COMMISSION OF THE EUROPEAN COMMUNITIES

FOURTH REPORT OF THE MINES SAFETY AND HEALTH COMMISSION

DECEMBER 1967

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FOREWORD

The Mines Safety and Health Commission is required by its terms of reference to submit each year to the Council of Ministers and the High Authority a report on its own activities and on relevant developments in the six Community countries. The present report, its fourth, being addressed not to the High Authority but to the new merged Commission of the three European Communities, it may perhaps be worth while te recall briefly how the MSHC came into being, of whom it consists, the work it has done up to now, and its principal aims and objects.

The pit disaster at Marcinelle in Belgium on 8 August 1956 made clear the desirability of instituting some form of Community co-ordination to cover the various arrangements for dealing with risks to miners' safety and health. At the instance of the High Authority, the ECSC Council of Ministers on 6 September 1956 decided to convene a Conference on Safety in Coal-mines "to put forward proposals to the Governments represented in the Special Council of Ministers and to the High Authority with the object of raising safety in the coal-mines to the highest possible level."

The Conference was attended by representatives of the Governments, the trade unions and the employers' federations of the Community countries, and by observers from Great Britain and the International Labour Organization. Its four working parties pressed ahead rapidly with their discussions and on 7 February 1957 produced their conclusions, which were embodied in a report issued the following month setting forth some 308 resolutions with respect not only to the fire hazard as underscored by the Marcinelle tragedy but also to other risks of a technical nature and to human factors proper consideration of which could contribute to better accident prevention. The Governments took extensive account of the resolutions, whose influence was readily apparent in new safety regulations subsequently promulgated.

Since the Conference was not, however, able to go in full detail into all the problems arising with regard to safety, the Governments decided, as the tripartite representation arrangement had worked so well, to set up a permanent Mines Safety Commission to carry on where the Conference had left off. On 9 July 1957, they laid down the terms of reference and rules of procedure for this body, which consists of 24 members, four for each country (two Government, one workers' and one employers' representative), together with British observers and ILO advisers. The Government representatives form a Restricted Committee which acts as a link between the Governments and the Commission, and is reponsible for preparing the Commission's proceedings.

The Commission's terms of reference were confined until the end of 1964 to safety in coalmines, but, in accordance with a High Authority proposal of 7 January 1964, were extended by a decision of the ECSC Council of Ministers on 11 March 1965 to cover health in coalmines also.

Rather than reproduce the Commission's terms of reference in full, we quote Article 1, which conveys the general outline of the whole:

> "The Commission shall follow developments with respect to safety and to the prevention of environmental health risks in coalmines, including any changes in the rules laid down by the authorities in this connection, and shall assemble all relevant particulars concerning practical advances and results in these fields.
>
> "To obtain such particulars the Commission shall apply to the Governments concerned.
>
> "It shall exploit the information available to it, and shall submit to the Governments proposals for improving standards of safety and health in coalmines" (see Official Gazette of the Communities, pp. 698-699/65).

It is thus, with this remit, a rather unusual body, very definitely in a position to exert influence on the evolution of mine safety and health regulations.

In this sphere, then, the MSHC and the High Authority departments concerned work in parallel: the dividing-line between their respective fields was drawn in 1966, with the High Authority responsible for conducting study and research with a view to long-term practical application of the findings, and the MSHC for pooling practical experience already gained and considering matters on which recommendations and directives could usefully be issued more or less forthwith. (In this context, "recommendations" and "directives" do not mean what they mean in the Treaty of Rome.) The MHSC translates the findings of High Authority-sponsored research into proposals for practical application; it can also suggest to the High Authority that the latter undertake research which it feels from its own discussions is likely to lead to improvements in safety and health standards.

The MSHC is assisted by working parties on technical aspects and on human factors, comprising experts from the Community countries and Britain. Some 280 experts in all have served in this capacity, and working-party meetings have averaged about 40 a year.

The findings of the various studies and exchanges of experience have been circulated to the Governments and other quarters concerned upon their adoption by the MHSC. So far some 163 recommendations and 95 directives, some on the technical and some on the human-factor side, have been forwarded to the Governments, which have in a great many cases acted upon them in the issuing of later regulations. The MHSC periodically ascertains what action has in fact been taken to follow up its recommendations and directives.

These reports have been published to date recording findings, follow-up action and common serious-accident statistics, the first for 1957-58, the second for 1959-60 and the third for 1961-65. The third being of exceptional length, a summary was also prepared in which the accident statistics, previously broken down in considerable detail, were recapitulated in condensed diagram form: as it is not always possible to make the data comparable as among the different countries, an endeavour was made to establish the relative incidence of the different causes of accidents and to examine the variations in the light of technical and economic trends.

This rough breakdown confirmed that the proportion of casualties caused by group accidents is comparatively small. While continuing to study the causes of group accidents, with which it has so far mainly concerned itself and with respect to which many papers have been written and preventive measures framed, it is felt that the MSHC should also devote a considerable part of its attention to those of the more individual type of accident, such as falls of ground and incidents connected with the present-day trend towards concentration, mechanization and automation.

Action has been taken to streamline the MSHC's working methods: in order to lessen the amount of work involved for the experts, who are having to cope with increasingly demanding problems in their normal duties in their own countries, some of the jobs they were previously asked to undertake are now being done by the Secretariat. In addition, members have asked that interim reports be issued to speed up the dissemination of findings, even where not yet complete or final, in the quarters concerned, and have pressed the point that the general report on the MSHC's activities should appear regularly each year.

L. LEVI SANDRI

Chairman of the Mines Safety and
Health Commission,
Vice-President of the Commission of
the European Communities.

I N T R O D U C T I O N

The Fourth Report of the Mines Safety and Health Commission sets out the activities of the Commission during 1966. It also gives underground accident statistics and summarizes developments in connection with safety regulations in the different ECSC countries during this period.

