.
- 2.2.2. The Working Party continued its work on harmonizing safety requirements for winding engines and shaft equipment in the light of information received the year before in the course of its visits to model installations in the Federal Republic of Germany, Sweden and Poland and from the documents listed in the 14th Report.
- 2.2.2.1. Among other things, the Working Party revised its opinion on electro-magnetic rope testing as a result of its trip to Poland to determine the limitations of the apparatus in question for fault detection with special reference to ropes of locked-coil construction. A study subsidized by the Commission of the European Communities and dealing with this subject was placed in the hands of the SMRE at Sheffield for comparative tests to be carried out on a variety of apparatus with special reference to the new devices developed since the MSHC's last studies in 1965. Reports on these studies were published as Annexes VI and IX to the 3rd annual Report of November 1966. Document No 3823/77 is available from the MSHC Secretariat.
- 2.2.2.2. The effectiveness of cage-arresting devices was examined after a survey carried out in each of the Member States had shown that most countries had reservations as to the safety of such devices. A summary report will be available in 1978.
- 2.2.2.3. As a result of the Markham accident, where a fault in a single element in the brake resulted in the complete failure of the whole braking system, the concept of back-up protection was examined for all safety devices on winding engines and in shafts together with the safety factor involved. (Doc. No 770/77 by Mr Wall of the SMRE, available in d-e-f).

2.2.2.4. Attention was also devoted to the possibility of disc-brake failure caused by slippage as a result of an oil leak. Doc. No 1467/77 by Mr Slolina (Tremonia Testing Centre) describes the functioning of the various systems and means of guarding against such occurrences.

2.2. An editorial committee has started drawing up a report on heavily used winding ropes, using a table of criteria drawn up by Mr Arnold of the Bochum Testing Centre (Document available under No 1873/77).

2.2.3. A round table discussion between the IOSEWR (International Organization for the Study of the Endurance of Wire Ropes) and the Working Party was held on 4 and 5 November 1977, and proved to be of mutual benefit.

The two bodies have similar aims and the tasks undertaken by them are complementary, the IOSEWR being concerned with all wire ropes and with scientific studies and exchanges of views at a very high scientific level, whereas the Mines Safety and Health Commission is concerned more with conditions of use and its work may result in amendments to regulations. Criticism was voiced at the meeting on the point of the current and conventional traction tests on outer wires to assess the time at which the rope should be renewed ; this being an essential safety factor. Pending the discovery of a better method, it was proposed that additional endurance and electromagnetic tests be carried out on the actual wires in use.

2.3. Chapter C - Electricity

2.3.1. Number of meetings : 10, as follows :

- 6 plenary meetings held on 12 and 13 January, 3 and 4 March, 3 to 5 May (study trip), 12 and 13 July, 13 and 14 September, 16 and 17 November 1977 ;
- 4 preparatory meetings.

2.3.2. As in the previous year, the work of the Working Party consisted of examining the European standards for the design of electrical apparatus for use in potentially explosive atmospheres, which had been drawn up by CENELEC and adopted by the national CENELEC committees. The Working Party formulated amendments and additions to render the draft standards applicable to gassy mines. For this task of harmonizing standards, the Working Party included representatives of the mining authorities, the users, workers, manufacturers, and testing centres. Again, as in previous years, assistance was received from representatives of Directorate-General XI - in the context of the elimination of barriers to trade - and of the Secretary-General of CENELEC.

The Working Party has now almost completed the task of adapting the CENELEC European Standards, Edition 1, No 50 014 - 50 020 of March 1977, and will be submitting the amended standards to the Mines Safety and Health Commission in 1978. They will be attached to the draft directive drawn up in 1975 (Doc. 1411/9/75), and the whole package will be submitted to the Council of the European Communities to become the Community's harmonized standards.

2.3.3. The Working Party has almost completed its examination of a very important draft standard from the point of view of safety in gassy mines, dealing with intrinsically safe electrical systems. In the absence of a draft standard from CENELEC, this draft was drawn up by a group of experts drawn from the Working Party.

2.3.4. Finally, the Working Party has found a solution to the problems of a distinctive Community marking for electrical apparatus and of safeguarding the confidential nature of certification documents.

2.3.5. The study comparing the national regulations covering the installation and use of electrical apparatus below ground carried out by Mr Loynes of the National Coal Board and subsidized by the Commission of the European Communities

was completed at the end of 1977 and will be examined in 1978, particularly in respect of the dangers of firedamp ignition, to ensure that the rules are uniform or to examine the equivalence of certain rules so that such equipment can be used without modification in all Community countries.

2.4. Chapter D - Flammable dusts

2.4.1. Number of meetings : 8, 3 of which being plenary meetings held on 4 March, 18 November and on 30 November and 1 December at the Eisdon Mine and at Pâturages, and 5 meetings of the Editorial Committee.

2.4.2. Work culminating in an MSHC Decision

As was mentioned under item 1.3.3.7., the MSHC approved a report on 'Recommendations for the installation of water barriers as protection against dust explosions underground'. This recommendation was submitted to the governments of the Member States as a proposal aimed at improving safety in coal mines and invites the governments to give favourable consideration to this system, which is designed to contain any dust explosions which may occur despite efforts to neutralize the dusts, and which gives advice on the arrangement of the barriers - in particular the wide-action barriers - the experience of the Member States being set out in an annex to the document (Annex VI to the present report).

2.4.3. Other work

2.4.3.1. The Working Party continued its examinations of the circumstances surrounding the Lens accident on 27 December 1974, with the aim of gaining experience to prevent future dust explosions, and in particular weak explosions. It took note of the measures already imposed by the French mining authorities to prevent the recurrence of such an incident, notably

- the introduction of water barriers either dispersed or concentrated,
- the protection of each production district by barriers,
- the application of new means of assessing the effectiveness of stonedusting,
- the authorisation of salt pastes for neutralisation purposes.

2.4.3.2. Work commenced on the harmonization of methods of monitoring neutralization by inert dusts (i.e. stone dusting).

2.4.3.3. The Belgian INIEX type of triggered barrier

This is a continuous barrier consisting of water-filled 'sausages' which are burst by detonators connected by a safety detonating cord, which is in turn ignited by a thermo-mechanical device.

The Working Party was able to see the apparatus in situ in a tail gate at the Eisdan Mine.

At the Pâturages Testing Centre, the Working Party was briefed on the principle and practice of this apparatus, which is currently being tested at the Tremonia Experimental Mine.

2.5. Chapter E - Common accident statistics

The Working Party did not meet in 1977. It will, however, have to meet as planned in 1978, at the MSHC's request, to define its new terms of reference as a result of the enlargement of the Community and the extension of the MSHC's terms of reference to all the extractive industries.*

2.6. Chapter F - Health in Mines

The Working Party did not meet in 1977. The planned harmonization of methods of measuring dust nuisance and threshold levels was put back to await the results of a current Community research project.

The Working Party will meet in 1978.

* a restricted meeting was held on 16 March 1978.

2.7. Chapter G - Human Factors

2.7.1. Number of meetings : 2.

2.7.2. A study -subsidized by the Commission of the European Communities- was commissioned from a group of German experts on the subjects of "Safety training for underground workers in mines in the European Community".

2.7.3. An ad hoc working party met on 9 February to draw up the terms of reference and guidelines for implementing the study.

2.7.4. On 23 September a special meeting of members of the Working Party and of specially qualified experts was held at the request of members of the Restricted Committee to coordinate the work of this study, the various national delegations providing information on the present level of qualifications required of mine managers.

2.7.5. The study was completed at the end of 1977 and will be examined by the Working Party in 1978.

The MSHC urges the Commission of the European Communities to take the necessary steps in respect of the Secretariat staffing situation, so that these two Working Parties on "Health" and "Human Factors" can carry out activities corresponding to the importance of the problems they have to solve.

2.8. Chapter H - Ventilation, firedamp and other mine gases

2.8.1. Number of meetings : 10, 3 of which were plenary meetings, held on 1 and 2 February, 15 April and 21 October 1977, 3 preparatory meetings and 4 meetings of the Committee of Experts on Firedamp Monitoring Instruments.

2.8.2. Work completed and adopted by the MSHC

As was mentioned under item 1.3.3.5., the Mines Safety and Health Commission adopted on 23 March 1977 a "First report on ignitions of firedamp by power loaders and heading machines" (Document No 2538/2/76 available in d-e-f).

The reason why this is a first report is because a number of problems remain to be resolved, in particular the extensive application of mobile automatic firedamp monitoring instruments with triggering or warning facilities, the effective ventilation of the zone between the face and the body of the machine and effective horizon control.

Research is currently being conducted into the process of ignition by shotfiring.

At the request of the MSHC, the Working Party will follow the development of the on-going research and studies with a view to producing a second report containing proposals to be submitted to the governments of the Member States in accordance with Article 1 of the MSHC's terms of reference.

2.8.3. Other work

2.8.3.1. Following the accidents at Lens-Liévin (27.12.74), Houghton-Main (12.6.75) and Luisenthal (21.7.1976), which led to the MSHC conforming a special brief, the Working Party continued its earlier work and made good progress in preparing a list of measures (minimum requirements) to be taken in the following fields :

- ventilation of cul-de-sac workings ;
- work in culs-de-sac, both those abandoned temporarily and those abandoned permanently ;
- controlling the emission of firedamp from old workings.

This report will be completed in 1978.

2.8.3.2. Problems arising from the use of diesel engines in mines

These problems were studied by Mr Staehler, with the financial assistance of the Commission of the European Communities.

The first part of the study (Document 4706/1/76, consisting of 40 pages of narrative and an annex of 160 pages) was handed over at the end of 1976 and reviewed the relevant national regulations in this field. The document was studied on 15 April by the Working Party, who had requested the attendance of specialists.

The minutes of this meeting and a record of the specialists' contributions may be found in Documents 2442/77 + corrigendum, 3042/78, 988/77, 1241/77, 1874/77, 1478/77, 1663/77 and 1477/77, which are available from the MSHC Secretariat in d-e-f.

In the second part of the study, Mr Staehler put forward proposals for uniform rules designed to prevent hazards. This second part was handed over at the end of 1977 (Document 4781/77) and will be examined in 1978 by a group of experts nominated by the Working Party.

2.8.3.3. Danger of ignitions of firedamp underneath armoured flexible conveyors

The present state of research in this field was the subject of Document No 3740/75, which is available from the MSHC Secretariat in d-e-f.

The Working Party examined a new report on research into this subject, subsidized by the Land of North-Rhine Westphalia (Document available under number 4580/77).

A final report is awaited before preventive measures are proposed to the Mines Safety and Health Commission.

2.8.3.4. Firedamp monitoring instruments

The Committee of Experts has drawn up minimum requirements for the manufacture and testing of hand-held methanometers, and these proposals will be submitted to the Working Party and to the MSHC in 1978 in the form of proposals to the governments of the Member States in accordance with Article 1 of the MSHC's terms of reference.

A second section is concerned with the maintenance of the devices and the training of operators.

2.9. Chapter I - Mechanization

2.9.1. Number of meetings : 6, 3 of which were plenary meetings held on 25 March, 22 June and 20 October 1977.

2.9.2. Work submitted to the MSHC

The Working Party completed its work on a 'First report on safety in the winning area' (Doc. 3068/75, available in d-e-f).

The document was submitted to the Mines Safety and Health Commission on 5 July 1977 ; it examines the large number of proposals to be submitted to the governments of the Member States in accordance with Article 1 of the MSHC's terms of reference, particularly on the question of close collaboration between manufacturers and users, and puts forward as exhaustive a catalogue as possible of measures concerning direct prevention (e.g. design protection against environmental factors, etc) and indirect prevention (e.g. lighting, communication, etc), as well as information, instructions, monitoring and personnel training.

The MSHC adopted the report, with the proviso (aimed at assisting the mining authorities) that a preface to the report should pick out the essential points from the enormous catalogue of recommendations.

2.9.3. Other work

The Working Party began its study of :

2.9.3.1. The safety aspects of transport by conveyor belt ;

2.9.3.2. the safety aspects of transport by locomotives ;

2.9.3.3. the problem of the chain and sprocket (Doc. 2682/1/77 by Mr Bassier, available in d-e-f).

2.10. Chapter J - Strata control and stability of ground

2.10.1. Number of meetings : 5, 3 of which were plenary meetings held on 22 April, 17 June and 18 November 1977 and two being meetings of the Committee of Experts on Rock Mechanics.

2.10.2. Work adopted by the MSHC

2.10.2.1. As was mentioned under item 1.3.3.6., the report on Strata reinforcement by bolting, dowelling and injection techniques in European coal mines' was adopted by the Mines Safety and Health Commission on 7 July 1977.

The 120 page-report describes strata reinforcement techniques, favourable parameters and methods of application and sets out the research to be carried out in the future. This information document is available to interested parties from the MSHC Secretariat under number 1612/4/75 in d-e-f. At the request of the MSHC, a summary was attached to the report setting out the conditions under which these techniques should be applied, either alone or in conjunction with other methods, and the kind of research and development work which should be encouraged in an attempt to improve the safety of these techniques (Annex VII to the present report).

2.10.2.2. This summary was published as document 1462/4/77 and was submitted to the governments of the Member States as a proposal for the improvement of safety in coal mines in accordance with Articles 1 and 4 of the MSHC's terms of reference.

2.10.2.3. The MSHC asked the Working Party to study the health risks presented by certain resins and to report its findings.

2.10.2.4. These techniques of strata reinforcement were presented to the Southern Counties Institution of Mining Engineers in London on 24 October 1977 by Messrs G. Thielen, J.F.Raffoux and P.A. Walker (Doc. 3320/1/77).

2.10.2.5. A new injection method was studied by the Working Party, and is the subject of a report prepared by Mr Thielen under the title "Application of the magnesia binder process at the Saarbergwerke AG' (Doc. No 627/77, available in d-e-f).

2.10.3. Other work

The work described in the 14th Report continued. None of it was brought to completion, and hence the various projects are simply noted below.

2.10.3.1. The effect of powered supports on the rate of serious accidents and fatalities caused by falls of ground or falling material.

This document was supplemented by a study carried out by CERCHAR, with the financial assistance of the Commission, entitled 'Example of statistical processing of accidents due to falls of ground. Processing of data from the Lorraine area' by Mr Raffoux (Doc. No 2609/1/77, available in d-e-f).

These documents will be submitted to the Working Party on Common Accident Statistics.

2.10.3.2. Accidents occurring as a result of roadway drivage, particularly under or in the vicinity of a newly exposed roof.

Report entitled 'Support in narrow workings in the South Midlands and South Nottinghamshire Atlas of the NCB' (Doc. No 761/77 by Mr Williams, available in e-f-d). Reports have been requested from the other delegations.

2.10.3.3. Improving the working life of roadways by building gate side packs, either by hand, mechanically, hydraulically or pneumatically, using materials found in situ or brought in.

2.10.3.4. Prevention of rock bursts. The importance of this problem was underlined by the roof fall in the Gardanne Mine on 15.6.1977 in a face crossing a fault zone. One miner was killed and gas and some 100 tonnes of coal were projected over a length of 40 metres.

2.10.3.5. Work commenced on the stability of tips.

2.10.3.6. For the extension of its work to cover the other extractive industries, the Working Party benefited from the collaboration at two of the Working Party's meetings of a Swedish observer and a representative of the French iron or mining industry.

2.11. Chapter K - Oil, gas and other materials extracted by borehole

- 2.11.1. The Working Party - which consisted at this stage only of government representatives - met on 10 June 1977 and a Committee of Experts on blowouts met 3 times : on 26 July, 9 September and 13 October 1977.
- 2.11.2. The Secretariat has been gathering accident statistics, the bases of national regulations and staff training methods to enable it to devise a programme to prevent individual accidents and health nuisances.
- 2.11.3. But the blowout which occurred in the Norwegian sector of the North Sea on 22 April 1977, and which resulted in 20 000 tonnes of oil gushing into the sea, was a reminder that absolute priority should be given to the prevention of such blowouts. Quite apart from the pollution of the sea - which does not fall within the MSHC's terms of reference - blowouts are a major source of hazard to the safety of hundreds of people working on a drilling platform. The risk of explosion, fire and destruction of plant jeopardizes rescue attempts.
- 2.11.4. At the request of the Working Party, a committee of experts was set up to study - first and foremost - the prevention of uncontrolled blowouts at sea, attention being devoted to the following aspects :
- 2.11.4.1. - the minimum elements of a drilling programme, for the attention of the administrative authorities for each proposed well ;
- 2.11.4.2. - safety devices at the heads of wells which are being drilled, such as blowouts preventers, control devices and flow lines ;
- 2.11.4.3. - equipping a production well to neutralize the danger of the changeover to the maintenance phase or in the case of damage to the platform ;
- 2.11.4.4. - maintenance programme and equipping wells for maintenance.

- 2.11.5. The first two chapters were drawn up in 1977 and will be submitted to the Working Party and to the MSHC in 1978.
- The other two chapters will be followed by other tasks, to be determined in the light of the examination of the report which the Norwegian Commission of Enquiry kindly sent to the Working Party*. These tasks will be concerned with the training, qualifications and responsibility of personnel.
- 2.11.6. The Secretariat of the Mines Safety and Health Commission has maintained contact with the European Diving Technology Committee which met in Stockholm on 20.4.1977 and in Luxembourg on 11 and 12.10.1977, to update the 'Guidance notes for safe diving', and took up its study of the harmonization of medical examinations for divers.

* Examined by the Working Party on 2 February 1978.

SECTION III3. Action taken by Governments on the proposals of the Mines Safety and Health Commission

The replies to the questionnaires sent to governments every two years, giving the position as at 1st. January 1978 are included as Annex V of the present report.

New regulation have been issued in North Rhine-Westfalia district of Germany which are in conformity with the proposals of the MSHC. One of these concerns the required safety standards when an exemption is given to exceed the normally prescribed firedamp limit in the ventilation. Another case is when working is permitted in high temperatures (e.g. between 28 and 32° centigrad on the effective temperature scale).

In many cases, the newer proposals (i.e. after 1975) which come into the questionnaire for the first time, are either the subject of careful study or are the object of new regulations which are currently under consideration.

SECTION IV

- 4.1. At the end of this chapter there are the usual tables :
- A and B : Frequency rates for serious injuries (A) and fatalities (B) for each of the countries of the Community of the Six since 1958.
 - C : Group accidents by cause for the Community of the Six since 1960 and breakdown by country for the Community of the Nine.
 - D : Summary table for the Community of the Six since 1958 and the same table for the United Kingdom since 1973.
 - Ia and Ib : Accidents by cause and site of accident and period of incapacity in absolute figures (a) and frequency rates (b).
 - 2a and 2b : Accidents by location and nature of injury for periods of incapacity exceeding 56 days and for fatalities, in absolute figures (a) and frequency rates (b). Tables 1 and 2 are given by country and for the Community of the Six and of the Nine, and refer to 1977. They are available from the Secretariat for the main coalfields.
- 4.2. The distinction between the Community of the Six and the Community of the Nine is maintained in order to permit monitoring of long-term trends. It is now possible to analyse changes between the past year and the previous year for the Community of the Nine ; reference will no longer be made to the Community of the Six in analyses of this type.
- 4.3. Analyses of the 1977 and 1976 statistics for the Community
- 4.3.1. As mentioned in Par. 1.1.2., the frequency rates for all the categories of accidents have decreased. These decreases, amounting to 1,34 % for accidents resulting in absence from work of 4 - 20 days, 2,21 % for accidents resulting in absence from work of 21 - 56 days, 2,13 % for accidents resulting in absence from work of more than 56 days, and

33 or 27 % for fatalities depending on whether or not account is taken of group accidents, are statistically significant at 95 % confidence level, except in the case of accidents resulting in absence from work of more than 56 days.

4.3.2 In absolute figures, accidents resulting in more than 4 days' incapacity and fatalities numbered 88 058 among 324 100 registered workers who worked a total of 577.59 million hours. One in every 3.68 registered workers was thus injured (or killed) during 1977, which represents, to be more precise, a frequency rate of 152.45 (152.45 casualties resulting in more than 4 days' incapacity or fatalities per million hours worked). The 1976 figures were 91 118 victims out of 331 900 registered workers who worked a total of 587.60 million hours, i.e. one victim per 3.64 registered workers and a frequency rate of 155.07. 1.69 % higher than in 1977 (statistically significant difference at 95 % confidence level).

4.3.3. The breakdown of these accidents by seriousness is as follows :

- accidents resulting in absence from work of 4-20 days = 57 526 or 65.3 % of the total number of accidents, with a frequency rate of 99.59
- accidents resulting in absence from work of 21-56 days = 23 779 or 27.1 % of the total number of accidents, with a frequency rate of 41.17
- accidents resulting in absence from work of more than 56 days = 6 637 or 7,5 % of the total number of accidents, with a frequency rate of 11.49
- fatalities = 116 or 0.13 % of the total number of accidents, with a frequency rate of 0.201.

This breakdown is practically identical to that for the previous year.

4.4.4. Breakdown of accidents by main causes (headings I-V of tables Ia) and by seriousness. The figures are given as a percentage of the total of headings I-XII for each category of seriousness.

| 1977 | 4-20 days % | 21-56 days % | more than 56 days % | fata- lities % | Total % |
|--|-------------------|--------------------|------------------------------|----------------------|------------|
| I Falls of ground | 21,9 | 18,2 | 20,1 | 23,3 | 20,7 |
| II Transport and haulage | 9,2 | 10,9 | 15,8 | 39,7 | 10,2 |
| III Slipping fal- ling and stumbling | 25,3 | 28,8 | 26,6 | 11,2 | 26,3 |
| IV Machinery, tools, etc. | 17,0 | 16,5 | 14,6 | 7,8 | 16,7 |
| V Falling objects | 16,6 | 17,3 | 16,7 | 4,3 | 16,8 |
| Total I-V | 90,0 | 91,8 | 93,7 | 86,2 | 90,7 |

Compared with the previous year, these five headings represent the same proportion of the total number of accidents (variation of approximately 1 % at the most).

The proportion of 'Falls of ground' and 'Transport and Haulage' has decreased and that of 'Slipping, falling and stumbling' and 'Falling objects' increased. The variations in these ratios are, however, slight (from - 3,7 % to + 2.4 % of the figures quoted).

From the point of view of seriousness, the breakdown is very similar to the breakdown for all accidents, except in the case of haulage and transport accidents where the relative proportion of the number of accidents increases distinctly with the seriousness of the accident. The number of haulage and transport accidents is, however, approximately half that of each of the other categories I-V.

- 4.4.5. To conclude, 1977 shows a favourable trend in the number of accidents, generally significant at 95 % confidence level although not very spectacular, (between 2.2 and 1.3 %), except in the case of fatalities which decreased by one third. The breakdown of accidents by categories remains very similar to that for the previous year, with a slight decrease in accidents due to technical causes and an increase in those due to falls by the victims or to falling objects.
- 4.5. Accident levels over a period of several years in the Community of the Six.
- 4.5.1. For accidents resulting in absences of less than 56 days, data are available from 1971 onwards (see table below).
There is an increase of 2,1 % in the frequency rate for both categories of Non fatal accidents, but only that for casualties resulting in absences of 4-20 days it is statistically significant at 95 % confidence level. It can be seen that there was a decrease in each year except for 1973 and 1977. The frequency rates are 8.8 % and 7.4 % lower than those for 1971 for N.F.A. resulting in absences of 4-20 days and 21-56 days respectively.
- 4.5.2. For accidents resulting in absences of more than 56 days comparisons can be made back to 1958. After levelling off over the period 1958 - 1967 at between 12.95 and 13.78, the frequency rate rose again from then until 1973 to 16.77, fell again to 14.92 in 1976 and rose again, although not significantly, to 15.36 in 1977. This rate is 13.4 % higher than in 1958.
- 4.5.3. In the case of fatalities the decrease this year is very considerable and significant. This decrease has been steady since 1958 (disregarding the victims of disasters), but it had not been statistically significant for ten years. The frequency rate of 0.233 is 62 % lower than in 1958. For the first five types of causes the rates have varied little; in respect of "falls of ground" and "haulage and transport"

and have decreased very distinctly in respect of the other three headings, compared with the previous year. The frequency rate for 'falls of ground' is 0.074 as against 0.253 in 1958 and has fallen steadily (Table B).

Accident levels since 1971 (Community of the Six)

| | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|---------|-----------|------------|-----------|-----------|-----------|------------|
| 4 - 20 days - actual | 47 203 | 40 376 | 37 384 | 34 797 | 33 985 | 30 643 | 29 466 |
| Frequency rate | 113,96 | 109,31 | 112,77 | 110,97 | 106,67 | 101,77 | 103,90 |
| increase/decrease on previous year (%) | - | - 4 (s) | + 3,17 (s) | - 1,6 (s) | - 3,9 (s) | - 4,8 (s) | + 2,1 (s) |
| 21 - 56 days - actual | 21 116 | 18 531 | 17 325 | 15 875 | 15 454 | 13 923 | 13 388 |
| Frequency rate | 50,98 | 50,17 | 52,26 | 50,62 | 48,5 | 46,24 | 47,21 |
| increase/decrease on previous year (%) | - | - 1,59 | + 4,17 (s) | - 3 (s) | - 4,2 (s) | - 4,8 (s) | + 2,1 |
| more than 56 days - actual | 6 249 | 5 763 | 5 560 | 5 054 | 4 795 | 4 791 | 4 357 |
| Frequency rate | 15,09 | 15,60 | 16,77 | 16,12 | 15,05 | 14,92 | 15,36 |
| Increase/decrease on previous year (%) | - | + 3,4 (s) | + 7 (s) | - 4 (s) | - 6,7 (s) | - 0,8 (s) | + 2,9 (s) |
| Fatalities total actual | 182 | 147 | 137 | 143 | 110 | 125 | 83 |
| Frequency rate | 0,440 | 0,399 | 0,413 | 0,456 | 0,345 | 0,415 | 0,293 |
| increase/decrease on previous year (%) | - | - 10 | + 3,9 | + 10,4 | - 24 | + 20 | - 29,4 (s) |
| Actual without group acc. (actual group accident) | 162 (3) | 141 (1) | 128 (1) | 96 (2) | 110 (0) | 109 (1) | 66 (1) |
| Frequency rate | 0,391 | 0,382 | 0,385 | 0,307 | 0,345 | 0,362 | 0,233 |
| increase/decrease on previous year (%) | - | - 2,3 | + 1 % | - 21 (s) | + 12 | + 4,9 | - 39,4 (s) |

(s) significant variation

A. Comparative Table of numbers of persons incapacitated
by underground accidents for eight weeks or longer
years 1958-1977 per '000,000 man-hours (frequency)

| GERMANY | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
| 1) Falls of ground | 4,843 | 4,779 | 4,886 | 4,797 | 4,682 | 4,663 | 4,894 | 4,732 | 4,721 | 4,524 | 4,618 | 4,736 | 4,321 | 4,354 | 4,20 | 4,30 | 4,08 | 3,69 | 3,47 | 3,67 |
| 2) Haulage and transport | 2,550 | 2,569 | 2,445 | 2,458 | 2,501 | 2,433 | 2,385 | 2,411 | 2,067 | 1,913 | 1,994 | 2,195 | 2,007 | 1,724 | 1,81 | 1,80 | 1,68 | 2,16 | 1,89 | 1,74 |
| 3) Movement of personnel | 2,497 | 2,463 | 2,348 | 2,512 | 2,608 | 2,646 | 2,744 | 3,032 | 2,852 | 2,974 | 3,300 | 3,399 | 3,370 | 3,246 | 3,48 | 3,98 | 4,15 | 3,37 | 3,58 | 4,09 |
| 4) Machinery, handling of tools and supports | 0,767 | 0,914 | 0,920 | 0,867 | 1,046 | 1,213 | 1,242 | 1,234 | 1,244 | 1,124 | 1,396 | 1,291 | 1,382 | 1,597 | 1,38 | 1,61 | 1,58 | 2,16 | 1,85 | 2,09 |
| 5) Falling objects | 2,537 | 2,719 | 2,738 | 2,945 | 3,077 | 3,038 | 3,242 | 3,344 | 3,272 | 3,642 | 3,773 | 4,036 | 4,166 | 3,313 | 3,49 | 3,49 | 3,37 | 2,97 | 2,92 | 3,03 |
| 6) Explosives | 0,015 | 0,011 | 0,010 | 0,009 | 0,008 | 0,006 | 0,006 | 0,005 | 0,005 | 0,017 | 0,011 | 0,007 | 0,008 | - | - | - | 0,01 | - | 0,01 | - |
| 7) Explosions of firedamp or coal dust | 0,011 | 0,016 | - | 0,002 | 0,123 | 0,010 | - | 0,014 | 0,013 | - | 0,004 | 0,004 | - | 0,012 | - | - | - | - | 0,02 | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | - | - | - | - | - | - | - | 0,005 | - | 0,003 | - | - | - | - | - | - | - | - | - | - |
| 9) Underground combustion and fires | - | - | 0,003 | 0,002 | - | - | - | - | - | - | 0,004 | - | - | - | - | - | - | - | - | - |
| 10) Inrushes of water | 0,004 | - | - | - | - | 0,004 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 11) Electricity | 0,010 | 0,014 | 0,012 | 0,014 | 0,006 | 0,012 | 0,009 | 0,002 | 0,010 | 0,006 | 0,011 | 0,026 | 0,012 | 0,008 | 0,01 | 0,005 | - | 0,009 | 0,01 | 0,01 |
| 12) Other causes | 0,487 | 0,522 | 0,457 | 0,503 | 0,488 | 0,473 | 0,477 | 0,354 | 0,414 | 0,396 | 0,429 | 0,402 | 0,532 | 0,632 | 0,96 | 0,99 | 0,52 | 0,32 | 0,40 | 0,36 |
| TOTAL | 13,721 | 14,007 | 13,819 | 14,109 | 14,539 | 14,499 | 14,999 | 15,133 | 14,598 | 14,599 | 15,540 | 16,096 | 15,798 | 14,886 | 15,31 | 16,19 | 15,40 | 14,69 | 14,16 | 14,98 |
| BELGIUM | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
| 1) Falls of ground | 5,911 | 4,294 | 4,324 | 4,071 | 4,439 | 4,432 | 4,417 | 3,574 | 3,568 | 3,850 | 3,676 | 5,075 | 4,673 | 3,989 | 4,6 | 4,02 | 3,99 | 2,79 | 2,77 | 2,55 |
| 2) Haulage and transport | 4,132 | 2,979 | 2,709 | 2,770 | 3,331 | 3,565 | 3,419 | 2,866 | 3,269 | 2,960 | 3,220 | 3,169 | 3,018 | 3,365 | 2,8 | 3,33 | 2,43 | 2,39 | 2,98 | 2,21 |
| 3) Movement of personnel | 1,354 | 0,998 | 1,008 | 1,062 | 1,136 | 1,066 | 0,961 | 0,771 | 0,936 | 0,903 | 1,122 | 1,186 | 1,144 | 1,496 | 1,3 | 1,41 | 1,70 | 1,29 | 1,06 | 0,93 |
| 4) Machinery, handling of tools and supports | 2,804 | 2,085 | 2,386 | 2,097 | 2,461 | 2,414 | 2,310 | 2,126 | 2,146 | 2,265 | 1,903 | 2,353 | 1,801 | 2,469 | 1,7 | 2,58 | 2,18 | 1,66 | 1,81 | 1,55 |
| 5) Falling objects | 0,414 | 0,371 | 0,354 | 0,301 | 0,445 | 0,547 | 0,397 | 0,292 | 0,349 | 0,459 | 0,358 | 1,244 | 1,242 | 1,870 | 1,5 | 1,44 | 1,84 | 1,46 | 1,63 | 1,16 |
| 6) Explosives | 0,027 | 0,007 | 0,032 | 0,018 | - | 0,019 | 0,018 | - | 0,013 | 0,056 | 0,049 | - | - | 0,025 | 0,03 | - | - | - | 0,03 | - |
| 7) Explosions of firedamp or coal dust | - | - | - | - | - | - | 0,009 | 0,031 | - | - | - | 0,019 | - | - | - | - | - | - | - | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | 0,011 | - | - | - | - | - | - | - | 0,013 | - | - | - | - | - | - | - | - | - | - | - |
| 9) Underground combustion and fires | - | - | - | - | - | - | - | 0,021 | - | - | - | - | - | - | - | - | - | - | - | - |
| 10) Inrushes of water | - | - | - | - | 0,010 | - | - | - | - | - | - | - | - | 0,025 | - | - | - | - | - | - |
| 11) Electricity | 0,011 | - | 0,016 | 0,018 | 0,010 | 0,009 | - | 0,010 | 0,015 | - | 0,016 | 0,019 | - | - | - | 0,03 | 0,03 | 0,03 | - | - |
| 12) Other causes | 0,260 | 0,255 | 0,260 | 0,301 | 0,351 | 0,198 | 0,268 | 0,333 | 0,362 | 0,278 | 0,228 | 0,175 | 0,195 | 0,324 | 0,2 | 0,36 | 0,41 | 0,06 | 0,17 | 0,07 |
| TOTAL | 14,924 | 10,989 | 11,089 | 10,638 | 12,161 | 12,250 | 11,799 | 10,024 | 10,669 | 10,771 | 10,572 | 13,240 | 12,097 | 13,563 | 12,13 | 13,16 | 12,61 | 9,71 | 10,47 | 8,48 |