The Third Report, which covered the period 1961 to 1965, had already referred to a number of activities during the first half of 1966. These will, therefore, only be mentioned for guidance purposes.

Since statistics of underground accidents previously covered the period up to 1964 only, the present Report will give the figures for the period 1965 and 1966.

This Report follows the same pattern as that of the Third Summary Report, viz:

1. Activities of the Commission,
2. Accident Statistics,
3. Developments in connection with safety regulations.

For the sake of clarity, all recommendations, reports and directives adopted by the Commission in 1966 are presented in annex form.

The same applies to the list of members of the Commission and of the Working Parties, as also to the usual statistical tables.

SECTION I

ACTIVITIES OF THE COMMISSION

The Full Commission met three times in 1966 and the Restricted Committee four times. There were 27 meetings of working parties on technical aspects and of their various expert committees, two of working parties on human factors, and one of the panel of judges on the competition for improved mine safety appliances.

During the year a clearer dividing-line was drawn between the respective fields and powers of the High Authority departments responsible for safety questions and the Commission. The Commission is principally concerned with conducting and following up exchanges of information and experience, and with studying matters on which recommendations, directives and opinions can be drafted fairly quickly, though it does devote attention too to the research in the light of which safety measures in line with current technological advance can be worked out in due course. The High Authority on the other hand deals with study and research activities for longer-term application.

The Commission's Secretariat was enlarged in 1966 by the appointment of two new members, both qualified mining engineers, with the rank of "senior administrator".

The technical working parties and committees continued their activities, as did the competition panel. Two of the working parties on human factors drew up recommendations.

A new Working Party on Health in Coal-Mines was set up following the extension of the Commission's terms of reference to include this field, and the preparatory groundwork for its studies was carried out by the Secretariat.

The following is a brief account of the origin of the various activities, progress during 1966, such conclusions as were reached, and problems still outstanding.

I. Technical Aspects

A - Fires and Underground Combustion

1. General considerations

The Working Party on Mine Fires and Underground Combustion continued during 1966 the work mentioned in the Third Report, through its expert committees.

2. Shaft fires

It should be recalled that during its session of 19 and 20 July 1965 the Commission examined the report of the Versuchsgrubengesellschaft in Dortmund and the report of the Expert Committee on the experiment with a full-scale fire, carried out on 7 April 1964 in an abandoned pit at Dorstfeld at a depth of 800 metres.

The object of this full-scale trial was, among other things, to check the effectiveness of the water-spraying equipment which the Commission had urged should be set up at pit mouths (see pp. 24 ff. of the Second Report).

The fire was actually put out, but in special conditions which make it impossible to consider the results as capable of general application; moreover, pulsatory flow was observed in the fire zone as well as a deflagration, both of which were attributed to recycling of fumes from the fire past the site of the fire itself, so that they were ignited.

At its session referred to above, the Mines Safety Commission decided to continue the investigation of the complex and controversial problem of the extinction of shaft fires by spraying of water, by collecting all the documentary information and studies available, as well as research results - especially with small-scale models - concerning the phenomena of gas flow in the vicinity of the seat of the fire and on the danger of ignition of the fumes.

This survey should make it possible to decide whether or not it is helpful to carry out tests on small-scale models.

The committee assembled the relevant documentation in 1966, including in particular the results of investigations and experiments made in Britain by SMRE, and a German study carried out by the Feuerungstechnisches Institut of the Karlsruhe Polytechnic. At its session of 13 January 1966 the committee heard a report by engineers who had carried out spraying trials using cold water in different pits of the Belgian Centre Coalfield, at the suggestion of the Belgian Mines Administration, with the purpose of investigating the effects of the water on the stability of the ventilation flow.

Among other things, these trials showed that

- the effectiveness of spraying an upcast airshaft may be reduced by the presence of ledges which trap the water running down the shaft walls, and completely ruined when the ascensional velocity of the air exceeds 10 metres/sec;
- if a fire breaks out below a horizon which is being worked in a downcast airshaft, inversion of the ventilation may cause part of the fumes to flow towards the workings;
- the values for the aeromotor effect of the water given by the nomogram attached to the Commission's Recommendation of 8 April 1960 are 30 to 35% too high in the case of the shafts where the experiments were carried out.

It therefore now remains to study the documentation assembled, to decide whether small-scale model tests be carried out, and to revise the Recommendation of 8 April 1960 in the light of the cold-spraying trials in Belgium.

3. Fire-resistant fluids

As envisaged in the Third Report, the experts of the safety institutes continued to exchange reports on the results of their experiments, in order to reach a common basis for assessing the degree of flammability and the technical properties of iols used for power transmission.

In the course of the four meetings held during 1966, they revised certain criteria, particularly those dealing with health factors, contained in the Second Report which was approved and distributed at the end of 1964.

One health problem which was gone into with special care was the possible toxicity of the fumes from a certain highly-chlorinated oil when tried out in certain couplings, which are given off when the safety plugs melt on overloading the couplings. Experiments were carried out in German mines in the presence of members of the committee; these showed that the nuisance arising in such circumstances depends mainly on the quantity of air flowing, the frequency with which the coupling is emptied and the temperature reached at each emptying. In addition, certain protective measures for indivuals were advocated, e.g. masks, soaked handkerchiefs, gloves, etc.

The committee will continue its exchanges of information for the purpose just referred to.

4. Ventilation

The Expert Committee on ventilation met nine times to continue the study begun in 1961, following the Commission's decision of 20 December 1960, to check whether Professor Budryk's theory - applied for the last 30 years in Poland - can also be used in Community mines; this envisages stabilizing the ventilation of a mine in the event of a fire, i.e. to eliminate inversions of the ventilation current which might hinder or even completely prevent effective fire-fighting measures, and might threaten the teams carrying out these measures as well as the men in the neighbouring workings, or even in the whole mine.

Such measures are not normal in Community mines, where, moreover, the conditions of gassiness are not the same as in Poland. This is largely why so many meetings and so much individual investigation by the experts were necessary, though it is true that the study necessarily also covered the instability conditions of ventilation currents in general, inter alia in diagonal roadways - a problem of importance today owing to the concentration of workings now so frequently practised.

A written report and practical conclusions were prepared and will be passed during 1967 to the Working Parties on Mine Fires and Underground Combustion and on Rescue Arrangements for submission to the Commission. In the committee's view the following problems remain outstanding:

- the assessment of the aeromotor force caused by a fire in a descensional ventilation system;
- the degree of instability of ventilation in diagonal roadways;
- a process to ensure that the atmosphere in a working on fire which it is desired to shut off by stoppings is rendered incapable of exploding.

B - Rescue Arrangements

The Working Party on Rescue Arrangements met three times; two of these meetings were held respectively at the Essen-Kray Rescue Station and at the Central Rescue Station at Mansfield, Great Britain.

Reports on the work finished in 1965 were approved by the Mines Safety Commission on 14 and 15 February 1966 and were annexed to the Third Report.

These were

1) a report on the communication links between the rescue base and the rescue team (Annex IV to the Third Report, page 347);
2) instructions for the construction of plaster stoppings (Essen-Kray Central Rescue Station: Annex Xa to the Third Report);
3) the final report on the devising of simple criteria for the selection of rescue personnel for heavy work in high temperatures (Rescue Station of the Charbonnages du Couchant de Mons: Annex IXa to the Third Report).

The following investigations, already announced in the Third Report, are still under way:

1) a research project subsidized by the High Authority for the purpose of improving the physiological conditions of breathing appartus. This project, which should have been finished on 30 June 1966, has had to be extended until 1 January 1968. one of the research workers having pointed out the value of studying the effect of hyperthermy on the behaviour of the wearers of breathing apparatus;
2) a study of the requirements which must be met by CO-filter self-rescuers;
3) investigation of overheating occurring in self-rescuers in high concentrations of CO.

During the meeting held on 7 and 8 July 1966 at Essen-Kray Central Research Station, the members of the Working Party were able to discuss with the staff of the rescue station certain problems and new devices, particularly:

- the organization of rescue work in the Ruhr;
- the tasks of the Central Rescue Station;
- new items of equipment, particularly lightweight closed-circuit breathing apparatus using oxygen, and new CO-recording devices;
- revival techniques, including cardiac massage, practised in a number of countries by first-aid workers; a new technique for rescuing trapped miners by means of large boreholes.

The Working Party emphasized the advisability of preparing for each country a catalogue of drilling equipment available, so that all countries can have certain equipment at their disposal in the event of an emergency. The Central Rescue Station at Essen has said that all its equipment is available for use by any of the other rescue centres in the Community.

The visit on 6 and 7 October 1966 to Mansfield, included:

- a demonstration of the construction of plaster stoppings, which are increasingly used as being sturdy, quick to install, and reliable;
- a demonstration of a mobile television studio to be used during rescue operations or the training of rescue workers, as well as mobile emergency winding equipment to be used in the case of failure of the normal winding engine;
- contacts with a large number of representatives of the coalmining industry and of manufacturers of rescue equipment.

C - Winding Ropes and Shaft Guides

No meetings were held during 1966, as the Commission had envisaged at its meeting of 20 July 1965; it was decided to wait until the safety institutes of the Community and of foreign countries who had received the report on electromagnetic testing of winding ropes (see Third Report) had an opportunity to reply.

Only one reply had been received by the Secretariat: this was from the Mines Institute in Katowice, Poland, and confirms the usefulness of the method for checking locked-coil cables and the value of this method as a complement to the normal checks on other types of cable, without however replacing these inspection methods.

D - Electrification

In five sessions, the Working Party dealt primarly with the following problems:

- the design of flexible cables for movable equipment;
- the study of the deleterious effects of salt pastes.

1) The first problem concerns the supplementary provisions to the Recommendations on protection of underground electrical networks against electric shock, fire and firedamp-explosion risks, approved by the Commission on 8 April 1960 with respect to electric shock and on 27 and 28 April 1964 with respect to fire and firedamp explosions.

   Of these, the problem of the design of flexible cables supplying machines which have to be frequently moved while still under voltage - both in the face and in roadways - was dealt with because of the special danger inherent in these movements.

   The design of the cables was discussed in conjunction with the detection devices and cut-out devices which are used to protect the installations.

   A table was accordingly prepared for each of the Community countries - with the exception of the Netherlands, which uses a neutral conductor weakly

insulated to earth - showing the present situation with regard to flexible cables supplying movable equipment, using low or medium voltage (up to 1100 V), as well as the protective systems used with this equipment.

Two concepts had to be clarified and defined:

- agreement was reached on a common definition of the terms "movable", "portable", "mobile", "semi-mobile" and "semi-fixed", as applied to equipment;
- the concept of a neutral conductor insulated to a greater or lesser extent.

2) The second question concerns salt pastes.

In its session of 14 and 15 February 1966, the Commission instructed the Working Party to study the deleterious effects on electrical equipment used underground of moisture in salt pastes, and of salt paste and dust processes used in dust suppression.

The Working Party made an exploratory visit on 12 October 1966 to the Tremonia experimental gallery, where trials part-financed by the High Authority had been going on for some months, and to the Minister-Stein pit to see a routine salt-paste spreading operation in a gate road.

E - Combustible Dusts

An account of how this Working Party came to be set up (following the Luisenthal disaster) and of the preparatory work carried out by the Secretariat was given in the Third Report.

The Working Party was directed to study the problems associated with combustible dust.

The work proper began in February 1966, and was concentrated on dust barriers, as being of more immediate practical importance.

Two groups of rapporteurs were nominated, one instructed to study accidents caused by dust explosions, and the other to prepare a synthesis of the information available in this field from experiments carried out at the safety institutes and draw up on this basis a restricted programme of research onto the more important points.