A. Comparative Table of numbers of persons incapacitated
by underground accidents for eight weeks or longer
years 1958-1977 per '000,000 man-hours (frequency)

| FRANCE * | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
| 1) Falls of ground | 5,027 | 4,665 | 4,744 | 4,416 | 4,222 | 4,177 | 4,308 | 3,941 | 3,927 | 3,634 | 4,162 | 4,044 | 3,761 | 3,721 | 3,79 | 4,38 | 4,52 | 3,75 | 3,82 | 3,88 |
| 2) Haulage and transport | 1,980 | 1,695 | 1,920 | 2,106 | 2,196 | 2,364 | 2,278 | 2,153 | 1,858 | 1,918 | 1,946 | 1,556 | 1,666 | 1,959 | 1,89 | 2,37 | 2,36 | 2,63 | 2,53 | 2,44 |
| 3) Movement of personnel | 1,505 | 1,118 | 2,873 | 2,334 | 2,458 | 2,368 | 2,383 | 2,087 | 2,239 | 2,174 | 2,815 | 3,226 | 3,372 | 3,667 | 4,51 | 4,79 | 4,11 | 4,29 | 4,81 | 5,39 |
| 4) Machinery, handling of tools and supports | 0,914 | 1,022 | 1,621 | 2,523 | 2,991 | 3,096 | 3,042 | 2,272 | 2,639 | 2,773 | 3,016 | 3,070 | 3,332 | 2,373 | 2,63 | 2,84 | 2,98 | 2,94 | 3,17 | 3,13 |
| 5) Falling objects | 1,890 | 2,187 | 1,893 | 2,292 | 2,073 | 2,278 | 2,074 | 1,839 | 1,785 | 2,114 | 2,386 | 2,537 | 2,515 | 4,566 | 4,96 | 5,00 | 5,12 | 4,11 | 4,11 | 3,94 |
| 6) Explosives | 0,043 | 0,051 | 0,031 | 0,017 | 0,051 | 0,009 | 0,013 | 0,037 | 0,010 | 0,011 | - | 0,050 | 0,016 | - | 0,02 | - | - | 0,03 | - | 0,03 |
| 7) Explosions of firedamp or coal dust | 0,047 | 0,088 | - | - | 0,004 | - | - | - | 0,029 | - | - | - | 0,087 | - | - | - | 0,08 | - | - | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | 0,004 | - | - | - | - | - | - | - | - | 0,005 | - | - | - | - | - | - | - | 0,01 | - | 0,02 |
| 9) Underground combustion and fires | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0,01 | 0,03 | 0,01 | 0,01 | - |
| 10) Inrushes of water | - | - | - | - | - | - | 0,018 | - | 0,005 | - | 0,006 | - | 0,032 | - | 0,01 | 0,04 | - | - | - | - |
| 11) Electricity | 0,014 | - | 0,004 | 0,029 | 0,004 | 0,014 | 0,009 | 0,014 | - | 0,005 | 0,006 | 0,014 | 0,024 | 0,009 | 0,01 | - | 9,01 | 0,03 | 0,03 | 0,02 |
| 12) Other causes | 2,956 | 2,768 | 0,793 | 0,362 | 0,240 | 0,354 | 0,227 | 0,174 | 0,200 | 0,185 | 0,233 | 0,291 | 0,294 | 0,314 | 0,43 | 0,67 | 0,63 | 0,64 | 0,49 | 0,47 |
| TOTAL | 14,380 | 13,594 | 13,909 | 14,079 | 14,239 | 14,660 | 14,347 | 12,517 | 12,692 | 12,819 | 14,570 | 14,788 | 15,099 | 16,609 | 18,24 | 20,09 | 19,85 | 18,44 | 18,97 | 19,31 |
| ITALY ¹⁾ | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
| 1) Falls of ground | 1,355 | 1,378 | 1,808 | - | 0,792 | 0,366 | 0,893 | 5,572 | 6,360 | 5,580 | 0,182 | 3,656 | - | 5,958 | 2,20 | - | - | - | - | - |
| 2) Haulage and transport | 1,335 | 0,984 | 1,205 | 0,676 | 1,847 | 1,465 | 1,787 | - | 0,707 | 0,797 | 0,812 | - | - | 3,404 | - | - | - | - | - | - |
| 3) Movement of personnel | 0,668 | 0,394 | 1,005 | 1,578 | 1,056 | 0,732 | 1,787 | - | 0,707 | 1,594 | 0,812 | 1,462 | - | 1,702 | - | 3,25 | - | - | - | - |
| 4) Machinery, handling of tools and supports | 1,169 | 0,984 | 0,603 | 0,902 | 1,584 | 1,465 | 3,127 | 7,164 | 7,067 | 13,552 | 7,304 | 8,043 | 6,896 | 2,553 | - | - | - | 4,00 | - | - |
| 5) Falling objects | 1,169 | 1,698 | 1,808 | 2,029 | 2,375 | 3,296 | 3,574 | 0,796 | - | 6,377 | 6,493 | 3,656 | - | 1,702 | - | - | 1,64 | - | - | - |
| 6) Explosives | 0,167 | - | - | 0,225 | - | 0,366 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7) Explosions of firedamp or coal dust | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 8) Sudden outburst of firedamp, suffocation by natural gases | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 9) Underground combustion and fires | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10) Inrushes of water | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 11) Electricity | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 12) Other causes | 0,334 | 0,591 | 0,603 | 0,451 | - | - | - | 1,592 | 3,360 | 3,189 | 0,812 | - | 5,172 | 0,851 | - | - | - | - | - | - |
| TOTAL | 6,197 | 6,299 | 7,032 | 5,861 | 7,654 | 7,690 | 11,168 | 15,124 | 18,201 | 31,089 | 17,043 | 16,817 | 12,068 | 16,170 | 2,20 | 3,25 | 1,64 | 4,00 | - | - |

* Including Provence as from 1970.

1) Production stopped since 1976

A. Comparative Table of numbers of persons incapacitated
by underground accidents for eight weeks or longer
years 1958-1977 per '000,000 man-hours (frequency)

| NETHERLANDS ¹⁾ | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|--------|--------|------|------|------|------|
| 1) Falls of ground | 1,326 | 1,464 | 1,305 | 1,829 | 2,238 | 1,742 | 2,017 | 1,923 | 1,688 | 2,466 | 2,450 | 2,737 | 2,634 | 2,528 | 2,06 | 4,219 | 1,041 | - | | | |
| 2) Haulage and transport | 1,511 | 1,562 | 1,898 | 1,924 | 2,590 | 1,826 | 1,952 | 2,808 | 2,621 | 1,866 | 2,407 | 2,562 | 2,634 | 1,820 | 2,19 | 2,443 | 2,603 | - | | | |
| 3) Movement of personnel | 0,324 | 0,386 | 0,187 | 0,514 | 0,580 | 0,630 | 0,472 | 0,774 | 0,605 | 0,766 | 1,160 | 1,165 | 0,905 | 0,404 | 1,03 | 0,888 | 0,521 | - | | | |
| 4) Machinery, handling of tools and supports | 0,617 | 0,402 | 0,780 | 0,915 | 1,015 | 1,050 | 1,094 | 1,282 | 2,066 | 0,833 | 1,031 | 1,689 | 1,894 | 3,033 | 1,81 | 1,554 | 4,686 | - | | | |
| 5) Falling objects | 0,401 | 0,515 | 0,492 | 0,819 | 0,642 | 0,630 | 0,923 | 0,862 | 0,958 | 0,866 | 1,590 | 1,106 | 0,659 | 1,213 | 1,55 | 0,888 | 1,562 | - | | | |
| 6) Explosives | - | - | - | - | - | - | 0,021 | - | - | - | - | - | - | - | - | - | - | - | - | | |
| 7) Explosions of firedamp or coal dust | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| 9) Underground combustion and fires | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| 10) Inrushes of water | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | |
| 11) Electricity | - | - | - | - | 0,021 | - | 0,021 | - | - | - | - | - | - | - | - | - | - | - | - | | |
| 12) Other causes | 0,262 | 0,161 | 0,390 | 0,210 | 0,497 | 0,147 | 0,129 | 0,088 | 0,353 | 0,700 | 0,301 | 0,116 | 0,165 | 0,202 | 0,52 | 0,666 | - | - | | | |
| TOTAL | 4,441 | 4,490 | 5,051 | 6,212 | 7,583 | 6,025 | 6,629 | 7,737 | 8,291 | 7,497 | 8,939 | 9,375 | 8,891 | 9,201 | 9,15 | 10,659 | 10,413 | | | | |
| UNITED KINGDOM ²⁾ | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | |
| 1) Falls of ground | | | | | | | | | | | | | | | | | | | | 1,05 | |
| 2) Haulage and transport | | | | | | | | | | | | | | | | | | | | | 1,69 |
| 3) Movement of personnel | | | | | | | | | | | | | | | | | | | | | 2,03 |
| 4) Machinery, handling of tools and supports | | | | | | | | | | | | | | | | | | | | | 1,09 |
| 5) Falling objects | | | | | | | | | | | | | | | | | | | | | 0,82 |
| 6) Explosives | | | | | | | | | | | | | | | | | | | | | 0,01 |
| 7) Explosions of firedamp or coal dust | | | | | | | | | | | | | | | | | | | | | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | | | | | | | | | | | | | | | | | | | | | - |
| 9) Underground combustion and fires | | | | | | | | | | | | | | | | | | | | | - |
| 10) Inrushes of water | | | | | | | | | | | | | | | | | | | | | - |
| 11) Electricity | | | | | | | | | | | | | | | | | | | | | - |
| 12) Other causes | | | | | | | | | | | | | | | | | | | | | 1,03 |
| TOTAL | | | | | | | | | | | | | | | | | | | | | 7,75 |

1) Production stopped since 1975

2) établit ses statistiques suivant le schéma de la Communauté depuis 1976

A. Comparative Table of numbers of persons incapacitated
by underground accidents for eight weeks or longer
years 1958-1977 per '000,000 man-hours (frequency)

| COMMUNITY (VI) 1) | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
| 1) Falls of ground | 4,846 | 4,490 | 4,571 | 4,434 | 4,387 | 4,337 | 4,509 | 4,215 | 4,186 | 4,060 | 4,261 | 4,492 | 4,135 | 4,109 | 4,08 | 4,29 | 4,15 | 3,61 | 3,48 | 2,31 |
| 2) Haulage and transport | 2,602 | 2,347 | 2,310 | 2,371 | 2,521 | 2,520 | 2,346 | 2,416 | 2,173 | 2,037 | 2,139 | 2,118 | 2,016 | 1,953 | 1,93 | 2,11 | 1,91 | 2,28 | 2,14 | 1,82 |
| 3) Movement of personnel | 2,003 | 1,823 | 2,185 | 2,185 | 2,282 | 2,261 | 2,326 | 2,364 | 2,320 | 2,354 | 2,795 | 3,023 | 3,084 | 3,117 | 3,47 | 3,88 | 3,89 | 3,38 | 3,62 | 3,05 |
| 4) Machinery, handling of tools and supports | 1,098 | 1,064 | 1,264 | 1,423 | 1,712 | 1,818 | 1,848 | 1,773 | 1,815 | 1,790 | 1,945 | 1,865 | 2,011 | 1,876 | 1,75 | 2,01 | 1,98 | 2,29 | 2,15 | 1,67 |
| 5) Falling objects | 1,962 | 2,161 | 2,105 | 2,353 | 2,375 | 2,406 | 2,442 | 2,415 | 2,362 | 2,638 | 2,858 | 3,185 | 3,308 | 3,506 | 3,62 | 3,63 | 3,62 | 3,08 | 3,08 | 1,93 |
| 6) Explosives | 0,023 | 0,020 | 0,017 | 0,012 | 0,018 | 0,010 | 0,011 | 0,013 | 0,007 | 0,019 | 0,015 | 0,019 | 0,011 | 0,002 | 0,008 | - | 0,01 | 0,006 | 0,01 | 0,01 |
| 7) Explosions of firedamp or coal dust | 0,017 | 0,030 | 0,010 | 0,001 | 0,071 | 0,006 | 0,001 | 0,011 | 0,016 | - | 0,002 | 0,004 | 0,025 | 0,007 | - | - | 0,02 | - | - | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | 0,002 | - | - | - | - | - | - | 0,002 | 0,001 | 0,003 | - | - | - | - | - | - | - | 0,003 | 0,003 | - |
| 9) Underground combustion and fires | - | - | 0,002 | 0,001 | - | - | - | 0,002 | - | - | 0,002 | - | - | - | - | 0,003 | 0,01 | 0,003 | - | - |
| 10) Inrushes of water | 0,002 | - | - | - | 0,001 | 0,002 | 0,003 | - | 0,001 | - | 0,002 | - | 0,009 | 0,002 | 0,003 | 0,009 | - | - | - | - |
| 11) Electricity | 0,010 | 0,008 | 0,010 | 0,018 | 0,007 | 0,012 | 0,008 | 0,006 | 0,007 | 0,005 | 0,010 | 0,021 | 0,014 | 0,007 | 0,008 | 0,006 | 0,01 | 0,016 | 0,01 | - |
| 12) Other causes | 0,985 | 1,012 | 0,513 | 0,428 | 0,404 | 0,390 | 0,364 | 0,289 | 0,354 | 0,337 | 0,341 | 0,333 | 0,434 | 0,509 | 0,73 | 0,84 | 0,53 | 0,37 | 0,40 | 0,70 |
| TOTAL | 13,551 | 12,954 | 12,986 | 13,227 | 13,781 | 13,781 | 13,861 | 13,506 | 13,242 | 13,246 | 14,370 | 15,160 | 15,047 | 15,088 | 15,60 | 16,77 | 16,12 | 15,05 | 14,92 | 11,49 |

1) Communauté des IX à partir de 1977

B. Underground accidents resulting in death within eight weeks

years 1958- 1977

per '000,000 man-hours (frequency)

| GERMANY | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|-------------|-------------|--------------|--------------|
| 1) Falls of ground | 0,268 | 0,290 | 0,263 | 0,216 | 0,280 | 0,260 | 0,200 | 0,184 | 0,197 | 0,206 | 0,148 | 0,192 | 0,113 | 0,147 | 0,10 | 0,08 | 0,12 | 0,12 | 0,06 | 0,07 |
| 2) Haulage and transport | 0,179 | 0,169 | 0,182 | 0,196 | 0,149 | 0,178 | 0,300 | 0,191 | 0,175 | 0,150 | 0,126 | 0,143 | 0,128 | 0,103 | 0,16 | 0,13 | 0,07 | 0,12 | 0,10 | 0,09 |
| 3) Movement of personnel | 0,094 | 0,097 | 0,070 | 0,086 | 0,059 | 0,089 | 0,071 | 0,070 | 0,094 | 0,076 | 0,079 | 0,056 | 0,058 | 0,032 | 0,06 | 0,06 | 0,06 | 0,06 | 0,07 | 0,05 |
| 4) Machinery, handling of tools and supports | 0,010 | 0,027 | 0,012 | 0,027 | 0,037 | 0,019 | 0,028 | 0,025 | 0,030 | 0,020 | 0,014 | 0,034 | 0,031 | 0,032 | 0,03 | 0,02 | 0,02 | 0,05 | 0,03 | 0,04 |
| 5) Falling objects | 0,065 | 0,041 | 0,039 | 0,065 | 0,072 | 0,072 | 0,054 | 0,058 | 0,048 | 0,063 | 0,051 | 0,049 | 0,035 | 0,047 | 0,06 | 0,02 | 0,04 | 0,05 | 0,05 | 0,02 |
| 6) Explosives | 0,009 | 0,003 | 0,003 | - | 0,004 | - | 0,002 | - | - | - | 0,004 | - | - | - | - | - | - | - | 0,005 | - |
| 7) Explosions of firedamp or coal dust | 0,011 | 0,012 | - | - | 0,660 | 0,002 | 0,002 | 0,019 | 0,056 | - | 0,061 | - | - | 0,008 | - | - | - | - | 0,01 | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | 0,005 | 0,003 | 0,002 | 0,004 | 0,002 | - | - | 0,002 | 0,002 | 0,007 | - | 0,004 | - | 0,008 | 0,004 | 0,005 | - | - | 0,01 | - |
| 9) Underground combustion and fires | - | 0,003 | - | 0,002 | - | 0,006 | 0,009 | 0,005 | - | - | - | - | - | - | - | - | - | - | - | 0,04 |
| 10) Inrushes of water | - | 0,003 | 0,002 | - | - | 0,004 | - | - | - | - | - | - | 0,012 | - | - | - | - | - | - | - |
| 11) Electricity | 0,022 | 0,008 | 0,002 | 0,005 | 0,010 | 0,002 | 0,004 | 0,005 | - | 0,003 | 0,004 | 0,004 | 0,004 | - | 0,004 | 0,005 | - | - | 0,005 | 0,01 |
| 12) Other causes | 0,025 | 0,025 | 0,036 | 0,049 | 0,049 | 0,025 | 0,017 | 0,023 | 0,027 | 0,017 | 0,022 | 0,022 | 0,027 | 0,083 | 0,04 | 0,09 | 0,03 | 0,005 | 0,03 | 0,02 |
| TOTAL | 0,687 | 0,680 | 0,611 | 0,651 | 1,344 | 0,657 | 0,587 | 0,582 | 0,629 | 0,542 | 0,509 | 0,504 | 0,408 | 0,460 | 0,46 | 0,420 | 0,34 | 0,41 | 0,377 | 0,34 |
| BELGIUM | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
| 1) Falls of ground | 0,223 | 0,213 | 0,299 | 0,266 | 0,246 | 0,264 | 0,222 | 0,239 | 0,324 | 0,264 | 0,179 | 0,214 | 0,268 | 0,100 | 0,08 | 0,21 | 0,06 | 0,03 | 0,07 | 0,03 |
| 2) Haulage and transport | 0,101 | 0,124 | 0,157 | 0,168 | 0,142 | 0,245 | 0,166 | 0,166 | 0,187 | 0,180 | 0,114 | 0,097 | 0,170 | 0,125 | 0,18 | 0,21 | 0,06 | 0,16 | 0,03 | 0,07 |
| 3) Movement of personnel | 0,011 | 0,027 | 0,008 | 0,035 | 0,010 | 0,057 | 0,028 | 0,011 | 0,025 | - | 0,033 | - | - | 0,049 | 0,03 | - | 0,03 | - | 0,07 | 0,03 |
| 4) Machinery, handling of tools and supports | 0,005 | 0,014 | 0,016 | 0,027 | 0,047 | - | 0,018 | 0,052 | 0,025 | 0,028 | 0,065 | - | - | 0,025 | - | 0,03 | - | 0,09 | 0,03 | 0,03 |
| 5) Falling objects | 0,016 | - | 0,008 | - | 0,010 | 0,019 | 0,018 | - | - | - | 0,016 | - | - | - | 0,03 | - | 0,03 | - | 0,03 | - |
| 6) Explosives | 0,011 | 0,014 | - | - | - | - | - | - | - | - | 0,016 | - | - | - | - | - | - | - | - | - |
| 7) Explosions of firedamp or coal dust | - | - | 0,016 | - | - | - | - | 0,011 | - | - | - | - | - | - | - | - | - | - | - | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | 0,016 | 0,014 | - | - | 0,047 | - | - | 0,041 | 0,013 | - | - | - | - | 0,025 | 0,18 | 0,06 | - | - | - | - |
| 9) Underground combustion and fires | - | 0,007 | - | - | - | - | - | 0,011 | - | - | - | - | - | - | - | - | - | - | - | - |
| 10) Inrushes of water | 0,011 | - | - | 0,044 | 0,047 | 0,019 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 11) Electricity | 0,021 | - | 0,024 | - | - | 0,009 | 0,009 | 0,011 | - | 0,014 | 0,033 | 0,019 | 0,024 | - | - | - | - | - | - | - |
| 12) Other causes | 0,005 | - | 0,008 | 0,009 | 0,019 | 0,028 | 0,009 | - | 0,013 | 0,042 | - | - | - | - | 0,03 | 0,03 | - | - | - | - |
| TOTAL | 0,420 | 0,413 | 0,536 | 0,549 | 0,568 | 0,641 | 0,471 | 0,542 | 0,587 | 0,528 | 0,456 | 0,330 | 0,462 | 0,324 | 0,53 | 0,54 | 0,20 | 0,29 | 0,24 | 0,193 |

B. Underground accidents resulting in death within eight weeks

years 1958-1977

per '000,000 man-hours (frequency)

| FRANCE * | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|
| 1) Falls of ground | 0,235 | 0,192 | 0,186 | 0,219 | 0,167 | 0,120 | 0,127 | 0,164 | 0,214 | 0,159 | 0,177 | 0,149 | 0,143 | 0,117 | 0,07 | 0,20 | 0,11 | 0,06 | 0,09 | 0,09 |
| 2) Haulage and transport | 0,115 | 0,085 | 0,082 | 0,122 | 0,077 | 0,121 | 0,141 | 0,052 | 0,126 | 0,088 | 0,101 | 0,186 | 0,127 | 0,108 | 0,08 | 0,07 | 0,12 | 0,07 | 0,10 | 0,06 |
| 3) Movement of personnel | 0,007 | 0,018 | 0,027 | 0,008 | 0,043 | 0,009 | 0,009 | 0,042 | 0,024 | 0,016 | 0,025 | 0,014 | 0,016 | 0,072 | 0,01 | 0,01 | 0,01 | 0,03 | 0,03 | - |
| 4) Machinery, handling of tools and supports | 0,018 | 0,040 | 0,016 | 0,008 | 0,030 | 0,009 | 0,036 | 0,009 | 0,015 | 0,016 | 0,006 | - | 0,032 | 0,027 | - | 0,02 | 0,03 | - | 0,10 | 0,02 |
| 5) Falling objects | 0,025 | 0,007 | 0,004 | 0,017 | 0,030 | 0,009 | 0,018 | 0,019 | 0,015 | 0,011 | 0,031 | 0,014 | 0,016 | 0,045 | - | 0,04 | 0,03 | 0,03 | 0,03 | - |
| 6) Explosives | - | 0,026 | - | - | - | 0,005 | 0,005 | 0,009 | 0,005 | 0,005 | 0,006 | - | 0,108 | 0,018 | - | - | - | - | 0,01 | - |
| 7) Explosions of firedamp or coal dust | 0,115 | 0,121 | - | - | 0,004 | - | - | 0,155 | - | - | 0,038 | - | 0,127 | - | - | - | 0,58 | - | 0,23 | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | 0,043 | 0,026 | 0,019 | 0,004 | - | 0,019 | 0,009 | - | 0,005 | 0,027 | 0,019 | 0,007 | - | 0,072 | - | 0,01 | - | - | - | - |
| 9) Underground combustion and fires | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0,01 | - | 0,01 | - | - | - |
| 10) Inrushes of water | - | - | - | 0,004 | - | - | - | 0,005 | - | 0,005 | - | - | 0,016 | - | 0,01 | - | - | - | - | - |
| 11) Electricity | - | 0,011 | 0,012 | - | 0,009 | 0,024 | - | - | 0,010 | - | - | 0,007 | - | - | - | - | - | - | - | - |
| 12) Other causes | 0,036 | 0,029 | 0,008 | - | 0,009 | 0,014 | 0,014 | - | 0,005 | 0,005 | - | 0,007 | - | 0,009 | 0,03 | - | - | - | - | 0,02 |
| TOTAL | 0,594 | 0,555 | 0,354 | 0,382 | 0,369 | 0,330 | 0,359 | 0,455 | 0,419 | 0,332 | 0,403 | 0,384 | 0,484 | 0,468 | 0,21 | 0,37 | 0,39 | 0,18 | 0,60 | 0,19 |
| ITALY ¹⁾ | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
| 1) Falls of ground | 0,167 | - | 0,201 | 0,225 | - | 0,366 | - | - | - | - | - | - | - | - | 2,20 | - | - | - | - | - |
| 2) Haulage and transport | - | 0,197 | - | - | - | - | - | - | - | 0,797 | - | - | - | - | - | - | - | - | - | - |
| 3) Movement of personnel | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4) Machinery, handling of tools and supports | - | - | - | - | - | - | - | - | - | 0,797 | - | - | - | - | - | - | - | - | - | - |
| 5) Falling objects | - | 0,197 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 6) Explosives | 0,501 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7) Explosions of firedamp or coal dust | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | 0,167 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 9) Underground combustion and fires | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10) Inrushes of water | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 11) Electricity | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 12) Other causes | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| TOTAL | 0,835 | 0,394 | 0,201 | 0,226 | - | 0,366 | - | - | - | 1,594 | - | - | - | - | 2,20 | - | - | - | - | - |

* Including Provence as from 1970.