The first group of rapporteurs examined reports on dust explosions which had occurred in Germany, in France and in the United Kingdom since 1950 and prepared an aide-mémoire of points to be noted in future in investigations of such accidents, in order to learn as much as possible about dust barriers. The second group tabled a report bringing up to date the knowledge obtained on the basis of experiments now in hand or planned; the group still has to prepare the joint programme of priority trials and to establish a standardized presentation for setting forth details of both past and future tests.

Four meetings were held in 1966, one plenary and three restricted.

F - Health

At the ECSC Council meeting of 11 March 1965, the Ministers amended the terms of reference of the Mines Safety Commission to include prevention of environmental risks to the health of workers in coal-mines.

At its session of 6 May 1966, the Commission proposed that each delegation should send to the Secretariat suggestions contributing to the preparation by the High Authority's departments of a programme for the Commission's activities in respect of industrial health in coal-mines.

The Restricted Committee examined three suggestions on 12 and 13 December 1966, and set up a Working Party comprising Government, employers' and workers' representatives, with terms of reference (1) briefly as follows:

> "to study, from the standpoint of technical prevention and industrial medicine, the prevention of environmental risks to the health of workers in coal-mines."

In order to reach the stage of practical application as soon as possible, the Restricted Committee instructed the Working Party to examine in the first instance the following points associated with technical measures against dust:

1) means of direct dust control, and general measures to reduce dustiness in underground workings, recognized as being to some extent effective (wet drilling, water infusion, spraying, special attachments to winning machines, pulsed-infusion shotfiring, etc.);
2) general rules covering the prevention of dust in respect of the design and use of winning machines;
3) organization of specialized dust-control services;
4) dust measurement (method, frequency, measuring points, conclusions to be drawn), and
5) establishment of dustiness thresholds, definition of categories of permissible dustiness, steps to be taken when faced with various categories of dustiness.

In order to be able to submit Recommendations to the Mines Safety Commission as quickly as possible, it was decided to tackle points 1 and 3 first.

After going into these different technical points, the Working Party will take up the medical problems closely associated with them.

G - High Authority Competition for Improved Mine Safety Devices

As was noted in the Third Report, the competition for improved mine safety devices organized by the High Authority in 1957 in accordance with the desire of the Mine Safety Conference, produced no sufficiently meritorious entries in the class of portable oxygen-deficiency detectors. In 1962 the closing date was deferred and a price offered of 70,000 units of account; though relaxed in some aspects in order to encourage the designers, the requirements were kept very strict with regard to accuracy, response time, robustness and small overall dimensions.

19 devices were finally submitted for the Panel's opinion on 8 October 1964; 7 were of the flame type and 12 flameless.

The principles on which these devices were based were not new, but considerable difficulties had to be overcome to apply them in such a small-sized device as was specified by the rules of the competition.

The devices in question were carefully checked in the laboratories of the different mining research stations of the Community.

These laboratory tests, which were prepared and supervised by groups of rapporteurs nominated by the Panel, were carried out in stages which corresponded to the difficulty of the checking required and the amount of checking apparatus required for the purpose; they called for a total of some 15,000 measurements.

During these trials numerous entries were rejected by the Panel, so that by September 1965 only two variants of a flame-type apparatus and four flameless (two variants of the same prototype) remained in the running.

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(1) Terms of reference ratified by the Mines Safety Commission on 24 and 25 April, 1967.

It was then necessary to subject these to six-month carrying tests underground at selected mines, in order to test, in particular, their endurance and robustness. However, the certification conditions regarding flameproof properties and intrinsic safety having not yet been standardized throughout the Community, the devices had to be submitted to certain tests in the safety stations before being given Inspectorate approval and thus being cleared for use underground. The underground tests of the six devices began only at the end of 1966.

H - Study of Accidents

The Commission is kept informed of all accidents the study of which is considered to be instructive.

1) In 1966 three accidents were reported to the Commission:

- accident at Silverwood Colliery, Great Britain, 3.2.1966, collision between trains, 10 killed;
- accident at Rossenray Pit, Ruhr, 15.2.1966, firedamp explosion, 16 killed;
- accident at Unser Fritz, Ruhr, 30.6.1966, dust explosion, 7 killed.

These were thus of the kind termed in the statistics "group accidents", i.e. resulting in the death or injury of more than five persons.

They have so far received only a preliminary examination by the Restricted Committee.

Although final conclusions can therefore not yet be reached, the main circumstances can be summarized as follows:

a) Accident at Silverwood

A train carrying materials was following a man-riding train on a track dipping on average 20 mm/metre, and in places 40 mm/metre. The driver lost control and jumped out, so that it ran into the train ahead carrying the men and killed ten workers.

b) Accident at Rossenray

An explosion of pure firedamp occurred in a strike road in a working lying near abandoned old workings, sealed off by glass-wool stoppings.

This methane explosion was very probably ignited by a short-circuit spark from a junction box which had been opened under voltage by an electrician working there.

Highly-concentrated methane having seeped through the stoppings (which were not gastight) was able to enter the damaged roadway which was, moreover, strongly ventilated. The ventilation conditions in the district were found to be unstable.

The accident caused 16 fatalities.

c) Accident at Unser Fritz

This was a dust explosion of weak to medium intensity, which occurred in an intake near a loading point, during shotfiring being carried out to enlarge the roadway cross-section.

An HT electric cable, freely suspended and protected by halftubes joined together, was so badly damaged by a shot that a short-circuit occurred, igniting the coal dust.

Seven miners were killed and 30 were injured.

2) During 1966, the Commission continued or completed the investigation of the following accidents which had occurred during the preceding years (see Third Report):

- explosion of methane and dust at Luisenthal Colliery, Saar, 7.2.1962 - 299 dead;
- fall of ground at Pit No. 13 of the Lens Group, France, 21.6.1962 - 6 dead;
- methane explosion at No. 7 colliery, Liévin, France, 2.2.1965 - 21 dead;
- methane explosion at Cambrian Colliery, Great Britain, 17.5.1965 - 31 dead;
- methane explosion at Mont-Cenis Colliery, Harne-Solingen, 22.7.1965 - 9 dead;
- methane explosion at La Tronquié Colliery, France, 24.11.1965 - 12 dead.

Findings on the first two accidents (Luisenthal and Lens) have already appeared in the Third Report.

The study of the other accidents had not yet been completed at the end of 1966.

I - Human Factors

In this field, two Working Parties each met once to finalize a Report and Recommendations, before submitting them to the Mines Safety Commission.

1. Psychological and Sociological Factors affecting Safety

The Report and Recommendations prepared by this Working Party were examined by the Restricted Committee on 24 January 1966, and adopted by the Commission on 15 February 1966.

This document has already appeared in the Third Report (pp. 56-62).

2. Effects of Methods of Payment on Safety

The Report and final Recommendations of this Working Party were examined by the Restricted Committee on 25 April 1966 and adopted by the Commission at its meeting of 5 and 6 May 1966.

The substance of these will be found in the Third Report (pp. 61-63); the full text is annexed to the present Report.

SECTION II

STATISTICS

Detailed tables of the serious and fatal accidents recorded in the Community in 1965 and 1966 will be found in the Annex. As in previous Reports, the figures are given by causes of accidents for the different countries and coalfields and for the Community overall.

Tables A and B following this Section show respectively, in condensed form, the figures for serious and for fatal accidents in the years from 1958 to 1966, and Table C for group accidents, i.e. those involving more than five serious or fatal casualties. (It is recalled that the Commission in November 1966 set up a working party to examine how far these statistics were comparable and what could be done to make them more so.) In addition, as in the Summary Report, the same data are plotted in Graphs 1-6, thus bringing out the variations over the years, though no actual statistical trend is discernible: as was pointed out in the Summary Report, it is not really possible to establish a statistical trend in view of the comparative shortness of the period covered (nine years). This being so, the remarks which follow are offered with certain reservations.

Between 1964 and 1966, in contrast to the movement in 1958-64 recorded in the Summary Report, the number of fatalities per million man-hours showed a rise (see Graph 1) and the number of serious injuries per million man-hours a drop (see Graph 2). (Actually, the fatality rate seems to have been running about level since 1961, the annual figures showing no more than the single standard deviation from the arithmetical mean, except in the case of 1965, when the figure was markedly lower, and 1965, when it was anyhow within the double standard deviation.)

From 1964 to 1965 the fatality rate went up from 0.493 to 0.522 per million man-hours, an increase of 6.7%. The actual number of fatalities was almost exactly the same, 411 and 410 respectively, but the number of man-hours was down from 841m. to 784m., i.e. 6.7%. The increase, a relatively minor one, can be explained by the three group accidents in 1965 (all firedamp explosions), which caused the loss of 41 lives in all, (1) one-tenth of the total fatalities for the year. This is a fairly high figure, not far off the mean of 12% for 1961-64 (see Summary Report), which was inflated by the 299 deaths in the single disaster at Luisenthal.

From 1965 to 1966 the fatality rate rose by a further 2.7%, since although deaths numbered only 374 as against 410 there was a still steeper drop in the number of man-hours worked; this is not, however, a significant change statistically. In 1966 as in previous years, 90% of the fatalities were due to the first five causes in the list, viz. falls of ground (I) 39%, transport of materials and personnel (II and III) 41%, and handling of equipment and falling objects (IV and V) 10%; 5% were the result of firedamp and coal-dust explosions leading to group accidents, and 5% of miscellaneous causes.

The serious-injury rate, which had risen appreciably in the preceding period, went down slightly in the two years here covered, by 2.6% from 1964 to 1965 and approx. 2% from 1965 to 1966; the latter figures, however, show only the simple standard deviation from the arithmetical mean, and those for the other years scarcely move outside this range. In 1966 as in the earlier years surveyed in the Summary Report, 1961-64, the same five causes were responsible for the great bulk (97%) of the serious accidents recorded, with the incidence about equally divided among cause I (33.8%), causes II and III (31.6%) and causes IV and V (31.5%). Falls of ground (I), though still the largest single factor, showed a further decrease in the

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(1) 14 deaths were caused by group accidents in 1964.

number of serious injuries produced per million man-hours 7% for the last two years; for transport (II and III) the rate also went down slightly, by 3.2% for the same period, while that for the handling of equipment and for falling objects (IV and V), which in the previous period had risen quite noticeably, dropped again a trifle in 1965 and 1966, by an average 2.5% for the two years.

As regards the influence of economic and technical developments on safety, it may be worth referring, purely for guidance, to the points noted in the Summary Report. As can be seen from the following table (diagrammatized in Graphs 5 and 6), Community production decreased in 1965 and 1966 from 228m. to 204m. tons (-10.5%), and man-hours worked from 841m. to 698m. (-17%), while output per manshift increased from 2,269 to 2,540 kg. (+11.9%). Against this background, the number of fatalities, as we have seen, fell from 411 to 374 (-9%), but the fatality rate per million tons extracted rose from 1.80 in 1964 to 1.88 in 1965 (+4.4%), owing to the relatively large number of group accidents in that year; it went down again, however, to 1.83 in 1966, representing an increase of 1.7% over 1964. The serious-injury rate per million tons, on the other hand, went down further from the level recorded at the end of the preceding period, 51.4 (1964), to stand in 1966 at 45.3 (-11.8%); this is a bigger drop than in the rate per million man-hours.

However, these figures are, we repeat, offered for guidance only, since until the new Working Party on Accident Statistics has gone into the question of comparability the rates must continue to be calculated per million hours of exposure to risk.