1) Production stopped since 1976

B. Underground accidents resulting in death within eight weeks

years 1958- 1977

per '000,000 man-hours (frequency)

| NETHERLANDS 1) | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|----------|--------------|------|------|------|
| 1) Falls of ground | 0,262 | 0,064 | 0,034 | 0,114 | 0,062 | 0,084 | 0,043 | 0,044 | 0,050 | 0,100 | 0,172 | 0,058 | 0,082 | 0,101 | - | - | - | - | - | |
| 2) Haulage and transport | 0,077 | 0,145 | 0,067 | 0,095 | 0,062 | 0,105 | 0,172 | 0,177 | 0,126 | - | 0,086 | - | 0,165 | - | 0,26 | - | - | - | - | |
| 3) Movement of personnel | - | - | - | - | - | - | - | - | - | - | - | 0,058 | - | - | - | - | - | - | - | |
| 4) Machinery, handling of tools and supports | 0,015 | 0,016 | - | - | 0,041 | - | - | 0,022 | - | 0,067 | - | 0,117 | - | - | - | - | - | - | - | |
| 5) Falling objects | - | 0,016 | - | - | - | - | 0,043 | - | - | - | 0,043 | - | - | - | - | - | 0,521 | - | - | |
| 6) Explosives | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 7) Explosions of firedamp or coal dust | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 9) Underground combustion and fires | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 10) Inrushes of water | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 11) Electricity | - | - | - | 0,019 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 12) Other causes | - | - | 0,017 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| TOTAL | 0,355 | 0,241 | 0,119 | 0,229 | 0,166 | 0,189 | 0,258 | 0,243 | 0,176 | 0,167 | 0,301 | 0,233 | 0,247 | 0,101 | 0,26 | - | 0,521 | | | |
| UNITED KINGDOM 2) | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
| 1) Falls of ground | | | | | | | | | | | | | | | | | | | | 0,02 |
| 2) Haulage and transport | | | | | | | | | | | | | | | | | | | | 0,07 |
| 3) Movement of personnel | | | | | | | | | | | | | | | | | | | | - |
| 4) Machinery, handling of tools and supports | | | | | | | | | | | | | | | | | | | | - |
| 5) Falling objects | | | | | | | | | | | | | | | | | | | | - |
| 6) Explosives | | | | | | | | | | | | | | | | | | | | - |
| 7) Explosions of firedamp or coal dust | | | | | | | | | | | | | | | | | | | | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | | | | | | | | | | | | | | | | | | | | - |
| 9) Underground combustion and fires | | | | | | | | | | | | | | | | | | | | - |
| 10) Inrushes of water | | | | | | | | | | | | | | | | | | | | - |
| 11) Electricity | | | | | | | | | | | | | | | | | | | | - |
| 12) Other causes | | | | | | | | | | | | | | | | | | | | - |
| TOTAL | | | | | | | | | | | | | | | | | | | | 0,11 |

1) Production stopped since 1975

2) établit ses statistiques suivant le schéma de la Communauté depuis 1976

B. Underground accidents resulting in death within eight weeks

years 1958-1977

per '000,000 man-hours (frequency)

| COMMUNITY VI 1) | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 1) Falls of ground | 0,253 | 0,242 | 0,235 | 0,217 | 0,234 | 0,217 | 0,175 | 0,177 | 0,208 | 0,192 | 0,160 | 0,176 | 0,135 | 0,133 | 0,092 | 0,13 | 0,11 | 0,10 | 0,07 | 0,05 |
| 2) Haulage and transport | 0,147 | 0,141 | 0,146 | 0,168 | 0,124 | 0,167 | 0,178 | 0,149 | 0,160 | 0,128 | 0,115 | 0,145 | 0,132 | 0,104 | 0,141 | 0,12 | 0,08 | 0,11 | 0,09 | 0,08 |
| 3) Movement of personnel | 0,057 | 0,063 | 0,047 | 0,056 | 0,045 | 0,060 | 0,045 | 0,051 | 0,060 | 0,044 | 0,054 | 0,038 | 0,039 | 0,043 | 0,043 | 0,04 | 0,05 | 0,047 | 0,06 | 0,02 |
| 4) Machinery, handling of tools and supports | 0,011 | 0,028 | 0,012 | 0,021 | 0,037 | 0,013 | 0,030 | 0,024 | 0,023 | 0,024 | 0,017 | 0,023 | 0,027 | 0,029 | 0,019 | 0,02 | 0,02 | 0,047 | 0,05 | 0,02 |
| 5) Falling objects | 0,045 | 0,027 | 0,024 | 0,041 | 0,062 | 0,046 | 0,037 | 0,037 | 0,030 | 0,036 | 0,040 | 0,031 | 0,025 | 0,041 | 0,038 | 0,02 | 0,04 | 0,038 | 0,04 | 0,01 |
| 6) Explosives | 0,009 | 0,010 | 0,002 | - | 0,002 | 0,001 | 0,002 | 0,002 | 0,001 | 0,002 | 0,006 | - | 0,002 | 0,005 | - | - | - | - | 0,006 | 0,01 |
| 7) Explosions of firedamp or coal dust | 0,032 | 0,036 | 0,002 | - | 0,375 | 0,001 | 0,001 | 0,053 | 0,030 | - | 0,044 | - | 0,037 | 0,005 | - | - | 0,13 | - | 0,06 | - |
| 8) Sudden outbursts of firedamp, suffocation by natural gases | 0,016 | 0,010 | 0,006 | 0,003 | 0,007 | 0,005 | 0,002 | 0,006 | 0,004 | 0,012 | 0,006 | 0,004 | - | 0,027 | 0,022 | 0,012 | - | - | 0,006 | - |
| 9) Underground combustion and fires | - | 0,003 | - | 0,001 | - | 0,003 | 0,005 | 0,005 | - | - | - | - | - | - | 0,003 | - | - | - | - | 0,01 |
| 10) Inrushes of water | 0,002 | 0,002 | 0,001 | 0,006 | 0,005 | 0,005 | - | 0,001 | - | 0,002 | - | - | 0,011 | - | 0,003 | 0,003 | - | - | - | - |
| 11) Electricity | 0,016 | 0,007 | 0,007 | 0,004 | 0,008 | 0,008 | 0,003 | 0,004 | 0,003 | 0,004 | 0,006 | 0,006 | 0,004 | - | 0,003 | 0,003 | - | - | 0,003 | - |
| 12) Other causes | 0,023 | 0,021 | 0,024 | 0,029 | 0,032 | 0,021 | 0,014 | 0,013 | 0,017 | 0,015 | 0,012 | 0,015 | 0,016 | 0,053 | 0,035 | 0,06 | 0,02 | 0,003 | 0,02 | 0,01 |
| TOTAL | 0,610 | 0,590 | 0,507 | 0,546 | 0,932 | 0,547 | 0,492 | 0,522 | 0,536 | 0,457 | 0,460 | 0,438 | 0,429 | 0,440 | 0,399 | 0,413 | 0,456 | 0,35 | 0,42 | 0,20 |

1) Communauté des IX à partir de 1977

D. RECAPITULATION : COMMUNITY OF THE SIX x)

| Year | Extraction (1) | Underground o.m.s. (kg.) | Million man- hours worked | Fatalities | Serious inju- ries (4) (disa- blement for 8 weeks or over | Fatalities per m. tons | Serious inju- ries (4) per m. tons | Fatalities per m. man- hours | Serious inju- ries 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 (3) 541 (4) | 12 418 | 3,602 (3) 2,320 (4) | 53,24 | 0,932 (3) 0,600 (4) | 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 | 181 016 | 3 065 | 522 | 240 | 7 501 | 1,326 | 41,44 | 0,460 | 14,370 |
| 1969 | 176 749 | 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 |
| 1972 | 151 809 | 3 659 | 369 | 147 | 5 763 | 1,033 | 26,34 | 0,399 | 15,60 |
| 1973 | 139 700 | 3 755 | 332 | 137 | 5 560 | 0,981 | 39,80 | 0,413 | 16,77 |
| 1974 | 133 300 | 3 742 | 313 | 143 | 5 054 | 1,073 | 37,91 | 0,456 | 16,12 |
| 1975 | 129 100 | 3 632 | 319 | 110 | 4 795 | 0,852 | 37,14 | 0,35 | 15,05 |
| 1976 | 125 600 | 3 710 | 301 | 125 | 4 491 | 0,995 | 35,76 | 0,415 | 14,92 |
| 1977 | 119.670 | 3.824 | 284 | 83 | 4 357 | 0,694 | 36,40 | 0,293 | 15,36 |
| 1978 | | | | | | | | | |

(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.

UNITED KINGDOM

| | | | | | | o/oo | | | |
|------|---------|-------|-----|----|------------------|-------|-------------------|-------|--------------------|
| 1973 | 130 200 | 3 598 | 306 | 74 | 490 | 0,568 | 3,76 | 0,242 | 1,60 |
| 1974 | 109 200 | 3 260 | 268 | 37 | 417 | 0,339 | 3,82 | 0,138 | 1,555 |
| 1975 | 127 700 | 3 493 | 303 | 55 | 522 | 0,431 | 4,09 | 0,181 | 1,722 |
| 1976 | 122 100 | 3 407 | 287 | 45 | 2 407 (1) 444 | 0,369 | 19,71 (1) 3,64 | 0,157 | 8,387 (1) 1,536 |
| 1977 | 120.700 | 3 338 | 294 | 33 | 2 280 | 0,273 | 18,874 | 0,11 | 7,75 |
| 1978 | | | | | | | | | |

Note : It is only possible to compare the figures in table 1 (Community of the Six) with those in table 2, by referring to the explanatory notes in Section IV, paragraphe 4.2. except after 1976.

1) Statistical tables for 1976 and 1977 following the system of classification used in the Community of Six.

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 support 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 emphasised 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.

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 shot-holes, 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 firedamp 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 VIII. As a general rule, if the cause of an accident includes 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 (CO₂, CH₄, CO, H₂S)

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 VIII "Ignitions or explosions of firedamp or explosions of coal dust".

b) Deoxygenation and poisoning by natural gases (CO₂, CH₄, CO, H₂S)

This includes accidents caused by lack of oxygen, by suffocation (CH₄, CO₂) and by poisoning (CO, H₂S). 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. Heavings or fires

This includes poisoning or suffocation by the gases produced, injuries from burns, roof falls, falls of objects, etc. following a heaving 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 heaving or a fire, it should always be included in category IX "Heavings 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 possible 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 curving 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

COUNTRY FEDERAL REPUBLIC OF GERMANY
COAL-FIELD

(absolute figures)

YEAR 1977
MAN-HOURS WORKED (1)

193.844.270

Table 1a

| 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 | 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 | | 2,083 | 1,100 | 455 | 9 | 3,647 | 1,283 | 574 | 222 | 4 | 2,083 | 8 | 10 | 4 | - | 22 | 221 | 122 | 30 | 1 | 374 | 3,595 | 1,806 | 711 | 14 | 6,126 | - | - | - |
| II. TRANSPORT, TOTAL | | 191 | 174 | 112 | 1 | 478 | 86 | 48 | 51 | 2 | 187 | 38 | 64 | 37 | 4 | 143 | 236 | 259 | 138 | 11 | 644 | 551 | 545 | 338 | 18 | 1,452 | - | - | - |
| a) Continuous Transport | | 74 | 77 | 55 | 1 | 207 | 33 | 20 | 21 | 1 | 75 | 2 | 2 | 2 | - | 6 | 21 | 23 | 15 | 3 | 62 | 130 | 122 | 93 | 5 | 350 | - | - | - |
| b) Discontinuous Transport | | 117 | 97 | 57 | - | 271 | 53 | 28 | 30 | 1 | 112 | 36 | 62 | 35 | 4 | 137 | 215 | 236 | 123 | 8 | 582 | 421 | 423 | 245 | 13 | 1,102 | - | - | - |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | | 1,666 | 1,098 | 326 | 1 | 3,091 | 1,066 | 676 | 182 | - | 1,924 | 190 | 163 | 57 | 7 | 417 | 1,213 | 798 | 228 | 2 | 2,241 | 4,135 | 2,735 | 793 | 10 | 7,673 | - | - | - |
| a) while moving about the mine | | 24 | 19 | 6 | - | 49 | 14 | 11 | 3 | - | 28 | 5 | 4 | 2 | 1 | 12 | 12 | 11 | - | - | 23 | 54 | 46 | 11 | 1 | 112 | - | - | - |
| b) in the course of other activities | | 1,642 | 1,079 | 320 | 1 | 3,042 | 1,052 | 665 | 179 | - | 1,896 | 185 | 159 | 55 | 6 | 405 | 1,201 | 787 | 228 | 2 | 2,218 | 4,081 | 2,689 | 782 | 9 | 7,561 | - | - | - |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | | 1,019 | 735 | 233 | 4 | 1,991 | 520 | 334 | 99 | 2 | 955 | 29 | 22 | 4 | - | 55 | 338 | 213 | 69 | 2 | 622 | 1,906 | 1,304 | 405 | 8 | 3,623 | - | - | - |
| a) Machines | | 156 | 143 | 53 | 1 | 353 | 93 | 76 | 35 | 2 | 206 | 8 | 5 | 1 | - | 14 | 66 | 59 | 30 | - | 155 | 323 | 283 | 119 | 3 | 728 | - | - | - |
| b) Tools | | 378 | 195 | 49 | - | 622 | 260 | 136 | 25 | - | 421 | 19 | 16 | 2 | - | 37 | 220 | 108 | 19 | - | 347 | 877 | 455 | 95 | - | 1,427 | - | - | - |
| c) Supports | | 485 | 397 | 131 | 3 | 1,016 | 167 | 122 | 39 | - | 328 | 2 | 1 | 1 | - | 4 | 52 | 46 | 20 | 2 | 120 | 706 | 566 | 191 | 5 | 1,468 | - | - | - |
| V. FALLS OF OBJECTS | | 631 | 932 | 300 | - | 2,863 | 683 | 344 | 132 | 1 | 1,160 | 75 | 56 | 22 | 2 | 155 | 615 | 356 | 133 | 1 | 1,105 | 3,004 | 1,688 | 587 | 4 | 5,283 | - | - | - |
| 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 ₂ S), TOTAL | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - | 2 | 1 | 1 | - | - | 2 | - | - | - | |
| a) Outbursts of Gas | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| b) De-oxygenation and Poisoning by natural Gases | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - | 2 | 1 | 1 | - | - | 2 | - | - | - | |
| IX. HEATINGS OR FIRES | | 1 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 | - | 7 | 10 | 2 | 2 | - | 7 | 11 | - | 7 | 7 | |
| X. INRUSHES | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| XI. ELECTRICITY | | - | - | - | - | - | 1 | - | - | 1 | - | - | - | - | - | 2 | 4 | 1 | 1 | 8 | 2 | 5 | 1 | 1 | 9 | - | - | - | |
| XII. OTHER CAUSES | | 184 | 76 | 48 | 2 | 310 | 69 | 38 | 8 | - | 115 | 10 | 2 | 1 | - | 13 | 98 | 42 | 11 | 2 | 153 | 361 | 158 | 68 | 4 | 591 | - | - | - |
| TOTAL | | 6,775 | 4,116 | 1,474 | 17 | 12,382 | 3,707 | 2,015 | 694 | 9 | 6,425 | 350 | 317 | 125 | 13 | 805 | 2,728 | 1,797 | 610 | 27 | 5,159 | 13,557 | 8,245 | 2,903 | 66 | 24,771 | - | 7 | 7 |

(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) Calendar 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)

COUNTRY BELGIUM
COAL-FIELD

YEAR 1977
MAN-HOURS WORKED (1) 25.790.080

Table 1a

| SITE OF THE ACCIDENT CAUSES OF ACCIDENTS | 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 | 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 | | 1754 | 248 | 48 | 0 | 2048 | 783 | 90 | 17 | 1 | 891 | 27 | 2 | 0 | 0 | 29 | 124 | 14 | 1 | 0 | 139 | 2688 | 352 | 66 | 1 | 3107 | | | |
| II. TRANSPORT, TOTAL | | 87 | 22 | 8 | 0 | 117 | 241 | 49 | 22 | 0 | 312 | 44 | 18 | 5 | 0 | 67 | 166 | 42 | 22 | 2 | 232 | 538 | 131 | 57 | 2 | 728 | | | |
| a) Continuous Transport | | 85 | 19 | 8 | 0 | 112 | 59 | 20 | 3 | 0 | 82 | 1 | 0 | 0 | 0 | 1 | 27 | 4 | 2 | 0 | 33 | 172 | 43 | 13 | 0 | 228 | | | |
| b) Discontinuous Transport | | 2 | 3 | 0 | 0 | 5 | 182 | 29 | 19 | 0 | 230 | 43 | 18 | 5 | 0 | 66 | 139 | 38 | 20 | 2 | 199 | 366 | 88 | 44 | 2 | 500 | | | |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | | 139 | 13 | 6 | 0 | 158 | 394 | 63 | 11 | 0 | 468 | 83 | 12 | 1 | 0 | 96 | 203 | 27 | 6 | 1 | 237 | 819 | 115 | 24 | 1 | 959 | | | |
| a) while moving about the mine | | 24 | 4 | 2 | 0 | 30 | 91 | 17 | 3 | 0 | 111 | 13 | 2 | 0 | 0 | 15 | 41 | 7 | 2 | 0 | 50 | 169 | 30 | 7 | 0 | 206 | | | |
| b) in the course of other activities | | 115 | 9 | 4 | 0 | 128 | 303 | 46 | 8 | 0 | 357 | 70 | 10 | 1 | 0 | 81 | 162 | 20 | 4 | 1 | 187 | 650 | 85 | 17 | 1 | 753 | | | |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | | 675 | 144 | 22 | 1 | 842 | 446 | 78 | 13 | 0 | 537 | 34 | 4 | 3 | 0 | 41 | 173 | 20 | 2 | 0 | 195 | 1328 | 246 | 40 | 1 | 1615 | | | |
| a) Machines | | 70 | 22 | 7 | 1 | 100 | 44 | 10 | 3 | 0 | 57 | 2 | 0 | 1 | 0 | 3 | 9 | 2 | 0 | 0 | 11 | 125 | 34 | 11 | 1 | 171 | | | |
| b) Tools | | 143 | 16 | 0 | 0 | 159 | 150 | 16 | 2 | 0 | 168 | 25 | 2 | 0 | 0 | 27 | 80 | 5 | 0 | 0 | 85 | 398 | 39 | 2 | 0 | 439 | | | |
| c) Supports | | 462 | 106 | 15 | 0 | 583 | 252 | 52 | 8 | 0 | 312 | 7 | 2 | 2 | 0 | 11 | 84 | 13 | 2 | 0 | 99 | 805 | 173 | 27 | 0 | 1005 | | | |
| V FALLS OF OBJECTS | | 503 | 98 | 7 | 0 | 608 | 631 | 78 | 12 | 0 | 721 | 78 | 15 | 3 | 0 | 96 | 296 | 46 | 8 | 0 | 350 | 1508 | 237 | 30 | 0 | 1775 | | | |
| VI. EXPLOSIVES | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO ₂ , CH ₄ , CO, H ₂ S), TOTAL | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | | | |
| a) Outbursts of Gas | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| b) De-oxygenation and Poisoning by natural Gases | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | | | |
| IX. HEATINGS OR FIRES | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| X. INRUSHES | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| XI. ELECTRICITY | | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 3 | 4 | 4 | 0 | 0 | 8 | | | |
| XII. OTHER CAUSES | | 74 | 8 | 0 | 0 | 82 | 75 | 4 | 1 | 0 | 80 | 17 | 0 | 1 | 0 | 18 | 96 | 9 | 0 | 0 | 105 | 262 | 21 | 2 | 0 | 285 | | | |
| TOTAL | | 3232 | 531 | 91 | 1 | 3855 | 2573 | 364 | 76 | 1 | 3014 | 283 | 51 | 13 | 0 | 347 | 1060 | 160 | 39 | 3 | 1262 | 7148 | 1106 | 219 | 5 | 8478 | | | |

(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) Calendar 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)

COUNTRY
COAL-FIELD

FRANCE

YEAR 1977
MAN-HOURS WORKED (1) 63.956.456

Table 1a

| 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 | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 56 days (2) | Fatal accidents | total |
| I. FALLS OF GROUNDS AND ROCKS | | 1265 | 448 | 165 | 5 | 1940 | 514 | 193 | 64 | 0 | 766 | 2 | 0 | 1 | 0 | 3 | 153 | 62 | 19 | 1 | 238 | 1934 | 704 | 248 | 6 | 2967 | 0 | 0 | 0 |
| II. TRANSPORT, TOTAL | | 89 | 69 | 48 | 0 | 216 | 61 | 33 | 25 | 0 | 121 | 12 | 15 | 6 | 0 | 33 | 183 | 127 | 77 | 4 | 402 | 345 | 244 | 156 | 4 | 772 | 0 | 0 | 0 |
| a) Continuous Transport | | 45 | 42 | 30 | 0 | 121 | 13 | 7 | 6 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 18 | 14 | 8 | 1 | 43 | 76 | 63 | 44 | 1 | 190 | 0 | 0 | 0 |
| b) Discontinuous Transport | | 44 | 27 | 18 | 0 | 95 | 48 | 26 | 19 | 0 | 95 | 12 | 15 | 6 | 0 | 33 | 165 | 113 | 69 | 3 | 359 | 269 | 181 | 112 | 3 | 587 | 0 | 0 | 0 |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | | 806 | 411 | 97 | 0 | 1422 | 508 | 287 | 69 | 0 | 906 | 29 | 16 | 5 | 0 | 52 | 910 | 537 | 174 | 0 | 1600 | 2253 | 1251 | 345 | 0 | 4060 | 0 | 0 | 0 |
| a) while moving about the mine | | 288 | 149 | 37 | 0 | 502 | 235 | 120 | 44 | 0 | 406 | 21 | 10 | 3 | 0 | 36 | 581 | 305 | 96 | 0 | 1005 | 1127 | 584 | 180 | 0 | 1950 | 0 | 0 | 0 |
| b) in the course of other activities | | 518 | 262 | 60 | 0 | 920 | 273 | 167 | 25 | 0 | 500 | 6 | 6 | 2 | 0 | 15 | 329 | 232 | 78 | 0 | 675 | 1126 | 667 | 165 | 0 | 2110 | 0 | 0 | 0 |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | | 889 | 428 | 95 | 0 | 1506 | 470 | 191 | 51 | 0 | 762 | 11 | 5 | 4 | 0 | 20 | 364 | 168 | 50 | 0 | 598 | 1734 | 792 | 200 | 0 | 2886 | 0 | 0 | 0 |
| a) Machines | | 69 | 34 | 21 | 0 | 134 | 47 | 20 | 11 | 0 | 83 | 0 | 0 | 2 | 0 | 2 | 20 | 13 | 9 | 0 | 42 | 136 | 67 | 43 | 0 | 261 | 0 | 0 | 0 |
| b) Tools | | 411 | 149 | 30 | 0 | 650 | 268 | 108 | 20 | 0 | 438 | 6 | 3 | 2 | 0 | 11 | 189 | 77 | 26 | 0 | 308 | 874 | 337 | 78 | 0 | 1407 | 0 | 0 | 0 |
| c) Supports | | 409 | 245 | 44 | 0 | 722 | 155 | 63 | 20 | 0 | 241 | 5 | 2 | 0 | 0 | 7 | 155 | 78 | 15 | 0 | 248 | 724 | 388 | 79 | 0 | 1218 | 0 | 0 | 0 |
| V. FALLS OF OBJECTS | | 790 | 361 | 95 | 1 | 1277 | 385 | 178 | 43 | 0 | 619 | 32 | 21 | 9 | 0 | 63 | 753 | 368 | 105 | 0 | 1241 | 1960 | 928 | 252 | 1 | 3200 | 0 | 0 | 0 |
| VI. EXPLOSIVES | | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 2 | 0 | 7 | 0 | 0 | 0 |
| VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST | | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO ₂ , CH ₄ , CO, H ₂ S), TOTAL | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 3 | 0 | 0 | 0 |
| a) Outbursts of Gas | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| b) De-oxygenation and Poisoning by natural Gases | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 3 | 0 | 0 | 0 |
| IX. HEATINGS OR FIRES | | 1 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 6 | 0 | 0 | 0 |
| X. INRUSHES | | 5 | 0 | 0 | 0 | 5 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 7 | 1 | 0 | 0 | 8 | 0 | 0 | 0 |
| XI. ELECTRICITY | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 4 | 42 | 2 | 1 | 0 | 5 | 0 | 0 | 0 |
| XII. OTHER CAUSES | | 168 | 29 | 16 | 0 | 227 | 137 | 36 | 7 | 0 | 188 | 12 | 5 | 1 | 0 | 20 | 204 | 43 | 6 | 1 | 273 | 521 | 113 | 30 | 1 | 708 | 0 | 0 | 0 |
| TOTAL | | 4014 | 1747 | 516 | 6 | 6601 | 2080 | 919 | 260 | 0 | 3391 | 98 | 62 | 26 | 0 | 191 | 2569 | 1308 | 434 | 6 | 4440 | 8761 | 4037 | 1235 | 12 | 14623 | 0 | 0 | 0 |

(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) Calendar 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)

YEAR 1977
MAN-HOURS WORKED (1)

293 999 555

Table 1a

COUNTRY UNITED KINGDOM
COAL-FIELD

| SITE OF THE ACCIDENT CAUSES OF ACCIDENTS | Period of incapacity | 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 | | |
|---|----------------------|--------------------|-------------------|---------------|-----------------|-------|---|-------------------|---------------|-----------------|-------|--------------------------|-------------------|---------------|-----------------|-------|------------------|-------------------|---------------|-----------------|-------|----------------------------------|-------------------|---------------|-----------------|-------|-----------------------|-----------------|-------|
| | | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 56 days (2) | Fatal accidents | total |
| I. FALLS OF GROUNDS AND ROCKS | | 2931 | 1018 | 206 | 1 | 4156 | 658 | 212 | 48 | 3 | 921 | 1 | 1 | 0 | 0 | 2 | 780 | 246 | 55 | 2 | 1083 | 4370 | 1477 | 309 | 6 | 6182 | | | |
| II. TRANSPORT, TOTAL | | 1070 | 435 | 128 | 5 | 1638 | 281 | 104 | 41 | 1 | 427 | 6 | 13 | 5 | 1 | 25 | 2606 | 1127 | 325 | 15 | 4073 | 3963 | 1679 | 499 | 22 | 6163 | | | |
| a) Continuous Transport | | 59 | 50 | 17 | 0 | 126 | 22 | 9 | 5 | 0 | 36 | 0 | 1 | 0 | 0 | 1 | 149 | 80 | 24 | 1 | 254 | 230 | 140 | 46 | 1 | 417 | | | |
| b) Discontinuous Transport | | 1011 | 385 | 111 | 5 | 1512 | 259 | 95 | 36 | 1 | 391 | 6 | 12 | 5 | 1 | 24 | 2457 | 1047 | 301 | 14 | 3819 | 3733 | 1539 | 453 | 21 | 5746 | | | |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | | 1207 | 454 | 90 | 0 | 1751 | 627 | 246 | 41 | 0 | 914 | 0 | 0 | 0 | 0 | 0 | 5487 | 2052 | 468 | 2 | 8009 | 7321 | 2752 | 599 | 2 | 10674 | | | |
| a) while moving about the mine | | 315 | 136 | 28 | 0 | 479 | 157 | 63 | 8 | 0 | 228 | 0 | 0 | 0 | 0 | 0 | 2732 | 988 | 251 | 0 | 3971 | 3204 | 1187 | 287 | 0 | 4678 | | | |
| b) in the course of other activities | | 892 | 318 | 62 | 0 | 1272 | 470 | 183 | 33 | 0 | 686 | 0 | 0 | 0 | 0 | 0 | 2755 | 1064 | 217 | 2 | 4038 | 4117 | 1565 | 312 | 2 | 5996 | | | |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | | 2231 | 727 | 142 | 0 | 3100 | 681 | 220 | 49 | 0 | 950 | 8 | 7 | 1 | 0 | 16 | 1882 | 628 | 130 | 0 | 2640 | 4802 | 1582 | 322 | 0 | 6706 | | | |
| a) Machines | | 368 | 109 | 27 | 0 | 504 | 82 | 21 | 6 | 0 | 109 | 2 | 0 | 0 | 0 | 2 | 120 | 47 | 16 | 0 | 183 | 572 | 177 | 49 | 0 | 798 | | | |
| b) Tools | | 167 | 36 | 8 | 0 | 211 | 68 | 21 | 7 | 0 | 96 | 0 | 2 | 0 | 0 | 2 | 354 | 119 | 27 | 0 | 500 | 589 | 178 | 42 | 0 | 809 | | | |
| c) Supports | | 1696 | 582 | 107 | 0 | 2385 | 531 | 178 | 36 | 0 | 745 | 6 | 5 | 1 | 0 | 12 | 1408 | 462 | 87 | 0 | 1957 | 3641 | 1227 | 231 | 0 | 5099 | | | |
| V. FALLS OF OBJECTS | | 1456 | 603 | 124 | 0 | 2183 | 355 | 134 | 26 | 0 | 515 | 4 | 9 | 1 | 0 | 14 | 1258 | 526 | 92 | 0 | 1876 | 3673 | 1272 | 243 | 0 | 4588 | | | |
| VI. EXPLOSIVES | | 26 | 9 | 1 | 0 | 36 | 8 | 2 | 0 | 1 | 11 | 0 | 0 | 0 | 0 | 0 | 35 | 9 | 2 | 1 | 47 | 69 | 20 | 3 | 2 | 94 | | | |
| VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO ₂ , CH ₄ , CO, H ₂ S), TOTAL | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 2 | | | |
| a) Outbursts of Gas | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b) De-oxygenation and Poisoning by natural Gases | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IX. HEATINGS OR FIRES | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 2 | 1 | 0 | 0 | 3 | | | |
| X. INRUSHES | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 1 | 0 | 2 | | | |
| XI. ELECTRICITY | | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 8 | 5 | 4 | 0 | 0 | 9 | | | |
| XII. OTHER CAUSES | | 1044 | 336 | 66 | 0 | 1446 | 423 | 154 | 22 | 0 | 599 | 24 | 21 | 1 | 0 | 46 | 2962 | 1092 | 215 | 1 | 4270 | 4453 | 1603 | 304 | 1 | 6361 | | | |
| TOTAL | | 9966 | 3582 | 757 | 6 | 14311 | 3034 | 1072 | 227 | 5 | 4338 | 43 | 51 | 8 | 1 | 103 | 15017 | 5686 | 1288 | 21 | 22012 | 28060 | 10391 | 2280 | 33 | 40764 | | | |

(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) Calendar 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)

YEAR 1977
MAN-HOURS WORKED (1) 577 590 360

Table 1a

| SITE OF THE ACCIDENT CAUSES OF ACCIDENTS | 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 (6) 6 | | |
|---|-----------------------|-------------------|---------------|-----------------|---------------|--|-------------------|---------------|-----------------|---------------|-----------------------------|-------------------|---------------|-----------------|--------------|-------------------|-------------------|---------------|-----------------|---------------|-------------------------------------|-------------------|---------------|-----------------|---------------|--------------------------|-----------------|-------|
| | Period of incapacity | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | 56 days (2) | Fatal accidents | total |
| I. FALLS OF GROUNDS AND ROCKS | 8,033 | 2,814 | 874 | 15 | 11,791 | 3,238 | 1,069 | 251 | 8 | 4,681 | 38 | 13 | 5 | - | 56 | 1,278 | 444 | 105 | 4 | 1,834 | 12,587 | 4,339 | 1,334 | 27 | 18,287 | | | |
| II. TRANSPORT, TOTAL | 1,437 | 700 | 296 | 6 | 2,439 | 669 | 234 | 139 | 3 | 1,045 | 100 | 110 | 53 | 5 | 268 | 3,191 | 1,555 | 562 | 32 | 5,340 | 5,397 | 2,599 | 1,050 | 46 | 9,092 | | | |
| a) Continuous Transport | 263 | 188 | 110 | 1 | 562 | 127 | 56 | 35 | 1 | 219 | 3 | 3 | 2 | - | 8 | 215 | 121 | 49 | 5 | 390 | 608 | 388 | 196 | 7 | 1,179 | | | |
| b) Discontinuous Transport | 1,174 | 512 | 186 | 5 | 1,877 | 542 | 178 | 104 | 2 | 828 | 97 | 107 | 51 | 5 | 260 | 2,976 | 1,434 | 513 | 27 | 4,950 | 4,789 | 2,231 | 854 | 39 | 7,913 | | | |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | 3,818 | 1,876 | 519 | 1 | 6,314 | 2,595 | 1,272 | 303 | - | 4,170 | 302 | 191 | 63 | 7 | 563 | 7,813 | 3,414 | 876 | 5 | 12,108 | 14,528 | 6,853 | 1,761 | 13 | 23,155 | | | |
| a) while moving about the mine | 651 | 308 | 73 | - | 1,032 | 497 | 211 | 58 | - | 766 | 39 | 16 | 5 | 1 | 61 | 3,366 | 1,311 | 349 | - | 5,026 | 4,554 | 1,847 | 485 | 1 | 6,887 | | | |
| b) in the course of other activities | 3,167 | 1,668 | 446 | 1 | 5,282 | 2,098 | 1,061 | 245 | - | 3,404 | 261 | 175 | 58 | 6 | 500 | 4,447 | 2,103 | 527 | 5 | 7,082 | 9,974 | 5,006 | 1,276 | 12 | 16,268 | | | |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | 4,814 | 2,034 | 492 | 5 | 7,345 | 2,117 | 823 | 212 | 2 | 3,154 | 82 | 38 | 12 | - | 132 | 2,757 | 1,029 | 251 | 2 | 4,039 | 9,770 | 3,924 | 967 | 9 | 14,670 | | | |
| a) Machines | 663 | 308 | 108 | 2 | 1,081 | 266 | 127 | 55 | 2 | 450 | 12 | 5 | 4 | - | 21 | 215 | 121 | 55 | - | 391 | 1,156 | 561 | 212 | 4 | 1,943 | | | |
| b) Tools | 1,099 | 396 | 87 | - | 1,582 | 746 | 281 | 54 | - | 1,081 | 50 | 23 | 4 | - | 77 | 843 | 309 | 72 | - | 1,224 | 2,738 | 1,009 | 217 | - | 3,964 | | | |
| c) Supports | 3,052 | 1,330 | 297 | 3 | 4,682 | 1,105 | 415 | 103 | - | 1,623 | 20 | 10 | 4 | - | 34 | 1,699 | 599 | 124 | 2 | 2,424 | 5,876 | 2,354 | 528 | 5 | 8,763 | | | |
| V. FALLS OF OBJECTS | 4,380 | 1,994 | 526 | 1 | 6,901 | 2,054 | 734 | 213 | 1 | 3,002 | 189 | 101 | 35 | 2 | 327 | 2,922 | 1,296 | 338 | 1 | 4,557 | 9,545 | 4,125 | 1,112 | 5 | 14,786 | | | |
| VI. EXPLOSIVES | 26 | 11 | 1 | - | 38 | 9 | 3 | 1 | 1 | 14 | - | - | - | - | - | 35 | 9 | 3 | 1 | 48 | 70 | 23 | 5 | 2 | 110 | | | |
| VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST | 1 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 | | | |
| VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO ₂ , CH ₄ , CO, H ₂ S), TOTAL | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | - | - | 3 | 2 | 1 | - | 6 | 4 | 2 | 1 | - | 7 | | | |
| a) Outbursts of Gas | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | |
| b) De-oxygenation and Poisoning by natural Gases | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | - | - | 3 | 2 | 1 | - | 6 | 4 | 2 | 1 | - | 7 | | | |
| IX. HEATINGS OR FIRES | 2 | - | - | - | 2 | 1 | - | - | - | 1 | - | - | - | - | - | 3 | 3 | - | 7 | 13 | 6 | 3 | - | 7 | 16 | - | 7 | 7 |
| X. INRUSHES | 5 | - | - | - | 5 | 2 | - | - | - | 2 | - | - | - | - | - | 1 | 1 | 1 | - | 3 | 8 | 1 | 1 | - | 10 | | | |
| XI. ELECTRICITY | 1 | - | - | - | 1 | 4 | 3 | - | - | 7 | - | - | - | - | - | 8 | 12 | 2 | 1 | 23 | 13 | 15 | 2 | 1 | 31 | | | |
| XII. OTHER CAUSES | 1,470 | 449 | 130 | 2 | 2,051 | 704 | 936 | 38 | - | 974 | 63 | 28 | 4 | - | 95 | 3,360 | 1,186 | 232 | 4 | 4,782 | 5,597 | 1,895 | 404 | 6 | 7,902 | | | |
| TOTAL | 23,987 | 9,976 | 2,838 | 30 | 36,831 | 11,394 | 4,370 | 1,257 | 15 | 17,036 | 774 | 481 | 172 | 14 | 1,441 | 21,371 | 8,951 | 2,371 | 57 | 32,750 | 57,526 | 23,779 | 6,637 | 116 | 88,058 | | | |

(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) Calendar 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

COUNTRY
COAL-FIELD

FEDERAL REPUBLIC OF GERMANY

(frequency rates)

YEAR
1977
MAN-HOURS WORKED (1)

193.844.270

Table 1b

| SITE OF THE ACCIDENT CAUSES OF ACCIDENTS | 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 | | |
|---|-----------------------|-------------------|---------------|-----------------|-------|--|-------------------|---------------|-----------------|-------|-----------------------------|-------------------|---------------|-----------------|-------|-------------------|-------------------|---------------|-----------------|-------|-------------------------------------|-------------------|---------------|-----------------|--------|--------------------------|-----------------|-------|
| | 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 | 10,75 | 5,67 | 2,35 | 0,05 | 18,81 | 6,62 | 2,96 | 1,15 | 0,02 | 10,75 | 0,04 | 0,05 | 0,02 | - | 0,11 | 1,14 | 0,63 | 0,15 | 0,01 | 1,93 | 18,55 | 9,32 | 3,67 | 0,07 | 31,60 | - | - | - |
| II. TRANSPORT, TOTAL | 0,99 | 0,90 | 0,58 | 0,01 | 2,47 | 0,44 | 0,25 | 0,26 | 0,01 | 0,96 | 0,20 | 0,33 | 0,19 | 0,02 | 0,74 | 1,22 | 1,34 | 0,71 | 0,06 | 3,32 | 2,84 | 2,81 | 1,74 | 0,09 | 7,49 | - | - | - |
| a) Continuous Transport | 0,38 | 0,40 | 0,28 | 0,01 | 1,07 | 0,17 | 0,10 | 0,11 | 0,01 | 0,39 | 0,01 | 0,01 | 0,01 | - | 0,03 | 0,11 | 0,12 | 0,08 | 0,02 | 0,32 | 0,67 | 0,63 | 0,48 | 0,03 | 1,81 | - | - | - |
| b) Discontinuous Transport | 0,61 | 0,50 | 0,30 | - | 1,40 | 0,27 | 0,14 | 0,15 | 0,01 | 0,78 | 0,19 | 0,32 | 0,18 | 0,02 | 0,71 | 1,11 | 1,22 | 0,63 | 0,04 | 3,00 | 2,17 | 2,18 | 1,26 | 0,07 | 5,68 | - | - | - |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | 8,59 | 5,66 | 1,68 | 0,01 | 15,95 | 5,50 | 3,49 | 0,94 | - | 9,93 | 0,98 | 0,84 | 0,20 | 0,04 | 2,15 | 6,26 | 4,12 | 1,18 | 0,01 | 11,56 | 21,33 | 14,11 | 4,09 | 0,05 | 39,58 | - | - | - |
| a) while moving about the mine | 0,12 | 0,10 | 0,03 | - | 0,25 | 0,07 | 0,06 | 0,02 | - | 0,14 | 0,03 | 0,02 | 0,01 | 0,01 | 0,06 | 0,06 | 0,06 | 0,06 | - | 0,12 | 0,28 | 0,24 | 0,06 | 0,01 | 0,58 | - | - | - |
| b) in the course of other activities | 8,47 | 5,57 | 1,65 | 0,01 | 15,69 | 5,43 | 3,43 | 0,92 | - | 9,78 | 0,95 | 0,82 | 0,28 | 0,03 | 2,09 | 6,20 | 4,06 | 1,18 | 0,01 | 11,44 | 21,05 | 13,87 | 4,03 | 0,05 | 39,00 | - | - | - |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | 5,26 | 3,79 | 1,20 | 0,02 | 10,27 | 2,68 | 1,72 | 0,51 | 0,01 | 4,93 | 0,15 | 0,11 | 0,02 | - | 0,28 | 1,74 | 1,10 | 0,36 | 0,01 | 3,21 | 9,83 | 6,73 | 2,09 | 0,04 | 18,69 | - | - | - |
| a) Machines | 0,80 | 0,74 | 0,27 | 0,01 | 0,82 | 0,48 | 0,39 | 0,18 | 0,01 | 1,06 | 0,04 | 0,03 | 0,01 | - | 0,07 | 0,34 | 0,30 | 0,15 | - | 0,80 | 1,67 | 1,46 | 0,61 | 0,02 | 3,76 | - | - | - |
| b) Tools | 1,95 | 1,01 | 0,25 | - | 3,21 | 1,34 | 0,70 | 0,13 | - | 2,17 | 0,10 | 0,08 | 0,01 | - | 0,19 | 1,13 | 0,56 | 0,10 | - | 1,80 | 4,52 | 2,35 | 0,50 | - | 7,36 | - | - | - |
| c) Supports | 2,50 | 2,05 | 0,68 | 0,01 | 5,24 | 0,86 | 0,63 | 0,20 | - | 1,69 | 0,01 | - | 0,01 | - | 0,02 | 0,27 | 0,24 | 0,10 | 0,01 | 0,62 | 3,64 | 2,92 | 0,98 | 0,02 | 7,57 | - | - | - |
| V. FALLS OF OBJECTS | 8,41 | 4,81 | 1,55 | - | 14,77 | 3,52 | 1,77 | 0,68 | 0,01 | 5,98 | 0,39 | 0,29 | 0,11 | 0,01 | 0,80 | 3,17 | 1,84 | 0,69 | 0,01 | 5,70 | 15,50 | 8,71 | 3,03 | 0,02 | 27,25 | - | - | - |
| VI. EXPLOSIVES | - | 0,01 | - | - | 0,01 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0,01 | - | - | 0,01 | - | - | - |
| VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO, CH, CO, H ₂ S), TOTAL | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0,01 | 0,01 | - | - | 0,02 | 0,01 | 0,01 | - | - | 0,02 | - | - | - |
| a) Outbursts of Gas | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| b) De-oxygenation and Poisoning by natural Gases | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0,01 | 0,01 | - | - | 0,02 | 0,01 | 0,01 | - | - | 0,02 | - | - | - |
| IX. HEATINGS OR FIRES | 0,01 | - | - | - | 0,01 | - | - | - | - | - | - | - | - | - | - | 0,01 | 0,01 | - | 0,04 | 0,06 | 0,01 | 0,01 | - | 0,04 | 0,06 | - | - | - |
| X. INRUSHES | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| XI. ELECTRICITY | - | - | - | - | - | - | 0,01 | - | - | 0,01 | - | - | - | - | - | 0,01 | 0,02 | 0,01 | 0,01 | 0,05 | 0,01 | 0,02 | 0,01 | 0,01 | 0,05 | - | - | - |
| XII. OTHER CAUSES | 0,95 | 0,39 | 0,25 | 0,01 | 1,60 | 0,36 | 0,20 | 0,04 | - | 0,59 | 0,05 | 0,01 | 0,01 | - | 0,07 | 0,50 | 0,22 | 0,06 | 0,01 | 0,79 | 1,86 | 0,81 | 0,36 | 0,02 | 3,05 | - | - | - |
| TOTAL | 34,95 | 21,23 | 7,60 | 0,09 | 63,88 | 19,12 | 10,39 | 3,58 | 0,05 | 33,15 | 1,81 | 1,64 | 0,64 | 0,07 | 4,15 | 14,06 | 9,27 | 3,15 | 0,14 | 26,61 | 69,94 | 42,53 | 14,98 | 0,34 | 127,79 | - | - | - |

(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) Calendar 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)

COUNTRY **BELGIUM**
COAL-FIELD

YEAR **1977**
MAN-HOURS WORKED ⁽¹⁾ **25.790.080**

Table 1b

| SITE OF THE ACCIDENT CAUSES OF ACCIDENTS | 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 | 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 | 68,01 | 9,53 | 1,86 | 0 | 79,41 | 30,36 | 3,48 | 0,65 | 0,03 | 34,54 | 1,04 | 0,07 | 0,00 | 0 | 1,12 | 4,80 | 0,54 | 0,03 | 0 | 5,38 | 104,22 | 13,64 | 2,55 | 0,03 | 120,47 | | | | |
| II. TRANSPORT, TOTAL | 3,37 | 0,85 | 0,31 | 0 | 4,53 | 9,34 | 1,89 | 0,85 | 0 | 12,09 | 1,70 | 0,69 | 0,19 | 0 | 2,59 | 6,43 | 1,62 | 0,85 | 0,07 | 8,99 | 20,86 | 5,07 | 2,21 | 0,07 | 28,22 | | | | |
| a) Continuous Transport | 3,29 | 0,73 | 0,31 | 0 | 4,34 | 2,28 | 0,77 | 0,11 | 0 | 3,17 | 0,03 | 0,00 | 0,00 | 0 | 0,03 | 1,04 | 0,15 | 0,07 | 0,00 | 1,27 | 6,66 | 1,66 | 0,50 | 0,00 | 8,84 | | | | |
| b) Discontinuous Transport | 0,07 | 0,11 | 0,00 | 0 | 0,19 | 7,05 | 1,12 | 0,73 | 0 | 8,91 | 1,66 | 0,69 | 0,19 | 0 | 2,55 | 5,38 | 1,47 | 0,77 | 0,07 | 7,71 | 14,19 | 3,41 | 1,70 | 0,07 | 19,38 | | | | |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | 5,38 | 0,50 | 0,23 | 0 | 6,12 | 15,27 | 2,44 | 0,42 | 0 | 18,14 | 3,21 | 0,46 | 0,03 | 0 | 3,72 | 7,87 | 1,04 | 0,23 | 0,03 | 9,18 | 31,75 | 4,45 | 0,93 | 0,03 | 37,18 | | | | |
| a) while moving about the mine | 0,93 | 0,15 | 0,07 | 0 | 1,16 | 3,52 | 0,65 | 0,11 | 0 | 4,30 | 0,50 | 0,07 | 0,00 | 0 | 0,58 | 1,58 | 0,27 | 0,07 | 0,00 | 1,93 | 6,55 | 1,16 | 0,27 | 0,00 | 7,98 | | | | |
| b) in the course of other activities | 4,45 | 0,34 | 0,15 | 0 | 4,96 | 11,74 | 1,78 | 0,31 | 0 | 13,84 | 2,71 | 0,38 | 0,03 | 0 | 3,14 | 6,28 | 0,77 | 0,15 | 0,03 | 7,25 | 25,20 | 3,29 | 0,65 | 0,03 | 29,19 | | | | |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | 26,17 | 5,58 | 0,85 | 0,03 | 32,64 | 17,29 | 3,02 | 0,50 | 0 | 20,82 | 1,31 | 0,15 | 0,11 | 0 | 1,58 | 6,70 | 0,77 | 0,07 | 0 | 7,56 | 51,49 | 9,53 | 1,55 | 0,03 | 62,62 | | | | |
| a) Machines | 2,71 | 0,85 | 0,27 | 0,03 | 3,87 | 1,70 | 0,38 | 0,11 | 0 | 2,21 | 0,07 | 0,00 | 0,03 | 0 | 0,11 | 0,34 | 0,07 | 0,00 | 0 | 0,42 | 4,84 | 1,31 | 0,42 | 0,03 | 6,63 | | | | |
| b) Tools | 5,54 | 0,62 | 0,00 | 0,00 | 6,16 | 5,81 | 0,62 | 0,07 | 0 | 6,51 | 0,96 | 0,07 | 0,00 | 0 | 1,04 | 3,10 | 0,19 | 0,00 | 0 | 3,29 | 15,43 | 1,51 | 0,07 | 0,00 | 17,02 | | | | |
| c) Supports | 17,91 | 4,11 | 0,58 | 0,00 | 22,60 | 9,77 | 2,01 | 0,31 | 0 | 12,09 | 0,27 | 0,07 | 0,07 | 0 | 0,42 | 3,25 | 0,50 | 0,07 | 0 | 3,83 | 31,21 | 6,70 | 1,04 | 0,00 | 38,96 | | | | |
| V. FALLS OF OBJECTS | 19,50 | 3,79 | 0,27 | 0 | 23,57 | 24,46 | 3,02 | 0,46 | 0 | 27,95 | 3,02 | 0,58 | 0,11 | 0 | 3,72 | 11,47 | 1,78 | 0,31 | 0 | 13,57 | 58,47 | 9,18 | 1,16 | 0,00 | 68,82 | | | | |
| VI. EXPLOSIVES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO ₂ , CH ₄ , CO, H ₂ S), TOTAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0,03 | 0 | 0 | 0 | 0 | 0,03 | 0,03 | 0 | 0 | 0 | 0,03 | | | | |
| a) Outbursts of Gas | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0,00 | 0 | 0 | 0 | 0 | 0,00 | 0,00 | 0 | 0 | 0 | 0,00 | | | | |
| b) De-oxygenation and Poisoning by natural Gases | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0,03 | 0 | 0 | 0 | 0 | 0,03 | 0,03 | 0 | 0 | 0 | 0,03 | | | | |
| IX. HEATINGS OR FIRES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| X. INRUSHES | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| XI. ELECTRICITY | 0 | 0 | 0 | 0 | 0 | 0,11 | 0,07 | 0,00 | 0 | 0,19 | 0 | 0 | 0 | 0 | 0 | 0,03 | 0,07 | 0 | 0 | 0 | 0,11 | 0,15 | 0,15 | 0,00 | 0,00 | 0,31 | | | |
| XII. OTHER CAUSES | 2,86 | 0,31 | 0,00 | 0 | 3,17 | 2,90 | 0,15 | 0,03 | 0 | 3,10 | 0,65 | 0,00 | 0,03 | 0 | 0,69 | 3,72 | 0,34 | 0 | 0 | 4,07 | 10,15 | 0,81 | 0,07 | 0,00 | 11,05 | | | | |
| TOTAL | 125,31 | 20,58 | 3,52 | 0,03 | 149,47 | 99,76 | 14,11 | 2,94 | 0,03 | 116,86 | 10,97 | 1,97 | 0,50 | 0 | 13,45 | 41,10 | 6,20 | 1,51 | 0,11 | 48,93 | 277,16 | 42,88 | 8,49 | 0,19 | 328,73 | | | | |

⁽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⁾ Calendar days.

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

(frequency rates)

YEAR 1977
MAN-HOURS WORKED (1) 63.956.456

Table 1b

COUNTRY FRANCE
COAL-FIELD

| SITE OF THE ACCIDENT CAUSES OF ACCIDENTS | 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 | 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 |
| I. FALLS OF GROUNDS AND ROCKS | 19,78 | 7,00 | 2,58 | 0,08 | 30,33 | 8,04 | 3,02 | 1,00 | 0,00 | 12,29 | 0,03 | 0,00 | 0,02 | 0,00 | 0,05 | 2,39 | 0,97 | 0,30 | 0,02 | 3,72 | 30,24 | 11,01 | 3,88 | 0,09 | 46,39 | 0,00 | 0,00 | 0,00 |
| II. TRANSPORT, TOTAL | 1,39 | 1,08 | 0,75 | 0,00 | 3,38 | 0,95 | 0,52 | 0,39 | 0,00 | 1,89 | 0,19 | 0,23 | 0,09 | 0,00 | 0,52 | 2,86 | 1,99 | 1,20 | 0,06 | 6,29 | 5,39 | 3,82 | 2,44 | 0,06 | 12,07 | 0,00 | 0,00 | 0,00 |
| a) Continuous Transport | 0,70 | 0,66 | 0,47 | 0,00 | 1,89 | 0,20 | 0,11 | 0,09 | 0,00 | 0,41 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,28 | 0,22 | 0,13 | 0,02 | 0,67 | 1,19 | 0,99 | 0,69 | 0,02 | 2,97 | 0,00 | 0,00 | 0,00 |
| b) Discontinuous Transport | 0,69 | 0,42 | 0,28 | 0,00 | 1,49 | 0,75 | 0,41 | 0,30 | 0,00 | 1,49 | 0,19 | 0,23 | 0,09 | 0,00 | 0,52 | 2,58 | 1,77 | 1,08 | 0,05 | 5,61 | 4,21 | 2,83 | 1,75 | 0,05 | 9,10 | 0,00 | 0,00 | 0,00 |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | 12,60 | 6,43 | 1,52 | 0,00 | 22,23 | 7,94 | 4,49 | 1,08 | 0,00 | 14,17 | 0,45 | 0,25 | 0,08 | 0,00 | 0,81 | 14,23 | 8,40 | 2,72 | 0,00 | 26,27 | 35,23 | 19,56 | 5,39 | 0,00 | 63,48 | 0,00 | 0,00 | 0,00 |
| a) while moving about the mine | 4,50 | 2,33 | 0,58 | 0,00 | 7,85 | 3,67 | 1,88 | 0,69 | 0,00 | 6,35 | 0,33 | 0,16 | 0,05 | 0,00 | 0,56 | 9,08 | 4,77 | 1,50 | 0,00 | 15,71 | 17,62 | 9,13 | 2,81 | 0,00 | 30,49 | 0,00 | 0,00 | 0,00 |
| b) in the course of other activities | 8,10 | 4,10 | 0,94 | 0,00 | 14,38 | 4,27 | 2,61 | 0,39 | 0,00 | 7,82 | 0,09 | 0,09 | 0,03 | 0,00 | 0,23 | 5,14 | 3,63 | 1,22 | 0,00 | 10,55 | 17,61 | 10,43 | 2,58 | 0,00 | 32,99 | 0,00 | 0,00 | 0,00 |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | 13,90 | 6,69 | 1,49 | 0,00 | 23,55 | 7,35 | 2,99 | 0,80 | 0,00 | 11,91 | 0,17 | 0,06 | 0,06 | 0,00 | 0,31 | 5,69 | 2,63 | 0,78 | 0,00 | 9,35 | 27,11 | 12,38 | 3,13 | 0,00 | 45,12 | 0,00 | 0,00 | 0,00 |
| a) Machines | 1,08 | 0,53 | 0,33 | 0,00 | 2,10 | 0,73 | 0,31 | 0,17 | 0,00 | 1,30 | 0,00 | 0,00 | 0,03 | 0,00 | 0,03 | 0,31 | 0,20 | 0,14 | 0,00 | 0,66 | 2,13 | 1,05 | 0,67 | 0,00 | 4,08 | 0,00 | 0,00 | 0,00 |
| b) Tools | 6,43 | 2,33 | 0,47 | 0,00 | 10,16 | 4,19 | 1,69 | 0,31 | 0,00 | 6,85 | 0,08 | 0,05 | 0,03 | 0,00 | 0,17 | 2,96 | 1,20 | 0,41 | 0,00 | 4,82 | 13,67 | 5,27 | 1,22 | 0,00 | 22,00 | 0,00 | 0,00 | 0,00 |
| c) Supports | 6,39 | 3,83 | 0,69 | 0,00 | 11,29 | 2,42 | 0,99 | 0,31 | 0,00 | 3,77 | 0,08 | 0,03 | 0,00 | 0,00 | 0,11 | 2,42 | 1,22 | 0,23 | 0,00 | 3,88 | 11,32 | 6,07 | 1,24 | 0,00 | 19,04 | 0,00 | 0,00 | 0,00 |
| V. FALLS OF OBJECTS | 12,35 | 5,64 | 1,49 | 0,02 | 19,97 | 6,02 | 2,78 | 0,67 | 0,00 | 9,68 | 0,50 | 0,33 | 0,14 | 0,00 | 0,99 | 11,77 | 5,75 | 1,64 | 0,00 | 19,40 | 30,65 | 14,51 | 3,94 | 0,02 | 50,03 | 0,00 | 0,00 | 0,00 |
| VI. EXPLOSIVES | 0,00 | 0,02 | 0,00 | 0,00 | 0,02 | 0,02 | 0,02 | 0,02 | 0,00 | 0,08 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,02 | 0,02 | 0,03 | 0,03 | 0,00 | 0,11 | 0,00 | 0,00 | 0,00 |
| VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST | 0,02 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 |
| VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO ₂ , CH ₄ , CO, H ₂ S), TOTAL | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,02 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,02 | 0,02 | 0,00 | 0,02 | 0,00 | 0,05 | 0,00 | 0,00 | 0,00 |
| a) Outbursts of Gas | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| b) De-oxygenation and Poisoning by natural Gases | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,02 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,02 | 0,02 | 0,00 | 0,02 | 0,00 | 0,05 | 0,00 | 0,00 | 0,00 |
| IX. HEATINGS OR FIRES | 0,02 | 0,00 | 0,00 | 0,00 | 0,08 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 | 0,02 | 0,03 | 0,00 | 0,00 | 0,00 | 0,09 | 0,00 | 0,00 | 0,00 |
| X. INRUSHES | 0,08 | 0,00 | 0,00 | 0,00 | 0,08 | 0,03 | 0,00 | 0,00 | 0,00 | 0,03 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | 0,02 | 0,11 | 0,02 | 0,00 | 0,00 | 0,13 | 0,00 | 0,00 | 0,00 |
| XI. ELECTRICITY | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,03 | 0,02 | 0,00 | 0,06 | 0,03 | 0,03 | 0,02 | 0,00 | 0,08 | 0,00 | 0,00 | 0,00 |
| XII. OTHER CAUSES | 2,63 | 0,45 | 0,25 | 0,00 | 3,55 | 2,14 | 0,56 | 0,11 | 0,00 | 2,94 | 0,19 | 0,08 | 0,02 | 0,00 | 0,31 | 3,19 | 0,67 | 0,09 | 0,02 | 4,27 | 8,15 | 1,77 | 0,47 | 0,02 | 11,07 | 0,00 | 0,00 | 0,00 |
| TOTAL | 162,76 | 27,32 | 8,07 | 0,09 | 3,21 | 32,52 | 14,37 | 4,07 | 0,00 | 53,02 | 1,53 | 0,97 | 0,41 | 0,00 | 2,99 | 40,17 | 20,45 | 6,79 | 0,09 | 69,42 | 136,98 | 63,12 | 19,31 | 0,19 | 228,64 | 0,00 | 0,00 | 0,00 |

(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) Calendar 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

COUNTRY
COAL-FIELD

UNITED KINGDOM

(frequency rates)

YEAR
1977
MAN-HOURS WORKED ⁽¹⁾ 293 999 555

Table 1b

| SITE OF THE ACCIDENT CAUSES OF ACCIDENTS | 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 | | |
|---|-----------------------------|------------------------------|--------------------------|-----------------|-------|--|------------------------------|--------------------------|-----------------|-------|-----------------------------|------------------------------|--------------------------|-----------------|-------|-----------------------------|------------------------------|--------------------------|-----------------|-------|-------------------------------------|------------------------------|--------------------------|-----------------|--------|-------------------------------------|-----------------|-------|
| | 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 | 9.96 | 3.46 | 0.70 | 0.00 | 14.13 | 2.23 | 0.72 | 0.16 | 0.01 | 3.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.65 | 0.83 | 0.18 | 0.00 | 3.68 | 14.86 | 5.02 | 1.05 | 0.02 | 20.95 | | | |
| II. TRANSPORT, TOTAL | 3.63 | 1.47 | 0.43 | 0.01 | 5.57 | 0.95 | 0.35 | 0.13 | 0.00 | 1.45 | 0.02 | 0.04 | 0.01 | 0.00 | 0.08 | 8.86 | 3.83 | 1.10 | 0.05 | 13.85 | 13.47 | 5.71 | 1.69 | 0.07 | 20.96 | | | |
| a) Continuous Transport | 0.20 | 0.17 | 0.05 | 0.00 | 0.42 | 0.07 | 0.03 | 0.01 | 0.00 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.27 | 0.08 | 0.00 | 0.86 | 0.78 | 0.47 | 0.15 | 0.00 | 1.41 | | | |
| b) Discontinuous Transport | 3.43 | 1.30 | 0.37 | 0.01 | 5.14 | 0.88 | 0.32 | 0.12 | 0.00 | 1.32 | 0.02 | 0.04 | 0.01 | 0.00 | 0.08 | 8.35 | 3.56 | 1.02 | 0.04 | 12.98 | 12.69 | 5.23 | 1.54 | 0.07 | 19.54 | | | |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | 4.10 | 1.54 | 0.30 | 0.00 | 5.95 | 2.13 | 0.83 | 0.13 | 0.00 | 3.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.66 | 6.97 | 1.59 | 0.00 | 27.23 | 24.89 | 9.35 | 2.03 | 0.00 | 36.30 | | | |
| a) while moving about the mine | 1.07 | 0.46 | 0.09 | 0.00 | 1.62 | 0.53 | 0.21 | 0.02 | 0.00 | 0.77 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.29 | 3.36 | 0.85 | 0.00 | 13.50 | 10.89 | 4.03 | 0.97 | 0.00 | 15.90 | | | |
| b) in the course of other activities | 3.03 | 1.08 | 0.21 | 0.00 | 4.32 | 1.59 | 0.62 | 0.11 | 0.00 | 2.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.36 | 3.61 | 0.73 | 0.00 | 13.73 | 14.00 | 5.32 | 1.06 | 0.00 | 20.39 | | | |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | 7.58 | 2.47 | 0.48 | 0.00 | 10.54 | 2.31 | 0.74 | 0.16 | 0.00 | 3.23 | 0.02 | 0.02 | 0.00 | 0.00 | 0.05 | 6.40 | 2.13 | 0.44 | 0.00 | 8.97 | 16.33 | 5.38 | 1.09 | 0.00 | 22.80 | | | |
| a) Machines | 1.25 | 0.37 | 0.09 | 0.00 | 1.71 | 0.27 | 0.07 | 0.02 | 0.00 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.15 | 0.05 | 0.00 | 0.62 | 1.94 | 0.60 | 0.16 | 0.00 | 2.71 | | | |
| b) Tools | 0.56 | 0.12 | 0.02 | 0.00 | 0.71 | 0.23 | 0.07 | 0.02 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.20 | 0.40 | 0.09 | 0.00 | 1.70 | 2.00 | 0.60 | 0.14 | 0.00 | 2.75 | | | |
| c) Supports | 5.76 | 1.97 | 0.36 | 0.00 | 8.11 | 1.80 | 0.60 | 0.12 | 0.00 | 2.53 | 0.02 | 0.01 | 0.00 | 0.00 | 0.04 | 4.78 | 1.57 | 0.29 | 0.00 | 6.65 | 12.38 | 4.17 | 0.78 | 0.00 | 17.34 | | | |
| V. FALLS OF OBJECTS | 4.95 | 2.05 | 0.42 | 0.00 | 7.42 | 1.20 | 0.45 | 0.08 | 0.00 | 1.75 | 0.01 | 0.03 | 0.00 | 0.00 | 0.04 | 4.27 | 1.78 | 0.31 | 0.00 | 6.38 | 10.45 | 4.32 | 0.82 | 0.00 | 15.60 | | | |
| VI. EXPLOSIVES | 0.08 | 0.03 | 0.00 | 0.00 | 0.12 | 0.02 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.03 | 0.00 | 0.00 | 0.15 | 0.23 | 0.06 | 0.01 | 0.00 | 0.31 | | | |
| VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO ₂ , CH ₄ , CO, H ₂ S), TOTAL | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| a) Outbursts of Gas | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b) De-oxygenation and Poisoning by natural Gases | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IX. HEATINGS OR FIRES | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | | | |
| X. INRUSHES | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| XI. ELECTRICITY | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.02 | 0.01 | 0.01 | 0.00 | 0.00 | 0.03 | | | |
| XII. OTHER CAUSES | 3.55 | 1.14 | 0.22 | 0.00 | 4.91 | 1.43 | 0.52 | 0.07 | 0.00 | 2.03 | 0.08 | 0.07 | 0.00 | 0.00 | 0.15 | 10.07 | 3.71 | 0.73 | 0.00 | 14.52 | 15.14 | 5.45 | 1.03 | 0.00 | 21.63 | | | |
| TOTAL | 33.89 | 12.18 | 2.57 | 0.02 | 48.67 | 10.31 | 3.64 | 0.77 | 0.01 | 14.75 | 0.14 | 0.17 | 0.02 | 0.00 | 0.35 | 51.07 | 19.33 | 4.38 | 0.07 | 74.86 | 95.43 | 35.33 | 7.75 | 0.11 | 138.63 | | | |

(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) Calendar days.