RECAPITULATION: COMMUNITY OVERALL

	Extraction (m. tons)	Underground o.m.s. (kg.)	In m. man-hours	Fatalities	Serious injuries (disablement for 8 weeks or over)	Fatalities per m. tons	Serious injuries per m. tons	Fatalities in m. man-hours	Serious injuries in m. man-hours
1958	246	1,555	1,260	770	17,074	3.12	69.4	0.610	13.551
1959	234	1,703	1,122	622	14,539	2.82	62.1	0.590	12.950
1960	234	1,872	1,037	526	13,459	2.24	57.5	0.507	12.986
1961	230	2,007	962	527	12,720	2.29	55.3	0.548	13.227
1962	227	2,124	901	840 (1) 541 (2)	12,418	3.70 (1) 2.37 (2)	54.7	0.932	13.781
1963	223	2,219	849	465	11,686	2.04	52.3	0.547	13.761
1964	228	2,269	841	411	11,726	1.80	51.4	0.493	13.860
1965	218	2,397	784	410	10,595	1.88	48.6	0.522	13.506
1966	204	2,540 (3)	698	374	9,247	1.83	45.3	0.536	13.242
1967									

(1) Incl. Luisenthal explosion.

(2) Excl. Luisenthal explosion.

(3) Provisional figure.