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

Table 1b

COUNTRY
COAL-FIELD

COMMUNITY (IX)

(frequency rates)

YEAR 1977
MAN-HOURS WORKED (1) 577 590 360

| SITE OF THE ACCIDENT CAUSES OF ACCIDENTS | Period of incapacity | 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 | | |
|---|----------------------|-----------------------|-------------------|---------------|-----------------|-------|--|-------------------|---------------|-----------------|-------|-----------------------------|-------------------|---------------|-----------------|-------|-------------------|-------------------|---------------|-----------------|-------|-------------------------------------|-------------------|---------------|-----------------|--------|--------------------------|-----------------|-------|
| | | 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 | | 13,91 | 4,87 | 1,51 | 0,03 | 20,41 | 5,61 | 1,85 | 0,43 | 0,01 | 8,10 | 0,07 | 0,02 | 0,01 | - | 0,10 | 2,21 | 0,77 | 0,18 | 0,01 | 3,18 | 21,79 | 7,51 | 2,31 | 0,05 | 31,66 | | | |
| II. TRANSPORT, TOTAL | | 2,49 | 1,21 | 0,51 | 0,01 | 4,22 | 1,16 | 0,41 | 0,24 | 0,01 | 1,81 | 0,17 | 0,19 | 0,09 | 0,01 | 0,46 | 5,52 | 2,69 | 0,97 | 0,06 | 9,34 | 9,34 | 4,50 | 1,82 | 0,08 | 15,74 | | | |
| a) Continuous Transport | | 0,46 | 0,33 | 0,19 | - | 0,97 | 0,22 | 0,10 | 0,06 | - | 0,38 | 0,01 | 0,01 | - | - | 0,01 | 0,37 | 0,21 | 0,08 | 0,01 | 0,68 | 1,05 | 0,64 | 0,34 | 0,01 | 2,04 | | | |
| b) Discontinuous Transport | | 2,03 | 0,89 | 0,32 | 0,01 | 3,25 | 0,94 | 0,31 | 0,18 | - | 1,43 | 0,17 | 0,19 | 0,09 | 0,01 | 0,45 | 5,15 | 2,48 | 0,89 | 0,05 | 8,57 | 8,29 | 3,86 | 1,48 | 0,07 | 13,70 | | | |
| III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL | | 6,61 | 3,25 | 0,90 | - | 10,93 | 4,49 | 2,20 | 0,52 | - | 7,22 | 0,52 | 0,33 | 0,11 | 0,01 | 0,97 | 13,53 | 5,91 | 1,52 | 0,01 | 20,96 | 25,15 | 11,86 | 3,05 | 0,02 | 40,09 | | | |
| a) while moving about the mine | | 1,13 | 0,53 | 0,13 | - | 1,79 | 0,86 | 0,37 | 0,10 | - | 1,33 | 0,07 | 0,03 | 0,01 | - | 0,11 | 5,83 | 2,27 | 0,60 | - | 8,70 | 7,88 | 3,20 | 0,84 | - | 11,92 | | | |
| b) in the course of other activities | | 5,48 | 2,89 | 0,77 | - | 9,14 | 3,63 | 1,84 | 0,42 | - | 5,89 | 0,45 | 0,30 | 0,10 | 0,01 | 0,87 | 7,70 | 3,64 | 0,91 | 0,01 | 12,26 | 17,27 | 8,67 | 2,21 | 0,02 | 28,17 | | | |
| IV. MACHINES, TOOLS AND SUPPORTS TOTAL | | 8,33 | 3,52 | 0,85 | 0,01 | 12,72 | 3,67 | 1,42 | 0,37 | - | 5,46 | 0,14 | 0,07 | 0,02 | - | 0,23 | 4,77 | 1,78 | 0,43 | - | 6,99 | 16,92 | 6,79 | 1,67 | 0,02 | 25,40 | | | |
| a) Machines | | 1,15 | 0,53 | 0,19 | - | 1,87 | 0,46 | 0,22 | 0,10 | - | 0,78 | 0,02 | 0,01 | 0,01 | - | 0,04 | 0,37 | 0,21 | 0,10 | - | 0,68 | 2,00 | 0,97 | 0,37 | 0,01 | 3,36 | | | |
| b) Tools | | 1,90 | 0,69 | 0,15 | - | 2,74 | 1,29 | 0,49 | 0,09 | - | 1,87 | 0,09 | 0,04 | 0,01 | - | 0,13 | 1,46 | 0,53 | 0,12 | - | 2,12 | 4,74 | 1,75 | 0,38 | - | 6,86 | | | |
| c) Supports | | 5,28 | 2,30 | 0,51 | 0,01 | 8,11 | 1,91 | 0,72 | 0,18 | - | 2,81 | 0,03 | 0,02 | 0,01 | - | 0,06 | 2,94 | 1,04 | 0,21 | - | 4,20 | 10,17 | 4,08 | 0,91 | 0,01 | 15,17 | | | |
| V. FALLS OF OBJECTS | | 7,58 | 3,45 | 0,91 | - | 11,95 | 3,56 | 1,27 | 0,37 | - | 5,20 | 0,33 | 0,17 | 0,06 | - | 0,57 | 5,18 | 2,24 | 0,59 | - | 7,89 | 16,53 | 7,14 | 1,93 | 0,01 | 25,60 | | | |
| VI. EXPLOSIVES | | 0,05 | 0,02 | - | - | 0,07 | 0,02 | 0,01 | - | - | 0,02 | - | - | - | - | - | 0,06 | 0,02 | 0,01 | - | 0,08 | 0,12 | 0,04 | 0,01 | 0,01 | 0,19 | | | |
| 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 ₂ S), 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 | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0,01 | 0,01 | - | 0,01 | 0,02 | 0,01 | 0,01 | - | 0,01 | 0,03 | - | 0,01 | 0,01 | |
| X. INRUSHES | | 0,01 | - | - | - | 0,01 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0,01 | 0,01 | - | - | - | 0,02 | | | |
| XI. ELECTRICITY | | - | - | - | - | 0,01 | 0,01 | - | - | 0,01 | - | - | - | - | - | 0,01 | 0,02 | - | - | - | 0,04 | 0,02 | 0,03 | - | - | 0,05 | | | |
| XII. OTHER CAUSES | | 2,55 | 0,78 | 0,23 | - | 3,55 | 1,22 | 1,62 | 0,07 | - | 1,69 | 0,11 | 0,05 | 0,01 | - | 0,16 | 5,82 | 2,05 | 0,40 | 0,01 | 8,28 | 9,69 | 3,28 | 0,70 | 0,01 | 13,68 | | | |
| TOTAL | | 41,53 | 17,27 | 4,91 | 0,05 | 63,77 | 19,73 | 7,57 | 2,18 | 0,03 | 29,49 | 1,34 | 0,83 | 0,30 | 0,02 | 2,49 | 37,00 | 15,50 | 4,10 | 0,10 | 56,70 | 99,60 | 41,17 | 11,49 | 0,20 | 152,46 | | | |

(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) Calendar days.

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

Fit 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 therefore 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, haemarthrosis, 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.

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

Table 2a

COUNTRY FEDERAL REPUBLIC OF GERMANY
COAL-FIELD

(absolute figures)

YEAR 1977
MAN-HOURS WORKED (1) 193.844.270

| NATURE OF THE INJURY | Amputations and enucleations 1 | | | Fractures with or without dislocation 2 | | | Luxations, twist and sprains 3 | | | Concussion and internal injury 4 | | | Open wounds contusion 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 | | | | |
|---|-----------------------------------|-----------------|-------|--|-----------------|-------|-----------------------------------|-----------------|-------|-------------------------------------|-----------------|-------|---|-----------------|--------|---|-----------------|-------|--------------------------------|-----------------|-------|---|-----------------|-------|------------------|-------------------|---------------|-----------------|--------|
| | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | 4 to 20 days (4) | 21 to 56 days (4) | > 56 days (4) | Fatal accidents | total |
| I. Head and neck | 1 | - | 3 | 58 | 19 | 215 | 1 | - | 12 | 15 | - | 146 | 61 | 2 | 2,287 | - | - | 16 | - | - | - | 1 | - | 30 | 1,990 | 561 | 137 | 21 | 2,709 |
| II. Eyes | 1 | - | 1 | - | - | - | - | - | - | - | - | 1 | 32 | - | 606 | 1 | - | 36 | - | - | - | - | - | 5 | 525 | 90 | 34 | - | 649 |
| III. Trunk | - | - | 2 | 127 | 4 | 373 | 6 | - | 74 | 1 | 3 | 28 | 83 | 6 | 1,474 | 4 | - | 32 | - | - | - | 1 | 2 | 6 | 1,043 | 709 | 222 | 15 | 1,989 |
| IV. Upper limbs (excluding the hands) (3) | 6 | - | 6 | 171 | - | 271 | 20 | - | 136 | - | - | - | 73 | - | 2,375 | 7 | - | 56 | - | - | - | 3 | - | 13 | 1,902 | 676 | 280 | - | 2,858 |
| V. Hands | 57 | - | 132 | 699 | - | 2,822 | 29 | - | 187 | - | - | - | 274 | - | 6,558 | 7 | - | 29 | - | - | - | 1 | - | 3 | 4,657 | 4,006 | 1,067 | - | 9,730 |
| VI. Lower limbs (excluding feet) (4) | 2 | - | 2 | 344 | 1 | 419 | 101 | - | 371 | - | - | - | 185 | - | 2,602 | 4 | - | 27 | - | - | - | 13 | - | 16 | 1,672 | 1,115 | 649 | 1 | 3,437 |
| VII. Feet | 9 | - | 10 | 290 | - | 669 | 61 | - | 669 | - | - | - | 99 | - | 1,659 | 2 | - | 11 | - | - | - | - | - | 2 | 1,594 | 965 | 461 | - | 3,020 |
| VIII. Multiple locations | - | 3 | 3 | 18 | 11 | 37 | - | - | 2 | 8 | 1 | 18 | 27 | 3 | 294 | - | 8 | 15 | - | - | - | - | 3 | 10 | 174 | 123 | 53 | 29 | 379 |
| IX. Not specified | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| TOTAL | 76 | 3 | 159 | 1,707 | 35 | 4,806 | 218 | - | 1,451 | 24 | 4 | 193 | 834 | 11 | 17,855 | 25 | 8 | 222 | - | - | - | 19 | 5 | 85 | 13,557 | 8,245 | 2,903 | 66 | 24,771 |

(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) Calendar days.

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

Table 2a

| COUNTRY COAL-FIELD | | BELGIUM (absolute figures) | | | | | | | | | | | | | | | | | | | | | | | YEAR 1977 MAN-HOURS WORKED (1) | | 25.790.080 | | | |
|---|--------------------------------|-------------------------------|-------|---|-----------------|-------|--------------------------------|-----------------|-------|----------------------------------|-----------------|-------|--|-----------------|-------|--|-----------------|-------|-----------------------------|-----------------|-------|--|-----------------|-------|--------------------------------------|-------------------|---------------|-----------------|-------|----|
| NATURE OF THE INJURY | Amputations and enucleations 1 | | | Fractures with or without dislocation 2 | | | Luxations, twist and sprains 3 | | | Concussion and internal injury 4 | | | Open wounds contusion 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 | | | | | |
| | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | 4 to 20 days (4) | 21 to 56 days (4) | > 56 days (4) | Fatal accidents | total | |
| PERIOD OF INCAPACITY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOCATION OF THE INJURY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I. Head and neck | 0 | 0 | 0 | 8 | 2 | 10 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 2 | 13 |
| II. Eyes | 0 | 0 | 0 | | | | | | | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 | 0 | 2 | - | 2 | |
| III. Trunk | 0 | 0 | 0 | 8 | 0 | 8 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 1 | 5 | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 | 0 | 12 | 2 | 14 | |
| IV. Upper limbs (excluding the hands) (3) | 0 | 0 | 0 | 18 | 0 | 18 | 1 | 0 | 1 | | | | 12 | 0 | 12 | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 | 0 | 31 | 0 | 31 | |
| V. Hands | 10 | 0 | 10 | 26 | 0 | 26 | 0 | 0 | 0 | | | | 21 | 0 | 21 | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 | 0 | 57 | 0 | 57 | |
| VI. Lower limbs (excluding feet) (4) | 2 | 0 | 2 | 20 | 0 | 20 | 3 | 0 | 3 | | | | 39 | 0 | 39 | 1 | 0 | 1 | | | | 2 | 0 | 2 | 0 | 0 | 67 | 0 | 67 | |
| VII. Feet | 4 | 0 | 4 | 13 | 0 | 13 | 0 | 0 | 0 | | | | 11 | 0 | 11 | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 | 0 | 28 | 0 | 28 | |
| VIII. Multiple locations | 0 | 0 | 0 | 7 | 1 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | | | | 1 | 0 | 1 | 0 | 0 | 11 | 1 | 12 | |
| IX. Not specified | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 16 | 0 | 16 | 100 | 3 | 103 | 4 | 0 | 4 | 1 | 1 | 2 | 94 | 1 | 95 | 1 | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 219 | 5 | 224 | |

(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) Calendar days.

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

Table 2a

| COUNTRY | | FRANCE | | | | | | | | | | | | | | | | | | | | | | | | YEAR 1977 | | | |
|---|-----------------------------------|--------------------|-----------------|--|---------------|-----------------|-----------------------------------|---------------|-----------------|-------------------------------------|---------------|-----------------|---|---------------|-----------------|---|---------------|-----------------|--------------------------------|---------------|-----------------|---|---------------|-----------------|------------|----------------------|-------------------|---------------|-----------------|
| COAL-FIELD | | (absolute figures) | | | | | | | | | | | | | | | | | | | | | | | | MAN-HOURS WORKED (*) | | | |
| NATURE OF THE INJURY | Amputations and enucleations 1 | | | Fractures with or without dislocation 2 | | | Luxations, twist and sprains 3 | | | Concussion and internal injury 4 | | | Open wounds contusion and muscular abrasions 5 | | | Burns and harmful effects of electricity and radiation 6 | | | Poisoning and suffocation 7 | | | Multiple injuries of those not specified (*) 8 | | | TOTAL 9 | | | | |
| | PERIOD OF INCAPACITY | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | 4 to 20 days (*) | 21 to 56 days (*) | > 56 days (*) | Fatal accidents |
| LOCATION OF THE INJURY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I. Head and neck | 0 | 0 | 0 | 18 | 4 | 72 | 1 | 0 | 1 | 9 | 1 | 10 | 41 | 1 | 42 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 | 788 | 242 | 73 | 6 | 1143 |
| II. Eyes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 12 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 738 | 47 | 14 | 0 | 964 |
| III. Trunk | 0 | 0 | 0 | 31 | 1 | 32 | 35 | 0 | 35 | 11 | 0 | 11 | 52 | 0 | 52 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 | 1294 | 810 | 133 | 1 | 2301 |
| IV. Upper limbs (excluding the hands) (*) | 0 | 1 | 1 | 66 | 0 | 66 | 20 | 0 | 20 | 0 | 0 | 0 | 58 | 0 | 58 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1124 | 300 | 146 | 1 | 1632 |
| V. Hands | 22 | 0 | 22 | 231 | 0 | 231 | 6 | 0 | 6 | 0 | 0 | 0 | 123 | 0 | 123 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 2438 | 1460 | 384 | 0 | 4415 |
| VI. Lower limbs (excluding feet) (*) | 1 | 0 | 1 | 121 | 0 | 121 | 52 | 0 | 52 | 0 | 0 | 0 | 142 | 0 | 142 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 1424 | 700 | 319 | 0 | 2518 |
| VII. Feet | 5 | 0 | 5 | 86 | 0 | 86 | 4 | 0 | 4 | 0 | 0 | 0 | 32 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 686 | 33 | 128 | 0 | 1174 |
| VIII. Multiple locations | 0 | 0 | 0 | 11 | 1 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 14 | 1 | 0 | 1 | 0 | 0 | 0 | 5 | 0 | 5 | 239 | 136 | 31 | 2 | 428 |
| IX. Not specified | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 5 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 30 | 9 | 7 | 2 | 48 |
| TOTAL | 28 | 1 | 29 | 564 | 6 | 570 | 118 | 0 | 118 | 22 | 1 | 23 | 479 | 1 | 480 | 3 | 0 | 3 | 1 | 0 | 1 | 20 | 1 | 21 | 8761 | 4637 | 1235 | 12 | 14623 |

(*) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme.
 (**) including complications.
 (***) The shoulders and the wrists are included under „upper limbs“.
 (****) The hips and the ankles are included under „Lower limbs“.
 (*****) Calendar days.

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

| COUNTRY | | UNITED KINGDOM | | | | | | | | | | | | | | | | | | | | | | | | YEAR | | 1977 | | MAN-HOURS WORKED (1) | | 293 999 555 | |
|---|--------------------------------|-----------------|-------|---|-----------------|-------|--------------------------------|-----------------|-------|----------------------------------|-----------------|-------|--|-----------------|-------|--|-----------------|-------|-----------------------------|-----------------|-------|--|-----------------|-------|------------------|-------------------|---------------|-----------------|-------|----------------------|--|-------------|--|
| NATURE OF THE INJURY | Amputations and enucleations 1 | | | Fractures with or without dislocation 2 | | | Luxations, twist and sprains 3 | | | Concussion and internal injury 4 | | | Open wounds contusion 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 | | | | | | | | |
| | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | > 56 days (*) | Fatal accidents | total | 4 to 20 days (*) | 21 to 56 days (*) | > 56 days (*) | Fatal accidents | total | | | | |
| PERIOD OF INCAPACITY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOCATION OF THE INJURY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I. Head and neck | 0 | 1 | 1 | 11 | 2 | 39 | 19 | 0 | 185 | 0 | 0 | 0 | 70 | 3 | 1905 | 0 | 0 | 2 | | | | 0 | 0 | 6 | 1548 | 384 | 100 | 6 | 2138 | | | | |
| II. Eyes | 0 | 0 | 0 | | | | | | | 0 | 0 | 0 | 13 | 0 | 664 | 0 | 0 | 6 | | | | 18 | 0 | 751 | 1188 | 262 | 31 | 0 | 1421 | | | | |
| III. Trunk | 0 | 0 | 0 | 22 | 0 | 67 | 354 | 0 | 6926 | 0 | 0 | 0 | 133 | 0 | 2560 | 0 | 0 | 5 | | | | 0 | 2 | 5 | 6554 | 2498 | 509 | 2 | 9563 | | | | |
| IV. Upper limbs (excluding the hands) (*) | 0 | 0 | 0 | 62 | 0 | 156 | 50 | 0 | 869 | | | | 69 | 0 | 2088 | 0 | 0 | 16 | | | | 0 | 0 | 6 | 2234 | 720 | 181 | 0 | 3135 | | | | |
| V. Hands | 37 | 0 | 86 | 55 | 0 | 454 | 16 | 0 | 362 | | | | 328 | 0 | 8348 | 3 | 0 | 20 | | | | 1 | 0 | 29 | 6129 | 2730 | 440 | 0 | 9289 | | | | |
| VI. Lower limbs (excluding feet) (*) | 6 | 0 | 6 | 139 | 0 | 232 | 250 | 0 | 3923 | | | | 195 | 0 | 4728 | 0 | 0 | 9 | | | | 2 | 0 | 16 | 6157 | 2165 | 592 | 0 | 8914 | | | | |
| VII. Feet | 4 | 0 | 7 | 38 | 0 | 159 | 8 | 0 | 218 | | | | 99 | 0 | 2222 | 0 | 0 | 3 | | | | 0 | 0 | 5 | 1744 | 721 | 149 | 0 | 2614 | | | | |
| VIII. Multiple locations | 4 | 0 | 7 | 28 | 5 | 80 | 94 | 0 | 1234 | 0 | 0 | 0 | 132 | 3 | 2066 | 1 | 0 | 7 | | | | 4 | 2 | 10 | 2231 | 900 | 263 | 10 | 3404 | | | | |
| IX. Not specified | | | | | | | | | | | | | | | | 1 | 0 | 40 | 0 | 1 | 1 | 14 | 14 | 235 | 175 | 71 | 15 | 15 | 276 | | | | |
| TOTAL | 51 | 1 | 107 | 355 | 7 | 1187 | 791 | 0 | 13717 | 0 | 0 | 0 | 1039 | 6 | 24501 | 5 | 0 | 108 | 0 | 1 | 1 | 39 | 18 | 1063 | 23060 | 10391 | 2280 | 33 | 40764 | | | | |

(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) Calendar days.

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

Table 2a

| NATURE OF THE INJURY | Amputations and enucleations 1 | | Fractures with or without dislocation 2 | | | Luxations, twist and sprains 3 | | | Concussion and internal injury 4 | | | Open wounds contusion and muscular abrasions 5 | | | Burns and harmful effects of electricity and radiation 6 | | | Poisoning and suffocation 7 | | | Multiple injuries of those not specified (*) 8 | | | TOTAL 9 | | | | | |
|---|-----------------------------------|-----------------|--|---------------|-----------------|-----------------------------------|---------------|-----------------|-------------------------------------|---------------|-----------------|---|---------------|-----------------|---|---------------|-----------------|--------------------------------|---------------|-----------------|---|------------------|-------------------|---------------|-----------------|--------|-------|-----|--------|
| | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | 4 to 20 days (2) | 21 to 56 days (2) | > 56 days (2) | Fatal accidents | total | | | |
| LOCATION OF THE INJURY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I. Head and neck | 1 | 1 | 4 | 95 | 27 | 286 | 21 | - | 198 | 25 | 1 | 157 | 174 | 6 | 4,236 | - | - | 18 | | | | 5 | - | 40 | 4,426 | 1,187 | 321 | 35 | 6,003 |
| II. Eyes | 1 | - | 1 | | | | | | | 2 | - | 3 | 59 | - | 1,284 | 1 | - | 42 | | | | 18 | - | 756 | 2,451 | 339 | 81 | - | 3,036 |
| III. Trunk | - | - | 2 | 188 | 5 | 480 | 395 | - | 7,035 | 12 | 4 | 40 | 272 | 7 | 4,091 | 4 | - | 37 | | | | 5 | 4 | 15 | 8,891 | 4,017 | 876 | 20 | 13,867 |
| IV. Upper limbs (excluding the hands) (2) | 6 | 1 | 7 | 317 | - | 511 | 91 | - | 1,026 | | | | 212 | - | 4,533 | 8 | - | 73 | | | | 4 | - | 20 | 5,260 | 1,696 | 638 | 1 | 7,656 |
| V. Hands | 126 | - | 250 | 1,011 | - | 3,533 | 51 | - | 555 | | | | 746 | - | 15,050 | 11 | - | 50 | | | | 3 | - | 33 | 13,224 | 8,196 | 1,948 | - | 23,501 |
| VI. Lower limbs (excluding feet) (4) | 11 | - | 11 | 624 | 1 | 792 | 406 | - | 4,349 | | | | 561 | - | 7,511 | 5 | - | 37 | | | | 20 | - | 37 | 9,253 | 3,980 | 1,627 | 1 | 14,936 |
| VII. Feet | 22 | - | 26 | 427 | - | 927 | 73 | - | 891 | | | | 241 | - | 3,924 | 2 | - | 14 | | | | 1 | - | 8 | 4,024 | 2,019 | 766 | - | 6,836 |
| VIII. Multiple locations | 4 | 3 | 10 | 64 | 18 | 137 | 94 | - | 1,236 | 8 | 1 | 18 | 176 | 6 | 2,377 | 2 | 8 | 23 | | | | 10 | 5 | 26 | 2,644 | 1,159 | 358 | 42 | 4,223 |
| IX. Not specified | | | | | | | | | | | | | 5 | - | 5 | 1 | - | 40 | 1 | 1 | 2 | 15 | 15 | 237 | 205 | 80 | 22 | 17 | 324 |
| TOTAL | 171 | 5 | 311 | 1,807 | 51 | 6,666 | 1,131 | - | 15,290 | 47 | 6 | 218 | 2,446 | 19 | 43,011 | 34 | 8 | 334 | 1 | 1 | 2 | 81 | 24 | 1,172 | 50,378 | 22,673 | 6,637 | 116 | 80,382 |

(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) Calendar days.

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

Table 2b

| COUNTRY COAL-FIELD | | FEDERAL REPUBLIC OF GERMANY (Frequency rates) | | | | | | | | | | | | | | | | | | | | YEAR 1977 | | | | | | | |
|---|--------------------------------|--|-----------------|---|---------------|-----------------|--------------------------------|---------------|-----------------|----------------------------------|---------------|-----------------|--|---------------|-----------------|--|---------------|-----------------|-----------------------------|---------------|-----------------|--|---------------|-----------------|---------|------------------|-------------------|---------------|-----------------|
| | | | | | | | | | | | | | | | | | | | | | | MAN-HOURS WORKED (1) 193.844.270 | | | | | | | |
| NATURE OF THE INJURY | Amputations and enucleations 1 | | | Fractures with or without dislocation 2 | | | Luxations, twist and sprains 3 | | | Concussion and internal injury 4 | | | Open wounds contusion 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 (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | 4 to 20 days (3) | 21 to 56 days (3) | > 56 days (3) | Fatal accidents |
| LOCATION OF THE INJURY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I. Head and neck | 0,01 | - | 0,02 | 0,30 | 0,10 | 1,11 | 0,01 | - | 0,06 | 0,08 | - | 0,75 | 0,31 | 0,01 | 11,80 | - | - | 0,08 | | | | 0,01 | - | 0,15 | 10,27 | 2,89 | 0,71 | 0,11 | 13,98 |
| II. Eyes | 0,01 | - | 0,01 | | | | | | | - | - | 0,01 | 0,17 | - | 3,13 | 0,01 | - | 0,19 | | | | - | - | 0,03 | 2,71 | 0,46 | 0,18 | - | 3,35 |
| III. Trunk | - | - | 0,01 | 0,66 | 0,02 | 1,92 | 0,03 | - | 0,38 | 0,01 | 0,02 | 0,14 | 0,43 | 0,03 | 7,60 | 0,02 | - | 0,07 | | | | 0,01 | 0,01 | 0,03 | 5,38 | 3,66 | 1,15 | 0,08 | 10,26 |
| IV. Upper limbs (excluding the hands) (4) | 0,03 | - | 0,03 | 0,88 | - | 1,40 | 0,10 | - | 0,70 | | | | 0,38 | - | 12,25 | 0,04 | - | 0,29 | | | | 0,02 | - | 0,07 | 9,81 | 3,49 | 1,44 | - | 14,74 |
| V. Hands | 0,29 | - | 0,68 | 3,61 | - | 14,56 | 0,15 | - | 0,96 | | | | 1,41 | - | 33,83 | 0,04 | - | 0,15 | | | | 0,01 | - | 0,02 | 24,02 | 20,67 | 5,50 | - | 50,19 |
| VI. Lower limbs (excluding feet) (4) | 0,01 | - | 0,01 | 1,77 | 0,01 | 2,16 | 0,52 | - | 1,91 | | | | 0,95 | - | 13,42 | 0,02 | - | 0,14 | | | | 0,06 | - | 0,08 | 8,63 | 5,75 | 3,35 | 0,01 | 17,73 |
| VII. Feet | 0,05 | - | 0,05 | 1,50 | - | 3,45 | 0,31 | - | 3,45 | | | | 0,51 | - | 8,56 | 0,01 | - | 0,06 | | | | - | - | 0,01 | 8,22 | 4,98 | 2,38 | - | 15,58 |
| VIII. Multiple locations | - | 0,02 | 0,02 | 0,09 | 0,06 | 0,19 | - | - | 0,01 | 0,04 | 0,01 | 0,09 | 0,14 | 0,02 | 1,52 | - | 0,04 | 0,08 | | | | - | 0,02 | 0,05 | 0,90 | 0,63 | 0,27 | 0,15 | 1,96 |
| IX. Not specified | | | | | | | | | | | | | - | - | - | - | - | - | | | | - | - | - | - | - | - | - | - |
| TOTAL | 0,40 | 0,02 | 0,83 | 8,81 | 0,19 | 24,79 | 1,12 | - | 7,47 | 0,13 | 0,03 | 0,99 | 4,30 | 0,06 | 92,11 | 0,14 | 0,04 | 1,16 | - | - | - | 0,11 | 0,03 | 0,44 | 69,94 | 42,53 | 14,98 | 0,36 | 127,79 |

(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) Calendar days.