GRAPHS
OF FATAL AND SERIOUS CASUALTIES
IN COMMUNITY COALMINES

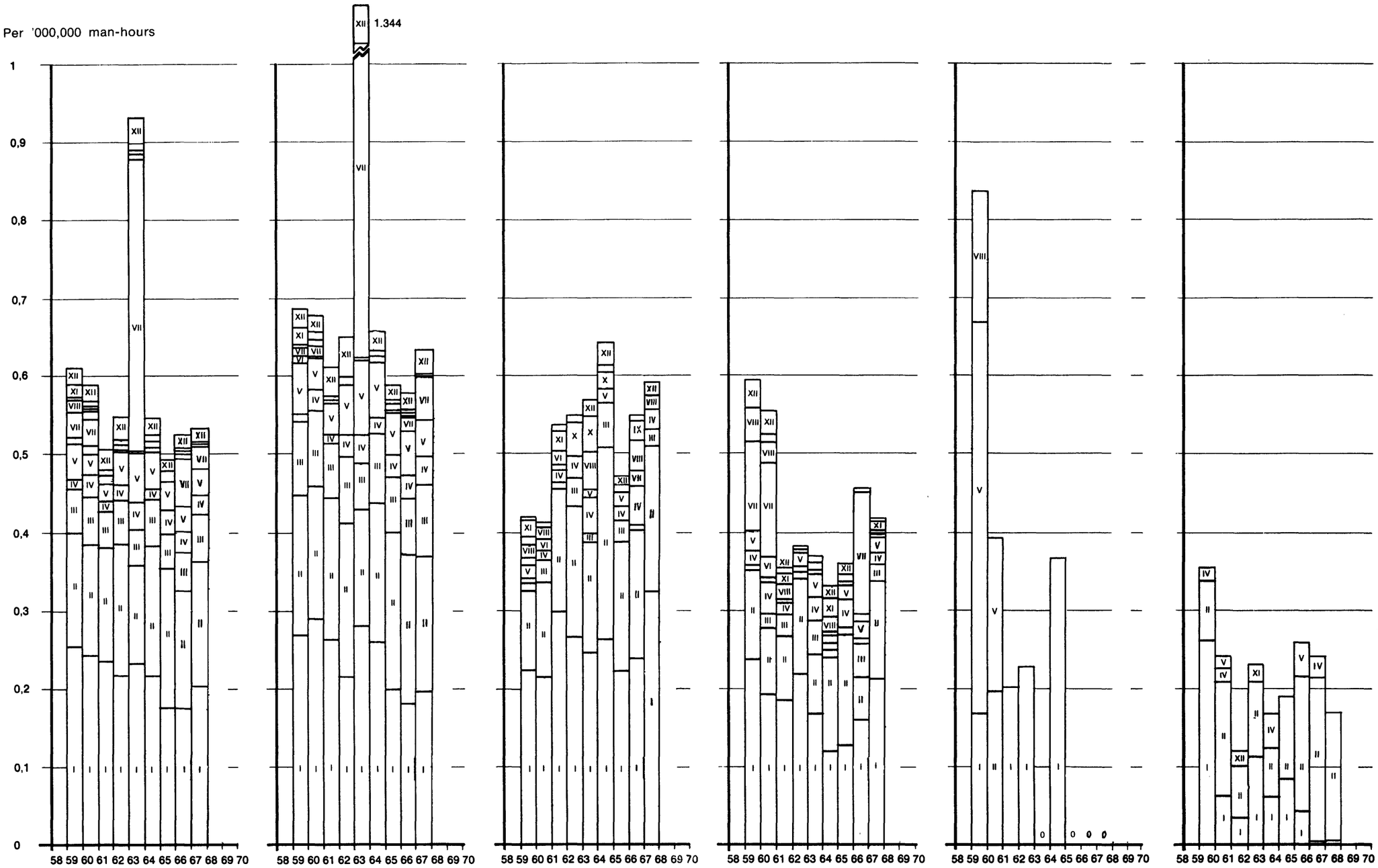
KEY

to Roman figures in Graphs

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

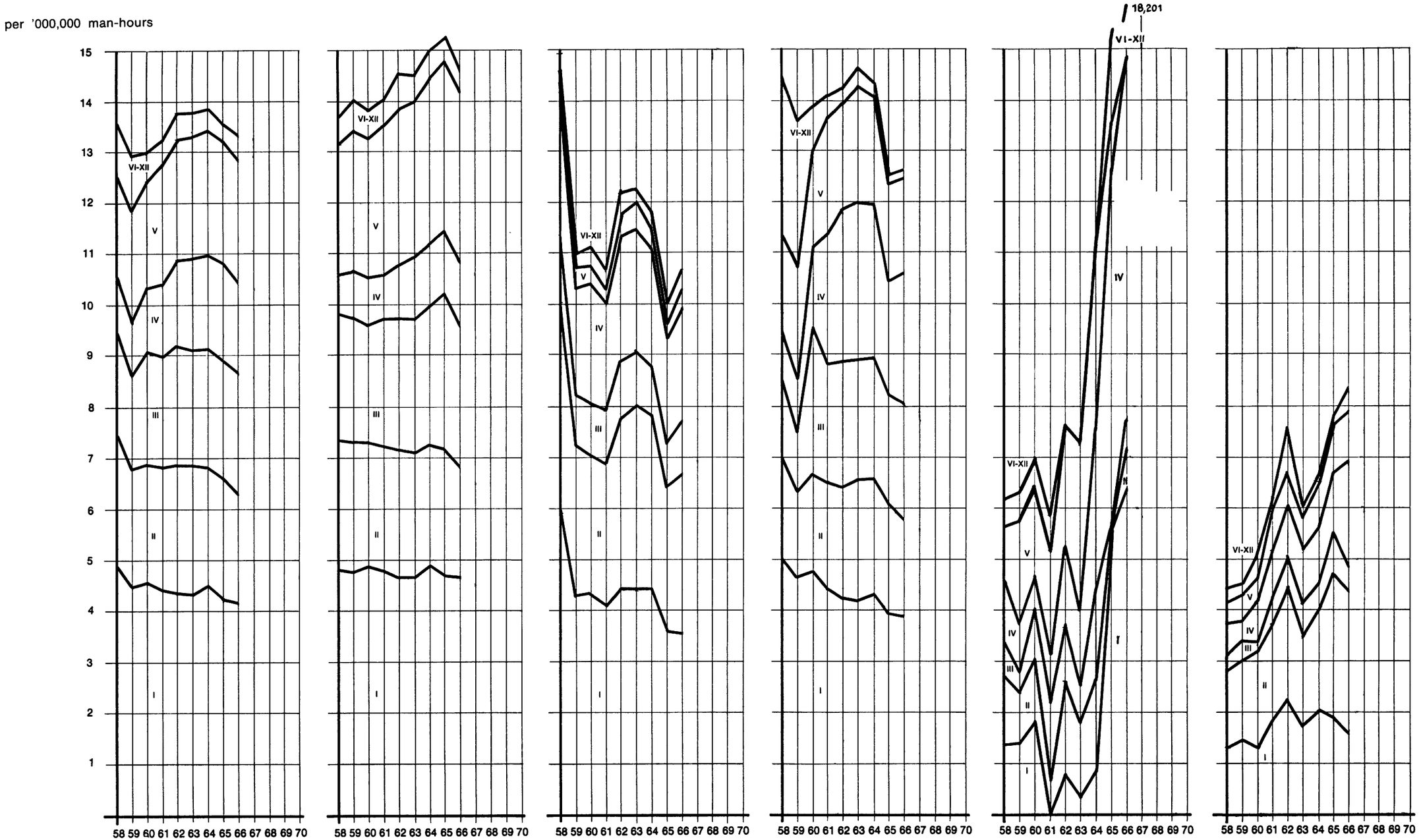
FATALITIES BELOW GROUND IN E.C.S.C. COUNTRIES, BY CAUSES OF ACCIDENT

CASUALTIES DIED WITHIN EIGHT WEEKS