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

| NATURE OF THE INJURY | FRANCE | | | | | | | | | | | | | | | | | | | | | | | | YEAR 1977 | | | | |
|---|--------------------------------|-----------------|-------|---|-----------------|-------|--------------------------------|-----------------|-------|----------------------------------|-----------------|-------|--|-----------------|-------|--|-----------------|-------|-----------------------------|-----------------|-------|--|-----------------|-------|---------------------------------|-------------------|---------------|-----------------|--------|
| | COAL-FIELD | | | | | | | | | | | | | | | | | | | | | | | | MAN-HOURS WORKED (1) 63.956.456 | | | | |
| | Amputations and enucleations 1 | | | Fractures with or without dislocation 2 | | | Luxations, twist and sprains 3 | | | Concussion and internal injury 4 | | | Open wounds contusion 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 (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | > 56 days (2) | Fatal accidents | total | 4 to 20 days (3) | 21 to 56 days (3) | > 56 days (2) | Fatal accidents | total |
| LOCATION OF THE INJURY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I. Head and neck | 0,00 | 0,00 | 0,00 | 0,28 | 0,06 | 0,34 | 0,00 | 0,00 | 0,02 | 0,14 | 0,02 | 0,16 | 0,64 | 0,02 | 0,66 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,06 | 0,00 | 0,06 | 12,32 | 3,78 | 1,14 | 0,09 | 17,87 |
| II. Eyes | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,03 | 0,00 | 0,03 | 0,19 | 0,00 | 0,19 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 11,54 | 0,73 | 0,22 | 0,00 | 15,07 |
| III. Trunk | 0,00 | 0,00 | 0,00 | 0,48 | 0,02 | 0,50 | 0,55 | 0,00 | 0,55 | 0,17 | 0,00 | 0,17 | 0,81 | 0,00 | 0,81 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,06 | 0,00 | 0,06 | 20,23 | 12,66 | 2,08 | 0,02 | 35,98 | |
| IV. Upper limbs (excluding the hands) (3) | 0,00 | 0,02 | 0,02 | 1,03 | 0,00 | 1,03 | 0,31 | 0,00 | 0,31 | 0,00 | 0,00 | 0,00 | 0,91 | 0,00 | 0,91 | 0,02 | 0,00 | 0,02 | 0,00 | 0,00 | 0,02 | 0,00 | 0,02 | 17,57 | 4,69 | 2,28 | 0,07 | 25,52 | |
| V. Hands | 0,34 | 0,00 | 0,34 | 3,61 | 0,00 | 3,61 | 0,09 | 0,00 | 0,09 | 0,00 | 0,00 | 0,00 | 1,92 | 0,00 | 1,92 | 0,02 | 0,00 | 0,02 | 0,00 | 0,00 | 0,02 | 0,00 | 0,02 | 38,12 | 22,83 | 6,00 | 0,00 | 69,03 | |
| VI. Lower limbs (excluding feet) (4) | 0,02 | 0,00 | 0,02 | 1,89 | 0,00 | 1,89 | 0,81 | 0,00 | 0,81 | 0,00 | 0,00 | 0,00 | 2,22 | 0,00 | 2,22 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,05 | 0,00 | 0,05 | 22,27 | 10,94 | 4,99 | 0,00 | 39,37 | |
| VII. Feet | 0,08 | 0,00 | 0,08 | 1,34 | 0,00 | 1,34 | 0,06 | 0,00 | 0,06 | 0,00 | 0,00 | 0,00 | 0,50 | 0,00 | 0,50 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,02 | 10,73 | 5,21 | 2,00 | 0,00 | 18,36 | |
| VIII. Multiple locations | 0,00 | 0,00 | 0,00 | 0,17 | 0,02 | 0,19 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,22 | 0,00 | 0,22 | 0,02 | 0,00 | 0,02 | 0,00 | 0,00 | 0,02 | 0,00 | 0,02 | 3,74 | 2,13 | 0,48 | 0,03 | 6,69 | |
| IX. Not specified | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,08 | 0,00 | 0,08 | 0,00 | 0,00 | 0,00 | 0,02 | 0,00 | 0,02 | 0,02 | 0,02 | 0,03 | 0,47 | 0,14 | 0,11 | 0,03 | 0,75 |
| TOTAL | 0,44 | 0,02 | 0,45 | 8,82 | 0,09 | 0,91 | 1,85 | 0,00 | 1,85 | 0,34 | 0,02 | 0,36 | 7,49 | 0,02 | 7,51 | 0,05 | 0,00 | 0,05 | 0,02 | 0,00 | 0,02 | 0,31 | 0,02 | 0,33 | 136,98 | 63,12 | 19,31 | 0,19 | 228,64 |

(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) Calendar days.

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

Table 2b

| NATURE OF THE INJURY | COUNTRY UNITED KINGDOM | | | | | | | | | | | | | | | | | | | | | | | | YEAR 1977 | | | | |
|---|--------------------------------|-------------------|-------|---|-------------------|-------|--------------------------------|-------------------|-------|----------------------------------|-------------------|-------|--|-------------------|-------|--|-------------------|-------|-----------------------------|-------------------|-------|--|-------------------|---------------|----------------------|-------|------|------|--------|
| | COAL-FIELD | | | | | | | | | | | | | | | | | | | | | | | | MAN-HOURS WORKED (1) | | | | |
| | Amputations and enucleations 1 | | | Fractures with or without dislocation 2 | | | Luxations, twist and sprains 3 | | | Concussion and internal injury 4 | | | Open wounds contusion 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 | | | | |
| PERIOD OF INCAPACITY | > 56 days (3) | Fatal acci- dents | total | > 56 days (3) | Fatal acci- dents | total | > 56 days (3) | Fatal acci- dents | total | > 56 days (3) | Fatal acci- dents | total | > 56 days (3) | Fatal acci- dents | total | > 56 days (3) | Fatal acci- dents | total | > 56 days (3) | Fatal acci- dents | total | 4 to 20 days (4) | 21 to 56 days (4) | > 56 days (4) | Fatal acci- dents | total | | | |
| LOCATION OF THE INJURY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I. Head and neck | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.12 | 0.06 | 0.00 | 0.62 | 0.00 | 0.00 | 0.00 | 0.23 | 0.01 | 6.47 | 0.00 | 0.00 | 0.00 | | | | 0.00 | 0.00 | 0.02 | 5.60 | 1.30 | 0.34 | 0.01 | 7.26 |
| II. Eyes | 0.00 | 0.00 | 0.00 | | | | | | | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 2.25 | 0.00 | 0.00 | 0.02 | | | | 0.06 | 0.00 | 2.55 | 4.04 | 0.68 | 0.10 | 0.00 | 4.83 |
| III. Trunk | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.22 | 1.20 | 0.00 | 23.55 | 0.00 | 0.00 | 0.00 | 0.45 | 0.00 | 8.70 | 0.00 | 0.00 | 0.01 | | | | 0.00 | 0.00 | 0.01 | 22.29 | 8.49 | 1.73 | 0.00 | 32.52 |
| IV. Upper limbs (excluding the hands) (3) | 0.00 | 0.00 | 0.00 | 0.21 | 0.00 | 0.53 | 0.17 | 0.00 | 2.95 | | | | 0.23 | 0.00 | 7.10 | 0.00 | 0.00 | 0.05 | | | | 0.00 | 0.00 | 0.02 | 7.59 | 2.44 | 0.61 | 0.00 | 10.66 |
| V. Hands | 0.12 | 0.00 | 0.29 | 0.18 | 0.00 | 1.54 | 0.05 | 0.00 | 1.23 | | | | 1.11 | 0.00 | 28.39 | 0.01 | 0.00 | 0.06 | | | | 0.00 | 0.00 | 0.09 | 20.84 | 9.28 | 1.49 | 0.00 | 31.62 |
| VI. Lower limbs (excluding feet) (4) | 0.02 | 0.00 | 0.02 | 0.47 | 0.00 | 0.78 | 0.85 | 0.00 | 13.34 | | | | 0.66 | 0.00 | 16.07 | 0.00 | 0.00 | 0.03 | | | | 0.00 | 0.00 | 0.05 | 20.93 | 7.36 | 2.01 | 0.00 | 30.31 |
| VII. Feet | 0.01 | 0.00 | 0.02 | 0.12 | 0.00 | 0.54 | 0.02 | 0.00 | 0.74 | | | | 0.33 | 0.00 | 7.55 | 0.00 | 0.00 | 0.01 | | | | 0.00 | 0.00 | 0.02 | 5.93 | 2.45 | 0.50 | 0.00 | 8.89 |
| VIII. Multiple locations | 0.01 | 0.00 | 0.02 | 0.09 | 0.02 | 0.27 | 0.32 | 0.00 | 4.20 | 0.00 | 0.00 | 0.00 | 0.45 | 0.01 | 7.02 | 0.00 | 0.00 | 0.02 | | | | 0.01 | 0.00 | 0.03 | 7.59 | 3.06 | 0.89 | 0.03 | 11.58 |
| IX. Not specified | | | | | | | | | | | | | | | | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.04 | 0.05 | 0.80 | 0.59 | 0.24 | 0.05 | 0.05 | 0.94 |
| TOTAL | 0.17 | 0.00 | 0.36 | 1.20 | 0.02 | 4.03 | 2.69 | 0.00 | 46.65 | 0.00 | 0.00 | 0.00 | 3.53 | 0.02 | 83.59 | 0.01 | 0.00 | 0.36 | 0.00 | 0.00 | 0.02 | 0.13 | 0.06 | 3.61 | 95.43 | 35.33 | 7.75 | 0.11 | 138.63 |

(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) Calendar days.

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

| NATURE OF THE INJURY | COMMUNITY (IX) | | | | | | | | | | | | | | | | | | | | | | | | YEAR 1977 | | | | | |
|---|--------------------------------|-----------------|-------|---|-----------------|-------|--------------------------------|-----------------|-------|----------------------------------|-----------------|-------|--|-----------------|-------|--|-----------------|-------|-----------------------------|-----------------|-------|--|-----------------|-------|----------------------------------|-------------------|---------------|-----------------|--------|--|
| | COAL-FIELD | | | | | | | | | | | | | | | | | | | | | | | | MAN-HOURS WORKED (1) 577 590 360 | | | | | |
| | Amputations and enucleations 1 | | | Fractures with or without dislocation 2 | | | Lukations, twist and sprains 3 | | | Concussion and internal injury 4 | | | Open wounds contusion 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 (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | Fatal accidents | total | > 56 days (3) | 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 (4) | 21 to 56 days (4) | > 56 days (4) | Fatal accidents | total | |
| LOCATION OF THE INJURY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I. Head and neck | - | - | 0,01 | 0,16 | 0,05 | 0,50 | 0,04 | - | 0,34 | 0,04 | - | 0,27 | 0,30 | 0,01 | 7,33 | - | - | 0,03 | | | | 0,01 | - | 0,07 | 7,66 | 2,06 | 0,56 | 0,06 | 10,39 | |
| II. Eyes | - | - | - | | | | | | | - | - | 0,01 | 0,10 | - | 2,22 | - | - | 0,07 | | | | 0,03 | - | 1,31 | 4,24 | 0,59 | 0,14 | - | 5,26 | |
| III. Trunk | - | - | - | 0,33 | 0,01 | 0,83 | 0,68 | - | 12,18 | 0,02 | 0,01 | 0,07 | 0,47 | 0,01 | 7,08 | 0,01 | - | 0,06 | | | | 0,01 | 0,01 | 0,03 | 15,39 | 6,95 | 1,52 | 0,03 | 24,01 | |
| IV. Upper limbs (excluding the hands) (2) | 0,01 | - | 0,01 | 0,55 | - | 0,88 | 0,16 | - | 1,78 | | | | 0,37 | - | 7,85 | 0,01 | - | 0,13 | | | | 0,01 | - | 0,03 | 9,11 | 2,94 | 1,10 | - | 13,26 | |
| V. Hands | 0,22 | - | 0,43 | 1,75 | - | 6,12 | 0,09 | - | 0,96 | | | | 1,29 | - | 26,06 | 0,02 | - | 0,09 | | | | 0,01 | - | 0,06 | 22,90 | 14,19 | 3,37 | - | 40,69 | |
| VI. Lower limbs (excluding feet) (4) | 0,02 | - | 0,02 | 1,08 | - | 1,37 | 0,70 | - | 7,53 | | | | 0,97 | - | 13,00 | 0,01 | - | 0,06 | | | | 0,03 | - | 0,06 | 16,02 | 6,89 | 2,82 | - | 25,86 | |
| VII. Feet | 0,04 | - | 0,05 | 0,74 | - | 1,60 | 0,13 | - | 1,54 | | | | 0,42 | - | 6,70 | - | - | 0,02 | | | | - | - | 0,01 | 6,97 | 3,50 | 1,33 | - | 11,84 | |
| VIII. Multiple locations | 0,01 | 0,01 | 0,02 | 0,11 | 0,03 | 0,24 | 0,16 | - | 2,14 | 0,01 | - | 0,03 | 0,30 | 0,01 | 4,12 | - | 0,01 | 0,04 | | | | 0,02 | 0,01 | 0,05 | 4,58 | 2,01 | 0,62 | 0,07 | 7,31 | |
| IX. Not specified | | | | | | | | | | | | | 0,01 | - | 0,01 | - | - | 0,07 | - | - | - | 0,03 | 0,03 | 0,41 | 0,35 | 0,14 | 0,04 | 0,03 | 0,56 | |
| TOTAL | 0,30 | 0,01 | 0,54 | 3,13 | 0,09 | 11,54 | 1,96 | - | 26,47 | 0,08 | 0,01 | 0,38 | 4,23 | 0,03 | 74,47 | 0,06 | 0,01 | 0,58 | - | - | - | 0,14 | 0,04 | 2,03 | 87,22 | 39,25 | 11,49 | 0,20 | 139,17 | |

(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) Calendar days.

ANNEXES

LIST OF ANNEXES

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**TERMS OF REFERENCE AND RULES OF PROCEDURE
OF THE MINES SAFETY COMMISSION**

*Decisions from the Council of Ministers of
9 July 1957, 11 March 1965 and 27 June 1974*

RULES OF PROCEDURE OF THE M. S. C.

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 42nd 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.

RULES OF PROCEDURE OF THE M. S. C.

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, it 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,

J. REY

President.

RULES OF PROCEDURE OF THE M. S. C.

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 (1)

The Commission shall consist of 36 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.

ORGANIZATION

(a) Restricted Committee

Article 5

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

RULES OF PROCEDURE OF THE M. S. C.

Article 6

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

Article 7

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 8 (1)

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 five or more Governments.

*(b) Working Parties**Article 9*

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

Article 10

The Working Parties shall decide their own *modus operandi*.

Article 11

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 12 (1)

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 six official languages of the Community.

WORKING PROCEDURE

Article 13

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

Article 14 (1)

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

The Chairman may allow advisers to speak.

Article 15

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 16

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 17 (1)

24 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 nineteen members in all.

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

(1) Amended having regard to decision of the Council of the European Communities of 1 January 1973 (Official Journal of the European Communities L2 of 1 January 1973).

RULES OF PROCEDURE OF THE M. S. C.

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 Community,

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

M. MAURICE-BOKANOWSKI

President

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

RULES OF PROCEDURE OF THE M. S. C.

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 health conditions in coalmines.

2. The Commission shall help the High Authority to work out a method of compiling inter-comparable 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 Authority 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.

COUNCIL DECISION

of 27 June 1974

on the extension of the responsibilities of the Mines Safety and Health Commission to all mineral-extracting industries

(74/326/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 145 thereof ;

Having regard to the draft of the Commission ;

Having regard to the Opinion of the European Parliament (1) ;

Having regard to the Opinion of the Economic and Social Committee ;

Whereas the representatives of the Governments of the Member States meeting within the special Council of Ministers, by Decision of 9 and 10 May 1957, set up a Mines Safety and Health Commission whose terms of reference as laid down by Decision of 9 July 1957 (2) of the representatives of the Governments of the Member States meeting within the Special Council of Ministers, amended by Decision of 11 March 1965 (3) are to follow developments in safety and in the prevention of occupational risks to health in coal mines and to draw up proposals appropriate for the improvement of safety and health in coal mines ;

Whereas this body has proved to be an effective and suitable instrument for safeguarding the health and safety of workers in coal mines ;

Whereas problems of safety similar to those in coal mines also exist in other mineral-extracting industries ;

Whereas the prevention of occupational accidents and diseases, as well as occupational hygiene, are among the objectives of the Treaty establishing the European Economic Community ;

Whereas the Council resolution of 21 January 1974 (4) concerning a social action programme envisages an action programme for workers which aims *inter alia* at improvement in safety and health conditions at work ;

Whereas the Safety and Health Commission should be assigned the task of extending to all mineral-extracting industries the preventive action which has hitherto been confined to coal mines ;

Whereas the representatives of the Governments of the Member States meeting within the Council agreed to assign this task to the Safety and Health Commission,

HAS DECIDED AS FOLLOWS :

Article 1

1. Preventive action against risks of accident and occupational risks to the safety and health of workers in all mineral-extracting industries except simple excavation, excluding the protection of the health of workers against the dangers arising from ionizing radiations which is subject to special regulations pursuant to the Treaty establishing the European Atomic Energy Community shall be the responsibility of the Mines Safety and Health Commission within the terms of reference laid down by Decision of 11 March 1965 of the representatives of the Governments of the Member States meeting within the special Council of Ministers.

2. Mineral-extracting industries shall be taken to mean the activities of prospecting and of extraction in the strict sense of the word as well as of preparation of extracted materials for sale (crushing, screening, washing), but not the processing of such extracted materials.

3. Simple excavation shall be taken to mean work whose purpose is not the extraction of materials for use.

(1) OJ No C 40, 8. 4. 1974, p. 64.

(2) OJ No 28, 31. 8. 1957, p. 487/57.

(3) OJ No 46, 22. 3. 1965, p. 698/65.

(4) OJ No C 13, 12. 2. 1974, p. 1.

RULES OF PROCEDURE OF THE M. S. C.

Article 2

1. This Decision shall enter into force on the fifth day following its publication in the *Official Journal of the European Communities*.

2. It shall apply :

— to the underground activities of the mineral-extracting industries : as from the day laid down in paragraph 1 ;

— to the other activities of the mineral-extracting industries : as from 1 January 1976.

Done at Luxembourg, 27 June 1974.

For the Council

The President

K. GSCHIEDLE

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

C - Working Party on Ventilation, Firedamp and other Mine Gases -
Chairman Mr Rhydderch

A. General terms of reference

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 should be applied in order to suppress or control firedamp.

In addition to the study of firedamp explosions occurring 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.

B. Special terms of reference

- 1.1. to study all the aspects of the accidents which occurred at Lens-Liévin, Houghton-Main and Luisenthal which might be interesting and important for preventing firedamp explosions and firedamp ignitions and in particular to propose measures which can be taken to control the emission of firedamp
 - coming from old workings and cul-de-sacs, both those abandoned temporarily and those abandoned permanently;
 - in cul-de-sac workings, account should be taken of the dust make, stoppages of work, and stoppage of auxiliary ventilation as well as: the length and nature of the ducting for the auxiliary ventilation;
- 1.2. to study the utility of automatic monitoring of auxiliary ventilation (air velocity etc..) and of automatic monitoring of CH₄ (by instruments installed on coal-getting and heading machines and including electrical call-out or alarm indication devices).
- 1.3. to compare national legislation designed to avoid the risk of sparking in auxiliary fans, with the ultimate aim of harmonising these.
2. Preparation of a report or interim report on "Methane under conveyors".
3. Preparation of recommendations on "Ignitions of firedamp by power loaders and heading machines".
4. Preparation of a report on use of CH₄ monitoring instruments in the Community Countries.
5. Preparation of a report on "Heavy gas emissions".

TERMS OF REFERENCE OF THE WORKING PARTIES OF THE M.S.H.C.

6. Preparation of a report on "Effects of firedamp on the risk of explosion with coal dusts (in collaboration with the Working Party on "Flammable Dusts").
7. Drafting of uniform requirements and test specifications for CH₄ monitoring instruments.
(see point 5 of the agenda)
8. Preparation of a report on "Use of diesel engines underground in mines".
9. Drafting conclusions concerning 'Outbursts'.

D - Working Party on Winding Ropes and Shaft Guides, Winding engines and Winches - Chairman Mr Lintzen

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 mechanisms 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.

E - Working Party on 'Strata Control and Rock Mechanics' - Chairman Mr J. S. Marshall

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 measures and conditions of workings, e.g. sequence of working the seams, features of the working areas (length, speed of advance, etc.), type and characteristics of the lining;

TERMS OF REFERENCE OF THE WORKING PARTIES OF THE M.S.H.C.

- 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 support and draw up minimum roof control requirements, taking into account the characteristics of the various faces (overall seam thickness, dip, dead rock....).

F - Working Party on Electrification - Chairman Mr StassenTerms 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).
8. Investigation of the use of remote-control circuits in automated mining operations.
9. The Mines Safety and Health Commission instructs the Working Party on Electricity:
 - 1 (i) to take due note of the results of the work of the CENELEC Committee of Experts entrusted with harmonizing the rules covering the design of electrical equipment for use in explosive atmosphere;
 - (ii) to examine the draft directive of the Commission of the European Communities dealing with the co-ordination in Member States of legislation on electrical equipment to be used in explosive atmosphere;

TERMS OF REFERENCE OF THE WORKING PARTIES OF THE M.S.H.C.

- 2 to propose, if appropriate, modifications to the above documents to make them applicable to coal mines in countries of the European Community;
- 3 to suggest the means by which harmonization of the certification procedures and reciprocal acceptance of the test methods and test certificates could be achieved;
- 4 to compare the rules covering installation and use of underground electrical equipment now current in each of the Community countries, particularly in respect of the dangers of firedamp ignition; to ensure that the rules are uniform or to examine the equivalence of certain rules, so that such equipment can be used without modification in all the Community countries.

G - Working Party on Human Factors affecting Safety: Chairman Mr LintzenTerms 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.

I - Working Party on 'Mechanization' - Chairman Mr Medaets

Taking into consideration current techniques in winning and roadway driving linings and roadway conveyors, the working party is instructed to study particular 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.

K - Working Party "petroleum, gas and other material extracted by drilling" - Chairman: Mr De KORVERA - Terms of reference

to collect any information available on safety and health hazards and the causes of accidents during prospecting, boring and extracting to obtain petroleum, gas and other materials in the Community countries;

- a) to pinpoint the fields in which new Community work might play a useful part;

and

- b) to be aware of work being carried out at international level by both the working parties set up at the London Conference of 1972

TERMS OF REFERENCE OF THE WORKING PARTIES OF THE M.S.H.C.

and the European Diving Technology Committee so as to keep the Mines Safety and Health Commission informed of progress.

B - Special terms of reference

At the meeting of the Working Party on 10th June 1977, with the approval of the Mines Safety and Health Commission, the Working Party took note of the blowout which happened on the Ekofisk Bravo platform in the Norwegian sector of the North Sea, and accordingly formed a Committee of Experts to study measures required to reduce the risk of similar instances at sea in the drilling, producing and work-over stages. Priority should be given to this work as blowout give rise to a considerable hazard to personnel employed on isolated offshore platforms.

L - Working Party on Combustible Dusts: Chairman Mr Koch

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 explosions, in particular :

- (a) dust neutralization (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.

M - Working Party on Health in Coal Mines: Chairman Mr Rhydderch

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 airborne dust control methods where powered supports, underground crushers, coal cutting and getting and roadway drilage 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 airborne dust 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 organization 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 standardize pre-recruitment medical examinations, periodic checks and checks in special instances,
 - (iv) a draft scheme for a minimum degree of standardization 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.

N - 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 assistance 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,

TERMS OF REFERENCE OF THE WORKING PARTIES OF THE M.S.H.C.

- (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 Group 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.
- 0 - 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 of underground accidents in the Community coal mines should be examined, with the following objectives:
- 1. To decide on suitable mathematical statistical systems,
 - 2. To evaluate, with their aid, chronological differences in frequency together with differences from country to country or coalfield to coalfield.

ANNEX III

COMPOSITION OF THE MINES SAFETY AND HEALTH COMMISSION

AND OF ITS WORKING PARTIES

Updated on 15 December 1978

page

| | |
|--|---------------------------|
| - MINES SAFETY AND HEALTH COMMISSION | |
| - RESTRICTED COMMITTEE | |
| - SECRETARIAT | Secretary: Mr J. LECLERCQ |
| - WORKING PARTIES | |
| C Ventilation, Firedamp and Other Mine Gases | Mr Obst |
| D Winding Engines, Rope and Shaft Guides | Mr Wetekam |
| E Strata Control and Stability of Ground | Mr Walker |
| F Electricity | Mr Obst |
| G Human Factors | Mr Obst |
| I Mechanization | Mr Wetekam |
| K Oil, Gas and other Materials extracted by Borehole | Mr Gillardin |
| L Flammable Dusts | Mr Wetekam |
| M Health in Mines | Mr Gillardin |
| N Rescue Arrangements, Mine Fires and Underground Combustion | Mr Walker |
| O Common Accident Statistics | Mr Gillardin |
| - <u>Committees of Experts</u> | |
| C1 Firedamp Monitoring Instruments | Mr Obst |
| C2 Diesel Engines | Mr Obst |
| D1 Winding Ropes | Mr Wetekam |
| D2 Winding Engines | Mr Wetekam |
| E1 Rock Mechanics | Mr Walker |
| G1 Community Safety Campaigns | Mr Obst |
| K1 Prevention of Blowouts | Mr Gillardin |
| N1 Stabilization of Ventilation in the Event of Fire below Ground | Mr Walker |
| N2 Fire-resistant Fluids | Mr Walker |
| N3 Fire-resistant Conveyor Belts and Other Long Items of Plant | Mr Walker |
| N4 Filter Self-rescuers | Mr Walker |

A. MINES SAFETY AND HEALTH COMMISSION

Chairman: H. VREDELING, Vice-président de la Commission des Communautés Européennes, Bruxelles

Secretary: M. J. LECLERCQ, Ingénieur en Chef-Directeur des mines (Belgique), Conseiller à la Commission des Communautés Européennes.

FEDERAL REPUBLIC OF GERMANY

Government Representatives

- Ministerialrat Dr. Ing. R. LINTZEN, Referat III A 1, Bundesministerium für Wirtschaft und Finanzen- 5300 BONN
- Dipl.-Ing. K. HORNEFFER, Bundesministerium für Arbeit und Sozialordnung - 5300 BONN

Employers' Representative

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

B. RESTRICTED COMMITTEE

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Mines Safety and Health Commission

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- Ing. G.B. NARBONE, Ministero dell'Industria, del Commercio e dell'Artigianato, Serv. Sicurezza Mineraria, Via Veneto 33 00100 ROMA

NETHERLANDS

- Ir. Th. M. JANSSEN, inspecteur der mijnen, Staatstoezicht op de mijnen, Apollolaan 9, HEERLEN (L)

UNITED-KINGDOM

- *Mr. J.S. MARSHALL*, HM Deputy Chief Inspector of Mines and Quarries, Health and Safety Executive, Regina House, 259/269 Old Marylebone Road, LONDON NW1 5RR

DENMARK

- M. Anders KJAER, maitre en sciences sociales, Secrétaire, Direktoratet for arbejdstilsynet, Roseruaengets Allé 16-18, 2100 KOBENHAVN Ø.

F O R M
to be returned to

SECRETARIAT
MINES SAFETY AND HEALTH COMMISSION
Bâtiment Jean Monnet - A2
Rue Alcide de Gaspéri
LUXEMBOURG - Kirchberg
Grand Duchy of Luxembourg.

Re: Changes to the list of Members of the Mines Safety and Health Commission
or its Committees of Experts.

I should be grateful if you would (delete where appropriate):

- ADD - CORRECT - DELETE:

SURNAME:

Christian name:

Duties:

.....

Address:

Postcode and town:

.....

Telephone: (Please give regional code and then the number)

Office:

Private number or name and number of the person who
can be contacted in the event of absence:

.....

to the list of:

- THE MINES SAFETY AND HEALTH COMMISSION in his capacity as* G E W TA

- THE RESTRICTED COMMITTEE id.

- of the following WORKING PARTIES **:

Ventilation, Firedamp and other Mine Gases Winding Engines, Ropes and Shaft Guides

Strata Control and Stability of Ground Electricity

Human Factors Mechanization

Oil, Gas and Other Materials extracted by borehole Flammable Dusts

Health in Mines Rescue Arrangements, Mine Fires and Underground Combustion

Common Accident Statistics

Date and signature:

.....

* Government/Employers'/Workers' representative or Technical Adviser
** Delete where appropriate

PUBLISHED REGULATIONS AND GUIDELINES

passed in some Member States during 1977

in the field of Health and Safety

PUBLISHED REGULATIONS AND GUIDELINES

passed in some Member States during 1977 in the field of Health and Safety

BELGIUM

Ministerial Decree of 27 January 1977 modifying Ministerial Decree of 31 October 1958 concerning the types, acceptance conditions and maximum charges per blast hole for explosives in underground mine workings.

Law of 25 February 1977 approving Convention no 124 concerning the medical suitability test for adolescents in underground mine workings, adopted in Geneva on 23 June 1965 by the General Conference of the International Labour Organization at its 49th session.

Royal Decree of 23 March 1977 laying down the safety guarantees required by certain electrical machines, devices and ducts.

Ministerial Decree of 20 September 1977 modifying Ministerial Decree of 2nd October 1974 laying down the ~~theoretical~~ spinning loss to be taken into account in calculating the breaking load of the different kinds of mine ropes.

FEDERAL REPUBLIC OF GERMANY

| | |
|------------|---|
| 03.02.1977 | Order concerning mine climates. |
| 29.03.1977 | Protection of Young People at Work Act : Employment in hot workings. |
| 19.04.1977 | Hand-held carbon monoxide (CO) measuring instruments : list of obligations. |
| 03.05.1977 | Ignition of a mixture of combustible gas and air by a discharge spark. |
| 20.05.1977 | Long shot holes. |
| 14.06.1977 | Coal bunkers. |
| 14.06.1977 | Guidelines on powered supports. |
| 08.07.1977 | Mechanically-driven overhead monorails on rails dipping at over 20 gon. |
| 20.07.1977 | Chief Mines Inspectorate for North Rhine-Westphalia Order on shaft and incline haulage installations (BVOS)l. |

| | |
|------------|--|
| 28.07.1977 | Safety with regard to the distributing valves of powered supports. |
| 08.07.1977 | Hand-held oxygen (O ₂) measuring instruments and portable oxygen (O ₂) measuring apparatus : guidelines. |
| 26.08.1977 | Remote-controlled or automatically controlled fixed CO measuring apparatus : basic principles. |
| 22.09.1977 | Safety from hydraulic prop slippage. |
| 28.09.1977 | Anchoring guidelines. |
| 17.11.1977 | Safety from the danger of crushing caused by support elements in low face workings. |
| 15.12.1977 | Technical requirements for shaft and incline haulage installations. |
| 20.12.1977 | Trial boring after times of standstill. |
| 23.12.1977 | Frame timbering. |
| April 1977 | Emergency plan for pit rescue teams. |

SAARLAND

Directives of the Chief Mines Inspectorate (Oberbergamt) of the Saarland and the Rhineland-Palatinate for the Official approval of the use of laser devices to produce guide beams, issued on 15 February 1977.

Mines Safety Regulations of the Chief Mines Inspectorate of the Saarland and the Rhineland-Palatinate for shaft and inclined haulage systems, issued on 1 September 1977 - Saarland edition.

Mines Safety Regulation of the Chief Mines Inspectorate of the Saarland and the Rhineland-Palatinate for shaft and inclined haulage systems, issued on 1 September 1977 - Rhineland-Palatinate edition.

Technical requirements for shaft and inclined haulage systems, dated 15 December 1977, in conjunction with the Mines Safety Regulations for shaft and inclined haulage systems.

IMPLEMENTATION OF RECOMMENDATIONS

up to safety and health established in the Community countries in 1977

will be published later

RECOMMENDATION
FOR THE USE OF WATER TROUGH BARRIERS
FOR CONTAINING COAL–DUST EXPLOSIONS UNDERGROUND

*Adopted by the Mines Safety and Health Commission on 5th July 1977
as a proposal to Governments for the improvement of safety in coal mines
in accordance with Article 1 of its Terms of Reference and follow up
in accordance with Article 4 of those terms*

WATER TROUGH BARRIERS

Recommendation
for the use of water barriers
for containing coal-dust explosions underground

- - - - -

1. Introduction

The Working Party on Flammable Dusts was directed by the Mines Safety and Health Commission to investigate protective measures against the ignition and explosion of dusts, to include the various barrier designs intended to arrest coal-dust explosions, mixed coal-dust/firedamp explosions and pure firedamp explosions.

Accordingly, the Working Party prepared an information report on water barriers for containing coal-dust explosions underground in the Federal Republic of Germany. The report was adopted by the Mines Safety and Health Commission on 22 January 1974 and published as Annex VII to the 11th Annual Report.

In its introduction, the MSHC stressed the report's usefulness, but pointed out that no recommendation was as yet being made. The report was intended to inform all interested parties, in particular mines, of the nature and results of the tests carried out in the Federal Republic of Germany.

In view of the good results obtained from tests and trials of water barriers in actual working conditions, the MSHC is now of the opinion that these barriers may be regarded as a suitable means of containing coal-dust explosions.

The Mines Safety and Health Commission therefore considers it appropriate to recommend to the governments of the Member States the use of water barriers as an additional and valuable means of containing coal-dust explosions underground.

2. Reasons

Protection against coal-dust explosions underground is dependent on avoiding the possibility of ignition and rendering deposits of dust harmless. Coal-dust explosions occurring despite these precautionary measures should be arrested by explosion barriers.

Virtually the only type of explosion barrier used in the past was the stone-dust barrier. It is true that water barriers had been known for a considerable time as well, but they were only installed in a few cases. There was insufficient knowledge of their effect, which depended on their design and the characteristics of the water troughs and the necessary operational facilities, in particular water pipes, were not yet available.

The favourable knowledge and experience gained by the various countries are described in the Annex, and have in turn led to appropriate regulations in these countries.

WATER TROUGH BARRIERS

3. Advantages of water barriers

Compared to stone-dust barriers, both the concentrated and the wide-action water barriers have the following considerable advantages:

- a) The volume of the extinguishing agent can be smaller.
- b) Whereas dust for stone-dust barriers must be delivered in sacks or silo trucks, water is nowadays available in most mines.
- c) The installation of water barriers is simpler.
- d) The water level on which the efficiency of the barriers depends can be read at the troughs without difficulty if these are transparent or water gauges are available.
- e) The maintenance involved is slight; water evaporation is prevented by lids on the troughs.
- f) Through appropriate arrangement of the troughs, water barriers are largely adaptable to the size and shape of existing cross-sections as they consist of individually installed troughs.

Experience in several countries has shown that the investment and operating costs of water barriers are lower.

4. Recommendations

- 4.1. To safeguard against explosions of flammable coal-dust deposits underground, the precautionary measures mainly designed to avoid ignition and to render such deposits harmless must be supplemented by the provision of explosion barriers to arrest any explosion that may still occur.

It is difficult for technical reasons to install these explosion barriers in vertical or strongly inclined roadways (approx. $> 40^\circ$ or $> 36^\circ$).

- 4.2. In all mines in which water is available, any new explosion barriers can be water barriers where conditions permit.
- 4.3. The layout of the barriers should be based on the knowledge that coal-dust explosions can develop in any roadway containing flammable dust, and in either direction, although gas concentrations and potential ignition sources are more likely to be found at certain points than at others. Water barriers should therefore be installed at regular intervals in such roadways, and particular attention paid to branches and gate roads. Wide-action water barriers rather than concentrated barriers are recommended for use in gate roads.

WATER TROUGH BARRIERS

ANNEX 1

GERMAN EXPERIENCE
WITH WATER BARRIERS
=====

WATER TROUGH BARRIERS

Annex 1German Experiences

In 1962 investigations were started in the German coal mining industry to

- a) test the efficiency of water barriers and to establish whether or not they were at least as good as stone-dust barriers, and
- b) develop water barriers for operational use.

The investigation produced positive results and led to corresponding regulations within the industry. These favourable results as well as operational experience have led to water barriers generally supplanting stone-dust barriers over the last few years. Whereas almost all the barriers were of the stone-dust type in 1967, the proportion of water barriers today is estimated at around 70 - 90 %.

The concentrated water barriers used by the German industry today are of design 3 and the wide-action barriers of design 4.

Concentrated water barriers (design 3)

The barriers consist of water-filled troughs arranged in groups (Annex 1.1). The troughs, which are covered by lids, hang in racks or stand on racks or supports. Generally speaking, the water content is around 90 litres, occasionally 40 litres. Troughs are made of a suitable material, the most important characteristic being destructibility.

A group of troughs comprises all troughs installed within a section of roadway 3 m long. Depending on the size of the cross-section, the group of troughs must cover at least 35%, 50% or 65% of the roadway width.

Several groups of troughs form a concentrated barrier. The barriers contain at least 200 litres of water per square meter of roadway cross-section. The amount of water is at least 5 litres per cubic meter of roadway volume in the barrier area.

The layout of the barriers in the mine workings is based on the knowledge that dust explosions can occur in any roadway and at any point. Barriers are therefore installed (Annex 1.2, part a):

- a) at roadway junctions and crossings at intervals of not more than 75 m, and
- b) in gate roads at intervals of not more than 200 m; in all other level and inclined roadways at intervals of not more than 400 m.

Wide-action water barriers (design 4)

The wide-action water barrier is a further development of the system described for covering the whole of the mine with a network of explosion barriers. Wide-action water barriers are installed throughout mine workings, in particular in gate roads (Annex 1.2, part b).

Where this system is used, no attempt is made to combine several groups

WATER TROUGH BARRIERS

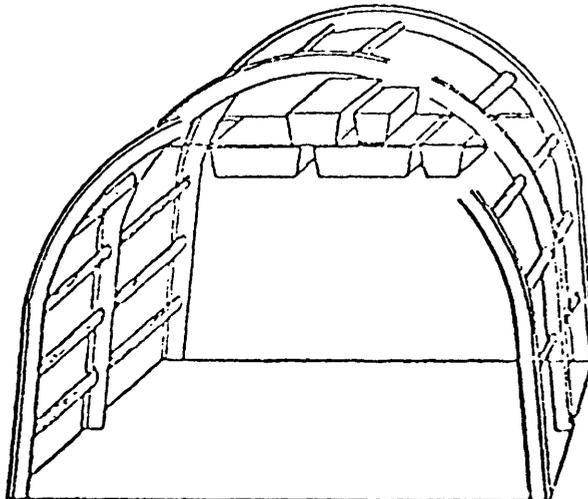
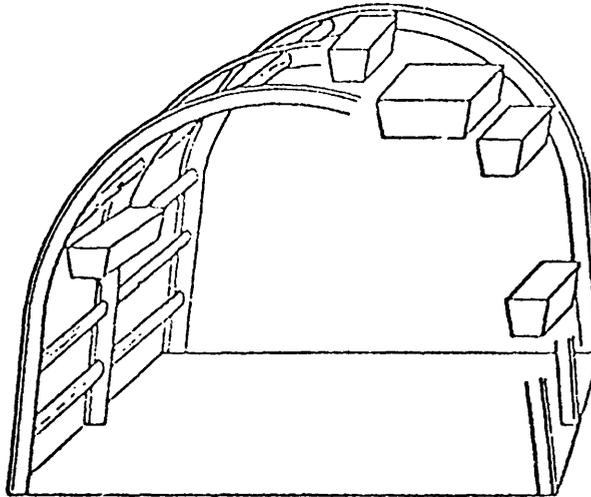
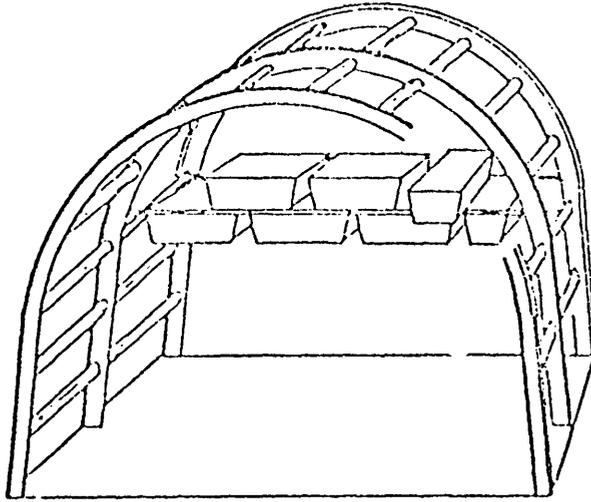
Annex 1

of troughs to form a barrier and to lay down specific water requirements for the entire barrier. Instead, the groups of troughs are spaced at intervals of up to 30 m from each other. The amount of water in each group of troughs is at least 1 litre per cubic metre of the roadway volume up to the next group of troughs.

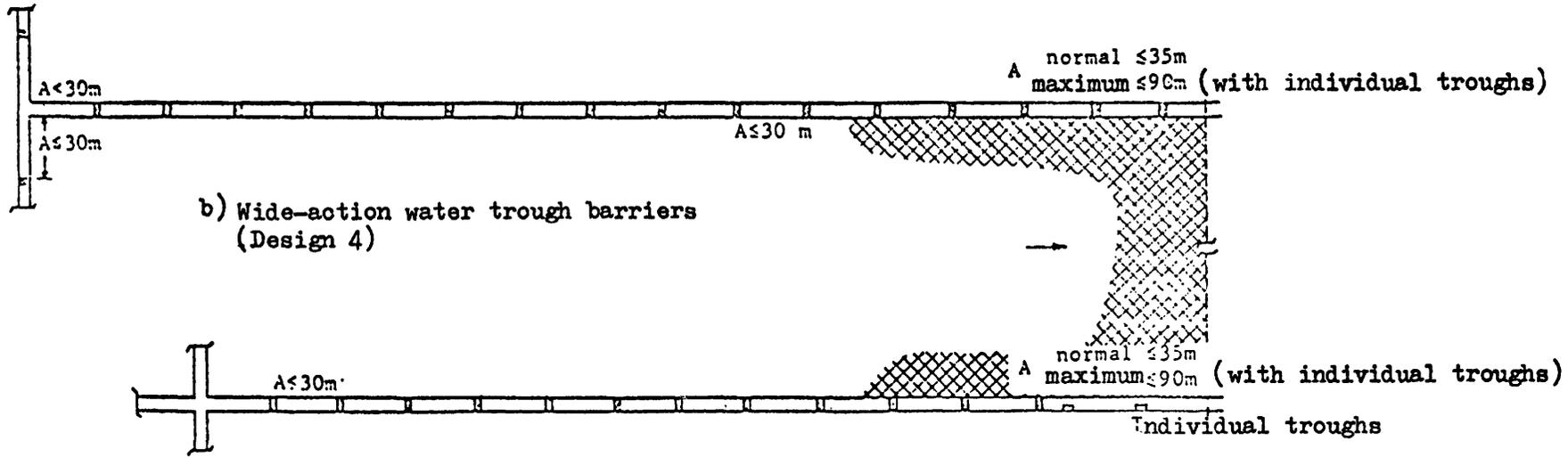
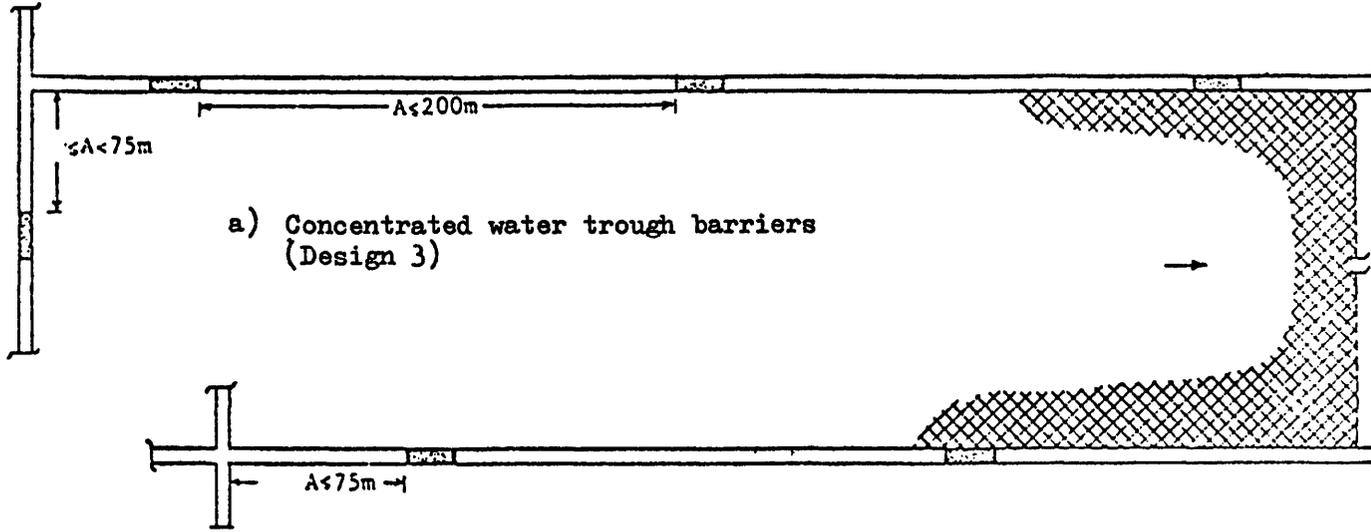
The distance from roadway junctions and crossings to the nearest group of troughs must not be more than 30 m.

In gate roads, the distance between the junction of face and roadway and the nearest group of troughs should be as small as possible and not more than 35 m. It may be increased to 90 m if additional troughs with a certain volume of water, dependent on the actual distance and the cross-section of the roadway, are installed in this area.

Otherwise the same regulations as for design 3 apply, in particular with regard to the groups of troughs and the arrangement of the troughs.



Water trough barriers of Design 3
(examples of arrangement of groups of troughs)



Installation of water trough barriers in gate roads

WATER TROUGH BARRIERS

Annex 2

French Conclusions
=====

WATER TROUGH BARRIERS

Annex 2French findings and conclusions

The use of concentrated water barriers has been developed in France since 1972. Before this, a number of water barriers were installed, but for experimental purposes only.

A circular of 22 December 1971 recommends water barriers in naturally damp roadways, working districts with hydraulic stowing, locations where the maintenance of stone-dust barriers would be a nuisance, inclined roadways and roadways severely constricted by monorails.

Subsequently, a new French regulation relating to control of flammable dusts was published on 13 July 1976 which specifies the use of barriers, in particular, in all dusty roads in mining districts, except strongly inclined roads, and lays down the conditions for installation of concentrated and wide-action water barriers.

18 000 troughs were installed in France in 1975, 39 900 in 1976. It is intended to install 50 000 in 1977. Barriers are now installed in all dusty roads where it is technically feasible to do so.

The new French regulation maintains the principle of creating isolated sections of roadway by means of concentrated barriers with 400 kg or 400 l of extinguishing agent per square metre of roadway cross-section, and specifies that concentrated or wide-action barriers must be set up in all the roadways within the isolated sections. It also lays down that concentrated barriers shall be installed at the foot of winding and upcast shafts and in roadways containing belt conveyors for coal transport which are located between the shafts and the isolated sections.

Comparative costs of water barriers and stone-dust barriers

The following conclusions (indicative only) may be drawn from studies carried out in three French coalfields on costs of installation and maintenance of concentrated barriers:

WATER TROUGH BARRIERS

Annex 2

(in French francs)

| Roadway cross-section | 10 m ² | | 12 m ² | | | 15 m ² | |
|-----------------------------|-------------------|----------|-------------------|------------------|------------------|-------------------|----------|
| | stone-dust | water | stone-dust | water | standing hanging | stone-dust | water |
| Extinguishing agent | stone-dust | water | stone-dust | water | standing hanging | stone-dust | water |
| Trough layout | | standing | | standing hanging | | | standing |
| Installation costs | 5000 | 4800 | 5400 | 4500 | 5000 | 7300 | 7100 |
| Maintenance costs 1 year | 3500 | 3100 | 4200 | 2300 | 2300 | 5100 | 4700 |
| Total cost for 1 year | 8500 | 7900 | 9600 | 6800 | 7300 | 12400 | 11800 |
| Difference in % | | - 7% | | - 30% | - 24% | | - 4,8% |

Water barriers are thus less expensive than stone-dust barriers both as regards installation and maintenance. The difference in costs at the end of one year of operation amounts to -5 to -30%, depending on the conditions, and arises principally out of maintenance requirements.

Effectiveness of water barriers

CERCHAR conducted systematic trials with dust explosions of low intensity initiated at the end of a dead-end gallery, 145 m long, 10 m² in cross-section, bolted and empty of material.

A comparison between concentrated water and stone-dust barriers was undertaken, the barriers being between 75 and 90 metres from the end of the gallery. The water barriers comprised 6 or 12 80-litre troughs,

WATER TROUGH BARRIERS

Annex 2

the stone-dust barriers consisted of 10 shelves each holding 50 or 100 kg of stone-dust. The extinguishing agent thus amounted to approximately 50 or 100 l per m² of gallery cross-section. In all, it was possible to halt dust explosions whose flame speed at the barrier was between 30 and 160 m/s, depending on the quantity of extinguishing agent used, and under such conditions the two types of barrier may be considered as being equally effective.

In another series of tests the effectiveness of wide-action water barriers was examined using different trough layouts. The barriers comprised four groups of troughs 20 m apart, the first group being 35 m from the end of the gallery. The troughs used were basically 80-litre PVC troughs either held in a support or standing on the floor, and arranged at right-angles to the line of the gallery.

Under such conditions, and given flame speeds varying between 60 and 100 m/s within the area of the wide-action barrier, the flame was generally stopped before the third group when each group comprised 2 troughs (1 litre of water per m³ of gallery volume up to the next group of troughs), whether the troughs were hanging 2 m above the floor in supports fixed to the walls; standing on the floor, or one standing on the floor and the other hanging at a height of 2 m (in which case the troughs touched one of the walls, leaving a passageway of 1.8 to 2 m wide).

With one single trough per group, arranged at right-angles to the line of the gallery (0.5 l/m³ of gallery volume), it was possible to stop the flame before the third group, provided that the trough supports did not sway as a result of the air displacement and that the troughs were approximately equidistant from the walls.

WATER TROUGH BARRIERS

ANNEX 3

UNITED KINGDOM EXPERIENCE
=====

WATER TROUGH BARRIERS

Annex 3

Research began on water barriers in the U.K. in the late 1960's with the object of developing a barrier that was more convenient and flexible in use than the light stone-dust barrier. In a modern gate roadway something like 15 shelves have to be erected (and maintained and advanced) to accommodate the amount of stone dust required of a light stone-dust barrier. It is often difficult to install such a large number of shelves among the equipment that has to be in use at the gate ends of coal conveyor roads. A barrier that was equally effective in suppressing explosions but which would require a smaller number of shelves would clearly be desirable. There was also a need for barriers that could be installed in the low wide roadways that were coming into use with retreat mining.

Tests were made in the large Buxton explosion gallery using barriers in which the water was contained in long trays made of wood and in individual containers, or tubs, made of wood or plastic material. It was found that water barriers can be as effective as stone-dust barriers and that lightly fitting lids, which reduce the rate of evaporation of the water, had no measurable effect on performance.

Trials were carried out at two collieries and no serious problems were encountered in their installation and maintenance. There was some criticism to the effect that a 50 litre tub of water was rather heavy and therefore difficult to empty, as when it is required to be moved.

On the basis of the results of the tests in explosions and the colliery trials the British regulations were amended to allow the use of approved types of water barriers. Previously only approved types of stone-dust barriers had been allowed. An approved type of water barrier is described that may be used in place of the light stone-dust barrier. Its overall length, construction and siting are the same as for the light stone-dust barrier, but the shelves are loaded with plastic tubs containing water. There are two sizes of tub that have been used. The overall dimensions of the larger tub, including the lid and allowing for handles, are 21 x 19 x 15 in., the last dimension being the height. The corresponding dimensions of the smaller tub are 18 x 13 x 12 1/2 inches. (The dimensions have not yet been officially transcribed into SI units). The former should contain 50 litres of water and the latter, 25 litres. The tubs are placed on the shelves with their long side parallel to the axis of the roadway.

The total mass of water contained in a barrier must be the same as that of stone dust required for a stone-dust barrier, that is, not less than 22 lbs per square foot of the average cross-section of the length of the road in which the barrier is placed. However, the maximum amount of water on a shelf may be up to twice that allowed for light stone-dust barriers. This means a

WATER TROUGH BARRIERS

Annex 3

loading of not more than 40 lbs of water per foot length of shelf length. The effect of this is that only about half the number of shelves are necessary in the water barrier as compared with the stone-dust barrier, but in order that the two barriers should extend for about the same distance along a roadway, the spacing between the shelves in the water barrier is 6 to 14 ft., compared with 3 to 7 ft. for the light stone-dust barrier. No part of any shelf or container must be less than 4 in. from the roof or sides of the road, or prop, or other support.

So far no colliery has taken up the option of using a water barrier instead of the light stone-dust barrier.

WATER TROUGH BARRIERS

ANNEX 4

BELGIAN EXPERIENCE
=====

WATER TROUGH BARRIERS

Annex 4BELGIAN EXPERIENCE WITH WATER BARRIERS1. Legislation

Belgian legislation on flammable dusts dates from 1962/63 and consists of three documents :

- The royal Arrete of 28 June 1962 on the prevention of coal-dust explosions in the underground workings of coal mines;
- The Circular from the Directeur General des Mines of 24 July 1963 containing the directives on neutralization;
- The Circular from the Directeur General des Mines of 7 November 1963 containing directives on isolating ventilation districts.

The royal Arrete provides simply that 'in every classified mine or part of a mine measures shall be taken to isolate workings or groups of workings to arrest dust explosions'.

The Circular of 7 November 1963 provides for two types of explosion barrier: a stone-dust type barrier and a water barrier. Although various models of the first type are described in detail the Circular provides only scant information on the second type (this was 1963!). It authorizes the installation of water barriers provided that:

- the distance between two consecutive troughs (or two consecutive groups of troughs) is one to two metres;
- the total volume of water of a barrier is 200 litres per square metre of roadway cross section.

Since 1963 the Administration des Mines, the Institut National des Industries Extractives (INIEX) and the collieries have consistently paid close attention to the work of the Versuchsgrubengesellschaft and to developments in German legislation.

In accordance with the very general terms of the royal Arrete and the Circular mentioned above and also with German experience, the Campine collieries have installed and developed water trough barriers, as shown below; they have had at all times the full agreement of the Corps des Mines.

2. Practice in the Campine collieries

Water barriers were initially brought into use in the five collieries at various times between 1968 and 1974. This disparity has remained apparent over the years and is reflected in the situation at the end of 1976. Moreover, at each time, it is essential to distinguish clearly between primary barriers (in stone-drifts) and secondary barriers (in the coal roads).

WATER TROUGH BARRIERS

Annex 4

The proportions of water barriers at the various collieries on 31 December 1976 were as follows:

- Primary : maximum 96%, minimum 7%, average 42%;
- Secondary : maximum 100%, minimum 0%, average 55%.

At the collieries in which all secondary barriers are water barriers, all the gate roads contain properly distributed barriers although only 84% of the primary barriers are water barriers. 3 940 troughs were installed in 1976 (out of a total of 5 030 for the coalfield).

The disparity between the various collieries is apparent even in the medium-term forecasts which range from "experimental stage" to 'high-speed development'.

From the point of view of cost no systematic study has been undertaken and the few data available are rather incongruous. The following conclusions may, however, be drawn:

- the cost of installing a water barrier is roughly the same as that of installing a stone-dust barrier;
- water barriers are far less expensive to check and maintain; an average figure of the order of Bfrs 3 000 per barrier per year has been quoted.

RECOMMENDATION FOR THE
STRATA REINFORCEMENT BY
BOLTING, DOWELLING AND INJECTION TECHNIQUES

Adopted by the Mines Safety and Health Commission
on 5th July 1977 as a proposal to Governments for the
improvement of Safety in coal mines in accordance
with article 1 of its terms of reference and follow up
in accordance with article 4 of those terms

STRATA REINFORCEMENT

STATEMENT OF THE VIEWS OF THE
MINES SAFETY AND HEALTH COMMISSION

on

STRATA REINFORCEMENT

The terms of reference given by the Mines Safety and Health Commission to the Working Party on Strata Control and Stability of Ground, on 26th March 1971, charged the Working Party with examining whether it was possible to draw up practical directives for the prevention of falls of ground, taking into account the individual features of coal measures and workings. In particular, it should study both general and specific measures for avoiding falls of ground. Accordingly,

1. The Working Party on Strata Control and Reinforcement of Ground, has assembled a considerable amount of information on techniques available for the reinforcement of strata as practised in mines in the member states of the European Community. These techniques include, bolting, dowelling and injection. The information is available in extenso in document 1612/4/75.
2. It is clear that these methods offer a way of strengthening the weak strata which may be encountered during mining, and by their application, under the appropriate circumstances, the risk of falls of ground which might cause injury to persons, may be reduced.

On its own, bolting may be acceptable in special circumstances.

3. Therefore, these techniques should, wherever possible be considered during the planning of workings ; in addition, their application may be useful and/or necessary when weak or broken ground is encountered.
4. The role of all three techniques is normally to help to create improved conditions in which conventional supports, can be set and/or can function with greater safety. However, in certain European coal mines special conditions exist in routine working where roadways can be solely supported by bolting.
5. In general, managements should be encouraged to establish codes of good practice in which account is taken of the experience and principles set out in Doc. n^o 1612/3/75. They should note the three methods of strata reinforcement and consider the application of these techniques, in particular in the following circumstances.
 - 5.1. When a face or heading has been established and may have to stand for some time in a position ; especially during the installation or salvage of equipment.

STRATA REINFORCEMENT

- 5.2. Whenever there is weak or broken ground such as in the vicinity of neighbouring workings or geological disturbances.
- 5.3. Where there are excavations with large cross-sections which cannot be dressed and supported immediately.
6. The technical details of the application of bolting, dowelling and injection will depend on the conditions in different coalfields and are set out in several examples described in doc. n^o 1612/4/75. Modifications may have to be made in the light of local circumstances.
 - 6.1. In cases where major reliance is placed on bolting, and especially where it is the sole method of support, its performance as a support should be monitored (an example of one method is given on page 7, para. 2.1.10 of doc. n^o 1612/4/75). This may embrace other elements of the support system, including the resins used.
 - 6.2. It is recommended that the chemicals used for bolting, dowelling and injection purposes should be tested for their general suitability for use underground. In particular certain types of resin are more flammable than others, release noxious vapours on mixing or may have an effect on health. The test procedure should result in advice being given to the user on the conditions of use of various products, and the appropriate precautions which should be taken during their use.

7. Necessary developments

The Mines Safety and Health Commission believes that in the research and development programmes for member states, the following items should be considered :

- 7.1. Systems of drilling and placing bolts dowels or injection which are remotely controlled from a position of safety suited to the conditions encountered in European Coal Mines.
- 7.2. Improved systems for dressing the newly exposed strata, especially in the case of large excavations.
- 7.3. Improved resins and other chemicals to obtain better adhesion in all sorts of conditions.
- 7.4. Improved methods of monitoring the performance of bolting as a support which should ideally lead to better methods of planning strata reinforcement using the appropriate technique of bolting, dowelling, or injection.

8. General

The Mines Safety and Health Commission takes note of the report (Doc. n^o 1612/4/75) and wishes that the study and the utilisation of these techniques of Strata Reinforcement be encouraged, for it feels that

STRATA REINFORCEMENT

applied in the right way, they can help to improve safety in mines. It hopes in particular that the research and development indicated in paragraphs 7.1. to 7.4. will be completed by the appropriate departments in the member states as possible ; and the Mines Safety and Health Commission invites Governments to encourage managements to use these techniques of Strata reinforcement when broken ground is encountered and especially in the circumstances set out in para 5.1. to 5.3. above.

9. The Mines Safety and Health Commission asks the Working Party on "Strata Control and Rock Mechanics" to submit a report on the health risks (if any) arising from the use of certain resins.
-

**RECOMMENDATION FOR THE SAFETY
IN THE WINNING AREA**

*Adopted by the Mines Safety and Health Commission on 11 July 1978
as a proposal to Governments for the improvement of Safety in coal mines
in accordance with article 1 of its terms of reference and follow up
in accordance with article 4 of those terms*

SAFETY IN THE WINNING AREA

FOREWORD

Mechanisation in mines underground has appreciably altered working conditions. Physical strain is now less, but, in return, increased demands are made on training, vigilance and prudence. Accident and health risks are incurred above all by changing operating conditions, restricted vision and lack of communication and by technical defects occurring when machinery is in use.

For these reasons, the Mines Safety and Health Commission has instructed the Working Party to submit proposals on how to avoid or reduce such risks.

The Working Party has analysed numerous accidents reports, listed the various causes and, taking into consideration the current level of technology, drafted specific proposals for the safety of machinery in the winning area. These proposals are designed to achieve further "humanisation" of work by providing the highest possible level of safety and health protection for the workers, as well as trouble-free operation of the machinery.

The safety proposals cover primary safety measures, secondary safety measures and guidance on safety measures. The primary safety measures must be implemented at the design and manufacture stages of a machine system and its components. Collaboration should occur between the machine manufacturers and the users. If this is insufficient in a particular case, the secondary safety measures are intended to provide additional devices for improved vision and, control of machinery, good communications between workers and also protection against accidents. Finally, the safety and health of the men concerned should be further safeguarded through guidance on safety measures i.e. by means of relevant training and appropriate working instructions.

The safety proposals must be considered in conjunction with the installation and operating instructions prescribed for each machine. In individual cases, minimum prescriptions can be laid down by the responsible authority. In addition, there should be close cooperation between manufacturers and users in order to ensure the safe and trouble-free operation of the machines.

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1. General1.1. The Working Party's terms of reference

The Mines Safety and Health Commission instructed the Working Party to investigate means of combating accidents resulting from mechanisation, taking into account current techniques in winning and roadway drivage, modern support methods and face and auxiliary conveyor systems.

Specific tasks of the Working Party are as follows :

- a) Compilation of a list of the minimum safety requirements to be observed by manufacturers in the design of machines and mechanical equipment. This list is intended for use by the mining industry.
- b) Examination of safety precautions and devices such as visual and acoustic signalling, functional testing and in particular methods of stopping machines and mechanical equipment from any point in the face and roadway. The possibilities of modern remote control and remote monitoring systems, electrical protection of motors in the event of overloading or obstruction of equipment, and developments in the field of lighting etc. are to be taken into account.

1.2. Division of study areas

After preliminary examination the Working Party decided that the initial effort should be directed towards the mechanisation of winning and conveying in the winning area (coalface area), this being the field covered by this first report. The mechanisation of roadhead operations, as long as machines of the type for winning are not used, will be the subject of a later report.

Accidents caused by falls of ground and electric current are not dealt with here but will be investigated by the Working Parties on Roof Control and Electricity.

Mechanisation in the winning area is not yet complete, but will probably progress towards fuller mechanisation and some automation. Technical procedures will be developed further with due consideration being paid to the safer use of machinery. Attention is to be given to the evaluation of the results of accident investigations for the purposes of establishing direct, indirect and educative safety precautions.

2. Definitions

2.1. Working places

The working places are the localized areas where coalface mining operations are carried out. It includes the face working area with its coal-getting and face conveyor systems, face supports and stowed goaf, the roadhead area with all its associated machinery and, where appropriate advance heading or, in retreating working, the materials recovery areas of the roadways.

2.2. Machinery

A machine is defined as an integrated unit of power and processing machinery employed for a specific purpose, including power transmission equipment and associated safety devices. Examples are machines and apparatus for coal-getting, conveyor systems and other mechanical equipment. Machinery whose functions are complementary and which are therefore used together are termed integrated machine systems.

2.3. Coal-getting machine

The coal-getting machine is a machine unit for coal-getting which may include the stripping of dirt or stone. The coal-getting is done by cutting or ploughing tools. In stripping winning (ploughing), drives and anchorages at the ends of the face are joined to the drives and anchorages of the face conveyor. In cutting winning, the drive and cutting tools are combined in the power loader ; only the anchorages for the

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haulage device of the power loader and the conveyor drives are joined together at the ends of the face.

2.4. Breakers

The breaker is a machine unit to reduce the size of large pieces of the product. It may, for example, be mounted over the scraper conveyor in such a way that the material being conveyed is picked up and large pieces up to a certain size crushed.

2.5. Scraper conveyors

The scraper conveyor is a machine unit used for continuous conveying of bulk material by means of endless single or multiple chain assemblies, equipped with special scrapers in the form of flights. The chains run in appropriately shaped, flexibly interlinked sheet-metal pans, which guide the chains and the scrapers and convey the bulk material. The drives and return ends of scraper chain conveyors form part of the conveyor at its end points, where the conveyor chains are guided over sprockets and the drive power initiated.

2.6. Face conveyors

The face conveyor is a conveyor in the face working area used for conveying in conjunction with the winning process. In mechanised working it is generally a scraper chain conveyor which is also used for guiding the coal-getting machine and for attaching various ancillary equipment.

2.7. Stage loaders

The stage loader is located at either end of the face conveyor. Generally a scraper chain conveyor is used which is moved forward with the face. The driving units or return ends or line of pans may be linked to the face conveyor at the roadhead.

2.8. Short conveyors

Short conveyors are generally scraper chain conveyors or belt conveyors covering short distances which can be observed or checked completely and continuously from the position of the operating controls.

2.9. Danger Area

A danger area is a localised area surrounding equipment which presents inherent hazards to persons which cannot be entirely eliminated by shielding.

3. Accidents and exceptional occurrences

3.1. Principles

Accidents and dangerous occurrences are evaluated from a safety point of view using the results of official investigations. The assessment of essential causes and technical factors leads to certain safety proposals.

3.2. Causes of accidents with coal-getting machines

- 3.2.1 Inadvertent movement of machinery or their individual components as a result of fractured materials, obstructions or inadequate anchorage or defective operating controls.
- 3.2.2 Chain breakages caused by overloading as a result of excessive wear or excessive static or dynamic stress.
- 3.2.3 Oscillation or whipping of free-running chains under tension and flying pieces of coal or dirt.
- 3.2.4 Injuries caused by contact with moving parts of machinery during scheduled or unscheduled work at the collieries.
- 3.2.5 Unexpected starting up of a machine unit as a result of incorrect switching or faults in the control mechanism.
- 3.2.6 Coal-getting machine inadvertently overshooting the limits of their proper travel.
- 3.2.7 Unexpected movement of chains and ropes under tension during repair work.

- 3.2.8 Firedamp ignitions or fires caused by the frictional heating of moving parts or the formation of incendive sparks or particles or by defective electric apparatus.
- 3.3. Causes of accidents with scraper chain conveyors
- 3.3.1 Inadvertent movement of the drive units or conveyor pans as a result of fractured materials, blockages, inadequate anchorage or faults in the control mechanism ; blockages inside the conveyor system at tail ends and through coal and bulky objects being trapped between the conveyor chain assemblies and the coal-getting machine, breaker or stage loader.
- 3.3.2 Chain breakages caused by overloading as a result of excessive wear or excessive static or dynamic stress.
- 3.3.3 Unexpected starting up of a machine unit as a result of incorrect switching or faults in the control mechanism.
- 3.3.4 Unexpected movement of individual machine parts and/or chains and ropes under tension during repair work.
- 3.3.5 Injuries which occur during normal or exceptional operations near, on or above the conveyor ; those which occur through inadvertent contact with moving parts of the machinery and whilst removing bulky objects from the moving conveyor.
- 3.3.6 Firedamp ignitions caused by frictional heating of moving parts or the generation of incendive sparks or particles or by defective electric apparatus.
- 3.4. Causes of accidents involving coal breakers
- 3.4.1 Inadvertent movement of a machine unit as a result of blockages or inadequate anchorage.
- 3.4.2 Unexpected starting up of a machine unit as a result of incorrect switching or faults in the control mechanism.
- 3.4.3 Injuries caused by contact with moving parts of the coal breaker and persons or their limbs being dragged into the breaker.

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4. Safety proposals4.1. Principles

4.1.1 Manufacture

Machinery for the winning area should be manufactured in accordance with the pertinent regulations and with accepted engineering principles, the aim being to ensure that if good operating practice is observed and the equipment is maintained in a safe and reliable condition the maximum degree of protection against all hazards is afforded to workers and trouble-free operation is achieved.

4.1.2 Good operating practice

Machinery in the winning area should be so selected and operated that the standard of safety provided for during design and manufacture is maintained. All reasonable measures should be taken to prevent accidents arising from changed operating conditions, poor visibility and difficulties in communication.

4.1.3 Danger points

Danger points on machinery should be covered to protect persons from inadvertent contact. If this is technically not feasible danger points should be treated as danger areas.

4.1.4 Danger areas

Danger areas should be fenced off, marked or identified to avoid inadvertent access. Marking is generally only effective in conjunction with adequate lighting. In danger areas where persons could be endangered by the operation of the machines work on them should only be carried out after stopping and locking out the machine.

4.1.5 Machine units and supports

Good operating practice for machine units should ensure that any reduction in the efficiency of the support system is within the permissible limits.

4.1.6 Co-ordination of safety precautions

The manufacturers and users of machinery for the winning area should co-ordinate all safety measures. Design and construction of machinery should in the first place conform to direct safety principles where this is technically feasible. These should be supplemented by special indirect safety measures in order to eliminate further hazards. Safe operation must be ensured by training.

4.2. Primary safety measures

4.2.1 Design characteristics

Machinery for the winning area should be so manufactured and assembled that, provided the machinery is operated in accordance with good practice, the materials and construction will ensure an adequate degree of safety. Components which are exposed to fluctuating stresses should be sufficiently robust to withstand these conditions.

Machinery for the winning area should be so manufactured, assembled and maintained that protection is afforded against the risks of accidental contact, centrifugal forces, suction, overheating, excessive pressure, overloading, noise, radiation and dust as far as is necessary for the protection of persons in accordance with good operating practice.

Protection against overheating should not only prevent accidents caused by contact with overheated components, but also include fire and explosion prevention. Frictional overheating of moving parts and incendive sparking caused, for example, by light alloys, are to be avoided. Non-inflammable or fire-resistant hydraulic fluids should be used.

Conveyor pans and spill plates should not have protruding corners against which material might become lodged while being conveyed.

4.2.2 Drive power and haulage medium

Machinery for the winning area should be so designed that the load on the haulage chains under the maximum possible static

drive power does not exceed a predetermined value which shall depend on the breaking strength of the chain.

The use of unprotected haulage chains should be avoided as far as possible. Chain guides, particularly at the chain sprocket or return wheel should be guarded to eliminate hazards. Dangerous whipping of unprotected chains or ropes under tension towards the travelling track or other working areas is to be prevented by appropriate restrainers.

4.2.3 Safety precautions against inadvertent movement

Machinery in the winning area should be secured in such a way that it may only move within the limits of proper operating practice. Inadvertent movement should be avoided by means of anchoring equipment which should be able to withstand any shifting forces resulting from the drive or the weight of the equipment.

4.2.4 Ancillary equipment

Machines in the winning area should be fitted with equipment to facilitate operation and maintenance from the goaf side. Machine parts that are difficult to handle because of their weight or dimensions must be fitted with attachment points so that they can be transported, assembled or repaired safely. It should be possible to fit, replace, secure and tension plough and conveyor chains in a safe manner according to established procedures using ancillary equipment supplied for the purpose. Spill plates, and additional equipment in seams of greater thicknesses, should be provided on the goaf side of the conveyor in order to protect the travelling track against coal slips or spillage of conveyed material. The delivery end of the face conveyor should be designed so as to ensure the safe transfer of the coal to the stage loader ; this may involve special precautions, e.g. guide plates and spillage conveyors, against jamming of conveyor chains, spillage and the return of coal fines in the bottom race. Dust control equipment must also be installed.

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The hydraulic shifting gear for the drive units, the face conveyor pan line and stage loader should be co-ordinated to permit controlled shifting. There should be systematic provision for suitable attachment points and anchorage.

4.3. Secondary safety measures

4.3.1 Lighting

Machinery in the winning area should be used only when the general level of lighting is adequate and such that all zones of danger can be recognised. The level of illumination should be in keeping with the manpower, degree of hazard and type of operation involved.

4.3.2 Communication

Machinery in the winning area should be used only if voice communication between the persons taking part in the operation is possible at all times. Communication facilities - wherever possible two-way devices - should be installed ready for use at appropriate intervals.

4.3.3 Operation

Machines in the winning area should only be operated if control devices are available which allow safe normal operation according to instructions. The control devices should, if possible, be centralised at one point. The control panel may be a fixed installation outside the winning area, a moveable unit within the area or a portable unit. Starting switches should be located and designed in such a way that they cannot be operated inadvertently. Cut-out devices should be easily recognizable and readily accessible.

4.3.4 Pre-start warning

Machines which cannot be continuously observed from the control panel should be used only in conjunction with a pre-start warning system. Before the machine is operated or set in motion an unmistakable warning signal must automatically be emitted which can be perceived throughout the danger zone.

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4.3.5 Shut-down and locking mechanisms

Machines which cannot be continuously observed from the control panel should be used only in conjunction with readily accessible shut-down and locking mechanisms. When an emergency stop switch is operated the driving power should be immediately cut off and locked against restarting. The shut-down and locking switches should be placed at the shortest practical intervals and must be capable of operation at all times.

4.3.6 Automatic monitoring

Machines in the winning area should be fitted with monitoring and display instruments which automatically indicate whether those elements of the installation which are important from the safety point of view are in good working order and fully operational. Potentially dangerous faults should cause the machine to be switched off automatically.

4.3.7 Protection of electrical apparatus against firedamp.

If possible in gassy mines electrical apparatus, with the exception of power and lighting apparatus, should only be of the intrinsically-safe type.

4.4. Guidance on safety measures

4.4.1 Description of good operating practice

The users in liaison with the manufacturers should draw up a written code of good operating practice, taking into account the operating techniques involved, the permissible stresses, local conditions and any dependence on other working processes.

4.4.2 Description of safety measures

The users in liaison with the manufacturers should provide information on potential hazards which could arise when the machine is operated in accordance with good practice and with due regard to local conditions. They should subsequently describe the direct safety features incorporated in the design by the manufacturer and the indirect safety measures to be taken by the user. Any further safety precautions required should be laid down for guidance.

4.4.3 Operating instructions

The users in liaison with the manufacturers should draw up operating instructions which conform to good operating practice and safety requirements for assembly, entry into service, operation, maintenance, cleaning, repair and dismantling of the machinery. The details of the working methods and the inter-dependence of various concurrent or consecutive operations should be taken into account.

4.4.4 Safety standards

Users should, in accordance with good practice, safety requirements and the operating instructions, lay down the most appropriate allocation of supervisory and inspection responsibilities and the extent to which use should be made of specially trained supervisory personnel or the colliery safety department. The manufacturer should be consulted.

4.4.5 Training

Users should examine whether the proposed methods of working, operating practice, safety measures and operating instructions are covered by the training programme. If not, the appropriate training schemes, introductory or familiarization courses, refresher instruction, should be introduced. Where necessary the manufacturer should collaborate in such programmes.

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STATISTICAL TABLES
FOR THE OTHER THAN COAL EXTRACTIVE INDUSTRIES

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Federal Republic of Germany

| Mineral | Mine quarry or borehole | Number of sites where mineral is worked | Production | Tons ROM or of mineral | Persons |
|--------------------|-------------------------|---|-------------|---------------------------|---------|
| Coal | Mine | 49 | 89.598.407 | t | 199.178 |
| Lignite | Mines and quarries | 44 | 134.548.543 | t | 18.905 |
| Petroleum | Borehole | 121 | 5.524.257 | t | (|
| Natural gas | Borehole | 124 | 18.845.822 | 1000 m ³ |) 6.668 |
| Iron ore | Mine | 12 | 3.034.368 | t (with H ₂ O) | 1.541 |
| Lead | (| (| 30.733 | t Pb | (|
| Zinc |) Mine |) 2 | 111.247 | t Zn |) 1.441 |
| Copper | (| (| 1.613 | t Cu | (|
| Bauxite | Quarry | 1 | 221 | t | 1 |
| Potash | Mine | 11 | 4.309.863 | t K ₂ O | 8.946 |
| Rock Salt | Mine | 9 | 7.188.683 | t NaCl | 2.326 |
| | Brine | 7 | 4.128.708 | t NaCl | 22 |
| Slate | | 28 | 139.765 | t | 493 |
| Ind./foundary sand | Quarry | 7 | 14.502 | t | 13 |
| Sand + gravel | Quarry | 1.411 | 385.000.000 | t | 23.127 |
| | | | | | 262.661 |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Supplementary information.

| | | | | | |
|--------------------------------------|--------|-------|-------------|---|---------|
| Sulphur | Mine | 3 | 459.847 | t | 164 |
| Pyrite | Mine | - | 1.000.629 | t | 979 |
| Graphite | Mine | 1 | 14.026 | t | 220 |
| Fluospar | Mine | 13 | 64.210 | t | 214 |
| Barytes | Mine | 5 | 276.779 | t | 290 |
| Feldspar | Mine | 13 | 419.976 | t | 186 |
| Uranium | - | - | - | | 86 |
| Talc | Quarry | 9 | 8.772 | t | 26 |
| Natural stones | Quarry | 1.290 | 111.100.000 | t | 34.792 |
| Linestone (+ gypsum and chalk) | Quarry | 118 | 9.900.000 | t | 12.156 |
| | | | | | 49.113 |
| | | | Total: | | 311.774 |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

France

1977

| Mineral | Mine, quarry or borehole | Number of sites where mineral is worked | Production | Tons ROM or mineral | Persons |
|----------------------|--------------------------|---|-------------|---------------------|---------------|
| Coal | Mine | 27 | 19.740.000 | t | (57.629 |
| | Quarry | 5 | 1.554.000 | t | |
| Lignite | Mine | 1 | 1.272.000 | t | (1.633 |
| | Quarry | 1 | 1.808.000 | t | |
| Petroleum | Borehole | 22 | 1.037.000 | t | |
| Natural gas | Borehole | 5 | 11.139.000 | 1000 m ³ | ? |
| Iron ore | Mine and quarry | 68 | 36.634.000 | t | 6.841 |
| Lead | | 4 | 31.500 | t Pb | (644 |
| Zinc | | 3 | 41.800 | t Zn | |
| Bauxite | | 14 | 2.085.000 | t | 722 |
| Potash | | 3 | 1.580.000 | t K ₂ O | 4.719 |
| Rocksalt | Mine and boreholes | 21 | 5.109.000 | t | 1.010 |
| Marble | | not available | 220.000 | t | + 4.000 |
| Slate | | 19 | 147.500 | t | 2.180 |
| Ind./founda-ry sands | Quarry | not available | 6.200.000 | t | 915 |
| Sands and gravel | Quarry | " | 232.350.000 | t | 14.753 |
| | | | | Total: | 95.676 + ? |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Supplementary information

| | | | | | |
|-------------|------|----|---------|---------------------|-------|
| Uranium | Mine | 19 | 2.236 | t U | 1.328 |
| Wolfram | Mine | 1 | 653 | t W | 223 |
| Gold | Mine | 3 | 1,57 | t Au | 180 |
| Fluospar | Mine | 16 | 269.500 | t Ca F ₂ | 603 |
| Barytes | Mine | 14 | 220.000 | t | 144 |
| Talc | Mine | 1 | 267.000 | t | 554 |
| China clay | | 14 | | | |
| Mica | | 1 | | | |
| Ochre | | 4 | | | |
| Kieselguhr | | 4 | | | |
| Phosphates | | 3 | 19.300 | t | |
| Andalousite | | 1 | | | |
| | | | | | 3.032 |
| | | | | | + ? |
| | | | Total: | 98.708 + | ?? |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Italy 1977 and * 1975

| Mineral | Mine, quarry or borehole | Number of sites where mineral is worked | Production | Tons ROM or of Mineral | Persons |
|--|--------------------------|---|-------------|------------------------|-----------|
| Coal | Mine | 1 | | t | 340 |
| Lignite | Quarry | 2 | 1.871.012 | t | 663 |
| Petroleum | Borehole | 117 | 1.122.991 | t | (906) |
| Natural gas | Borehole | | 13.736.841 | 1000 m ³ | |
| Iron ore | Mine | 3 | (469.984) | t | 578 |
| | Quarry | 1 | | | |
| Bauxite | Quarry | 2 | 34.525 | t | 5 |
| Lead | () Mine | 11 | 30.933 | t Pb | () 3.049 |
| Zinc | | | 79.318 | t Zn | |
| Copper | | | 700 | t Cu | |
| Potash | Mine | 5 | 225.493 | t K ₂ O | 1.392 |
| Rocksalt | Quarry | 4 | 3.671.187 | t | 299 |
| | Mine | 7 | | | |
| Volcanic Rock -for polishing -in block form | Quarry | 1.296 | 1.954.353 | t | 6.136 |
| | | | 23.264.753 | t | |
| Sedimentary Rock - for polishing - in block form | Quarry | 3.623 | 4.528.831 | t | 20.885 |
| Slate* | Quarry | 132 | 99.840 | t | 491 |
| Ind./foundary sands * | Quarry | 115 | 4.528.831 | t | 594 |
| Sands and gravel | Quarry | 2.902 | 125.838.910 | t | 8.783 |
| | | | | Total | 44.121 |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Supplementary information

| | | | | | |
|--------------------------|----------|--------|------------|--------------------------------|-------|
| Pyrite | Mine | 3 | 863.085 | t to 38% 28% ^{1/2} | 854 |
| Manganèse | Mine | 1 | 9.314 | t | 12 |
| Sulphour | Mine | 13 | 638.068 | t to 17% ^{1/2} | 1.899 |
| Anhydrite | Quarry | 12 | 45.711 | t | 132 |
| Asbestos | Mine | 2 | 149.327 | t | 329 |
| Barytes | Mine | 14 | 136.369 | t | 440 |
| Feldspar | Mine | 9 | 213.593 | t | 103 |
| Fluorspar | Quarry | 1 | | | |
| | Mine | 9 | 186.449 | t | 1.008 |
| Graphite | Mine | 1 | 3.819 | t | 15 |
| Marl | Mine | 4 | 9.975.119 | t | 327 |
| | Quarry | 23 | | | |
| Pitch, Tar etc | Mine | 2 | 77.298 | t | 34 |
| | Quarry | 2 | | | |
| Oil bearing | Mine | 1 | 64.924 | t to 6% oil | 17 |
| Bituminous rock | Quarry | 1 | | | |
| Aluminium si- licates | Mine | 3 | 662.299 | t | 201 |
| | Quarry | 38 | | | |
| Talc/stéatite | Mine | 15 | 162.437 | t | 446 |
| Mercuric ores | Mine | 6 | 142.845 | t | 941 |
| Antimony ores | Quarry | 1 | 1.951 | t | 66 |
| Celestine | Quarry | 1 | 196 | t | 1 |
| Water vapour | Borehole | 12 | 30.078.443 | t | 188 |
| Clay * | Quarry | 132 | 37.098.136 | t | 2.889 |
| Pear | Quarry | 7 | 26.430 | t | 16 |
| | | | | | 9.918 |
| Total: | = | 54.039 | | | |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Belgium

1977

| Mineral | Mine, quarry or borehole | Number of sites where mineral is worked | Production | Tons ROM or of mineral | Persons |
|----------------------------------|--------------------------|---|------------------|------------------------|---------------|
| Coal | Mine | 10 | 7.068.041 | t | 23.519 |
| Iron ore | Quarry | 1 | 46.500 | t | 20 |
| Marble | Mine | 1 | 3.053 | m ³ | 162 |
| | Quarry | 9 | 176.381 | m ² (20mm) | |
| Slate | Mine | 4 | C* | | ? |
| | Quarry | 6 | C* | | |
| Sand and gravel | Quarry | 356 | 22.471.298 | t | 2.398 |
| | | | | | 26.099 |
| <u>Supplementary information</u> | | | | | |
| Calckstone | Quarry | 51 | 29.084.289 | t | 905 |
| Porphyrite | Quarry | 4 | 5.726.141 | t | 800 |
| Roadstone | Quarry | 30 | 1.334.626 | t | |
| Gypsum | Quarry | 95 | 2.522.148 | t | |
| Dolomite | Quarry | 12 | 2.695.883 | t | 4.184 |
| Chert | Quarry | 7 | 2.237 | t | |
| Quartz and quartzite | Quarry | 6 | 283.744 | t | |
| Carbonates | Quarry | 16 | 4.200.000 (x) | t | 3.450 |
| Clay | Quarry | 136 | 5.200.000 (x) | t | 5.630 |
| | | | | | 14.969 |
| Total: | | | | | 41.068 + ? |

(x) = estimation

(C)* = not available (confidential).

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Luxemburg

1976

| Mineral | Mine, quarry or borehole | Number of sites where mineral is worked | Production | Tons ROM or of mineral | Persons |
|----------------------------------|--------------------------|---|-------------------------|---------------------------------|------------------|
| Iron ore | Mine | 2 | 1.117.834 | t | 127fond |
| | Quarry | 4 | 960.821 | t | 532 (surf. c.o.) |
| Slate | Mine | 1 | 1.743.000 + 5.906 + 575 | pieces + m ² + t | 79 |
| Foundary sand | Quarry | | 1.500 | t | ? |
| Sand and gravel | Quarry | | 936.226 | t | ? |
| | | | | | 738 |
| <u>Supplementary information</u> | | | | | |
| Building stones | Quarry | | 7.292 | m ³ | |
| Stone for crushing | Quarry | | 776.271 | t | |
| Sized stone | Quarry | | 102 + 515 | m ³ + m ³ | ? |
| Plaster | Quarry | | 1.650 + 28.321 | t + m ² | |
| Total | | | | | 738 |
| + estimation | | | | | 400 |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Ireland 1977

| Mineral | Mine, quarry or borehole | Number of sites where mineral is worked | Production | Tons ROM or of mineral | Persons |
|-----------------------------------|--------------------------|---|------------|------------------------|---------|
| Coal | Mine | 7(1 in maintenance) | 58.938 | t (ROM) | 308 |
| | Quarry | 2 | 10.243 | t | 10 |
| Lead | Mine | 3 | 62.190 | t conc* | (|
| Zinc | | | 217.960 | t conc* |)1.587 |
| | | | | | (|
| Copper and pyrites | Mine | 1 | 18.125 | t conc* | (210 |
| | | | 47.511 | t conc* |) |
| Marble and calc-stone | Quarry | 87 | not avai. | - | 884 |
| Sand and gravel | Quarry | 377 | not avai. | - | 863 |
| | | | | | 3.862 |
| <u>Supplementary information</u> | | | | | |
| Barytes | Mine | 2 | 25.054 | t | 47 |
| | Quarry | 1 | 364.444 | t | 33 |
| Gypsum | Mine | 2 | 342.131 | t | 67 |
| Other rocks | Quarry | 122 | not avai. | - | 895 |
| | | | | | 1.042 |
| | | | | Total | 4.904 |
| * t ROM Lead and zinc = 2.104.648 | | | | | |
| Copper and pyrite = 743.019 | | | | | |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

United Kingdom

1977

| Mineral | Mine, quarry or borehole | Number of sites where mineral is worked | Production | Tons ROM or of mineral | Persons |
|-----------------------------|--------------------------|---|-------------|------------------------|---------|
| Coal | Mine | 231 | 105.400.000 | t | 252.600 |
| | Quarry | 173 | 12.900.000 | t | 7.877 |
| Petroleum | Borehole | | 37.800.000 | t | |
| Natural gas | Borehole | | 40.200.000 | 1.000 m ³ | |
| Iron ore | Mine | 2 | 123.000 | t | 220 |
| | Quarry | 11 | 4.002.000 | t | 252 |
| Lead | Mine | 29 | 270.000 | t | 520 |
| Zinc-Copper + As, Sn, Wo | Mine | 9 | 9.400 | t | 1.416 |
| Potash | Mine | 1 | 800.000 | t | 570 |
| Rocksalt | Mine | 1 | 601.000 | t | 223 |
| Slate | Mine | 7 | 18.000* | t | 237 |
| | Quarry | 45 | 280.000* | t | 576 |
| Sand and gravel | Quarry | 1.395 | 92.060.000 | t | 11.747 |
| | | | | | 276.238 |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Supplementary information

| | | | | | |
|----------------------|--------|-----|------------|---|---------|
| Limestone | Mine | 6 | 526.000 | t | 91 |
| | Quarry | 489 | 81.430.000 | t | 12.477 |
| Clay shale | Mine | 1 | 560.000 | t | 20 |
| | Quarry | 230 | 23.590.000 | t | 1.813 |
| Chalk and chert | Quarry | 26 | 15.570.000 | t | 1.112 |
| Igneous rock | Quarry | 303 | 26.050.000 | t | 5.549 |
| Sandstone | Mine | 4 | 404.000 | t | 38 |
| | Quarry | 241 | 8.490.000 | t | 1.974 |
| Clay | Mine | 31 | 247.000 | t | 462 |
| | Quarry | 157 | 5.880.000 | t | 4.095 |
| Calcspar | Mine | 3 | 15.750 | t | 41 |
| Gypsum and anhydrite | Mine | 12 | 3.300.000 | t | 692 |
| | | | | | 28.364 |
| Total: | | | | | 304.602 |

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

Netherlands

1977

| Mineral | Mine, quarry or borehole | Number of sites where mineral is worked | Production | Tons ROM or of mineral | Persons |
|---------------------|--------------------------|---|-------------|------------------------|--------------|
| Petroleum | Borehole | 1 | 1.381.587 | t | 3.780 |
| Natural gas | Borehole | 6 | 100.560.600 | 1000 m ³ | |
| Rocksalt | Borehole | 1 | 3.097.634 | t | 59 |
| Marl | Quarry | 3 | 3.075.916 | t | 99 |
| Silicious limestone | Quarry | 1 | 195.000 | t | 5 |
| Sand | Quarry | - | 25.632.000 | t | ? |
| Gravel | Quarry | - | 8.286.000 | t | ? |
| | | | | | 3.938 + ? |

Danemark

1977

| Mineral | Mine, quarry or borehole | Number of sites where mineral is worked | Production | Tons ROM or of mineral | Persons |
|-----------------|--------------------------|---|------------------------------|------------------------|---------|
| Petroleum | Borehole | 1 | 514.200 | t | ? |
| Lead Zinc | Mine | 1 | 44.000 138.000 | t conc. t conc. | 319 |
| Rocksalt | Borehole | 1 | 313.717 | t | ? |
| Sand and gravel | Quarry | 792 | 22.916.852 | m ³ | ? |
| | | | | | 319 |

European Communities — Commission

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The 15th Report of the Mines Safety and Health Commission provides an outline of its work in 1977 and of the activities of its 11 Working Parties and 11 Committees of Experts in relation to the coalmining industry and to the other mineral-extracting industries, with particular reference to the prevention of blowouts during offshore oil and gas exploration and production.

It also contains a brief summary of the Congress organized to mark the 20th anniversary of the foundation of the MSHC, with an account of its activities, the problems to be solved and those to be anticipated from the application of the technology of the future.

There follows a collection of such economic and social statistics as are at present available on the extractive industries other than coal-mining in the Community of Nine. Detailed accident statistics for coal-mines, harmonized for the Nine, are provided together with a commentary.

The annexes include not only the terms of reference of the MSHC and its Working Parties and a bibliography of studies published, but also the proposals by the MSHC to the Governments on water barriers, strata reinforcement and mechanization of winning areas.

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