CASES OF SERIOUS INJURY BELOW GROUND IN E.C.S.C. COUNTRIES, BY CAUSES OF ACCIDENT

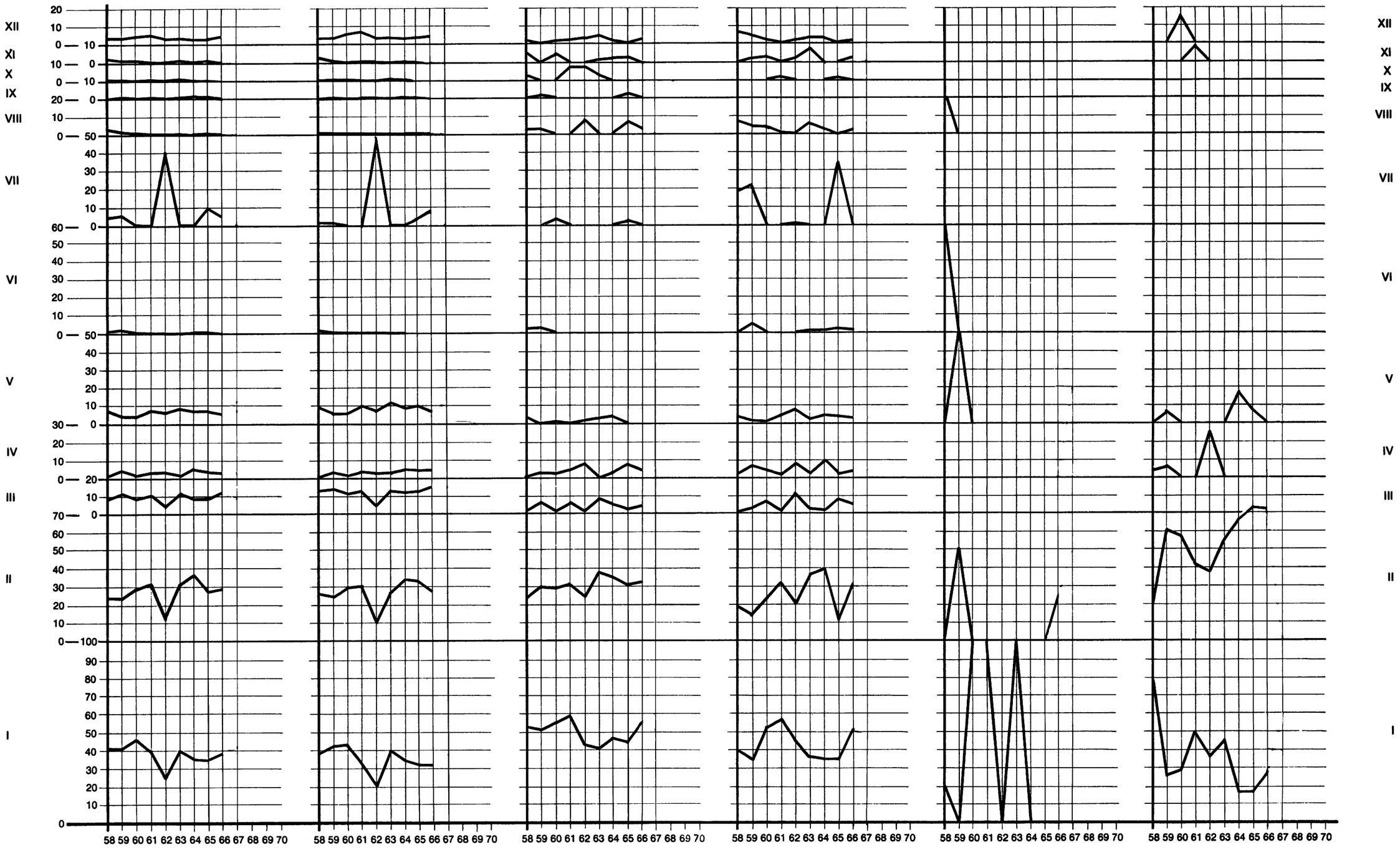
CASUALTIES WERE UNABLE TO RESUME WORK BELOW GROUND FOR AT LEAST EIGHT WEEKS



FATALITIES BELOW GROUND IN E.C.S.C. COUNTRIES, BY CAUSES OF ACCIDENT

CASUALTIES DIED WITHIN EIGHT WEEKS

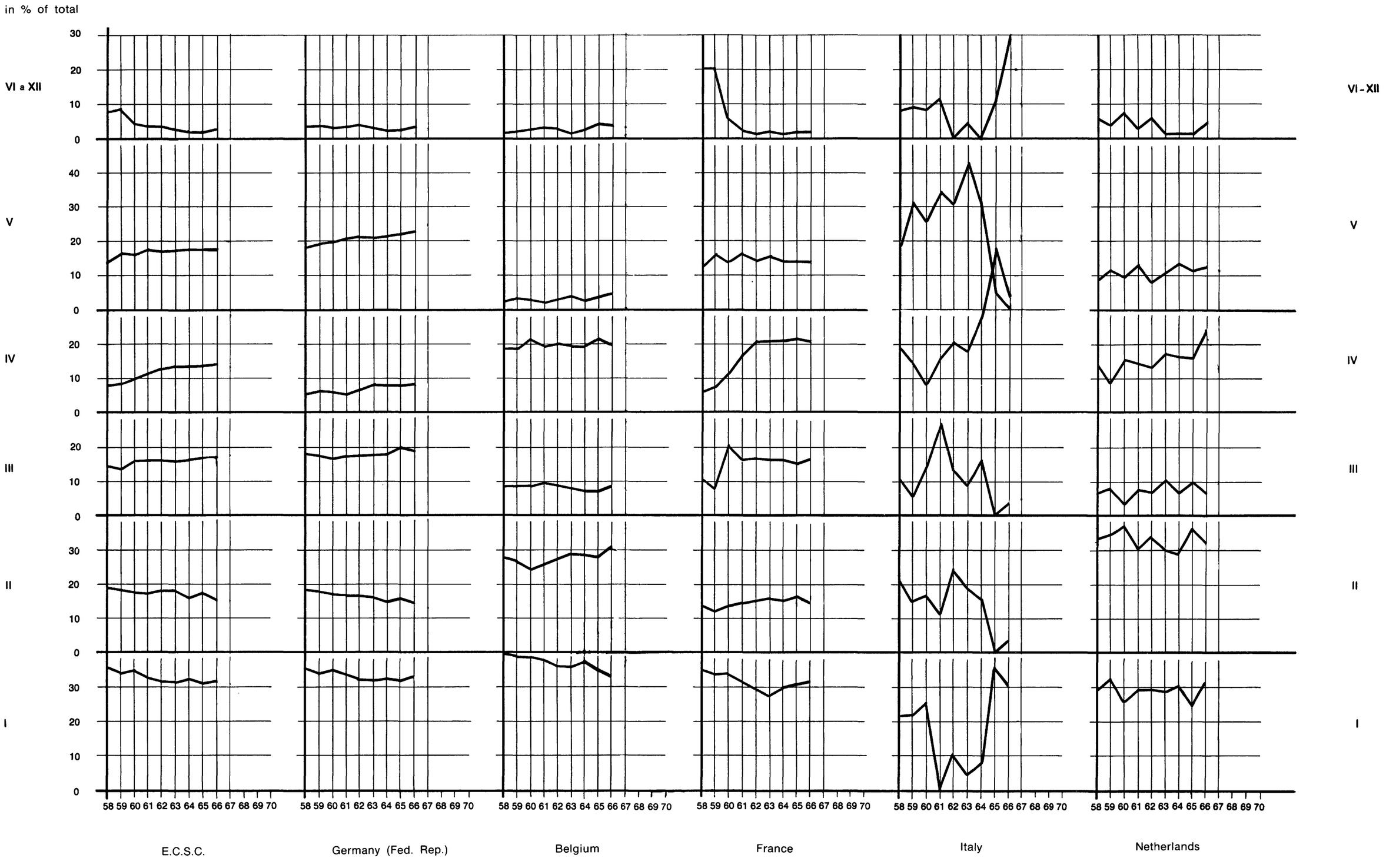
in % of total



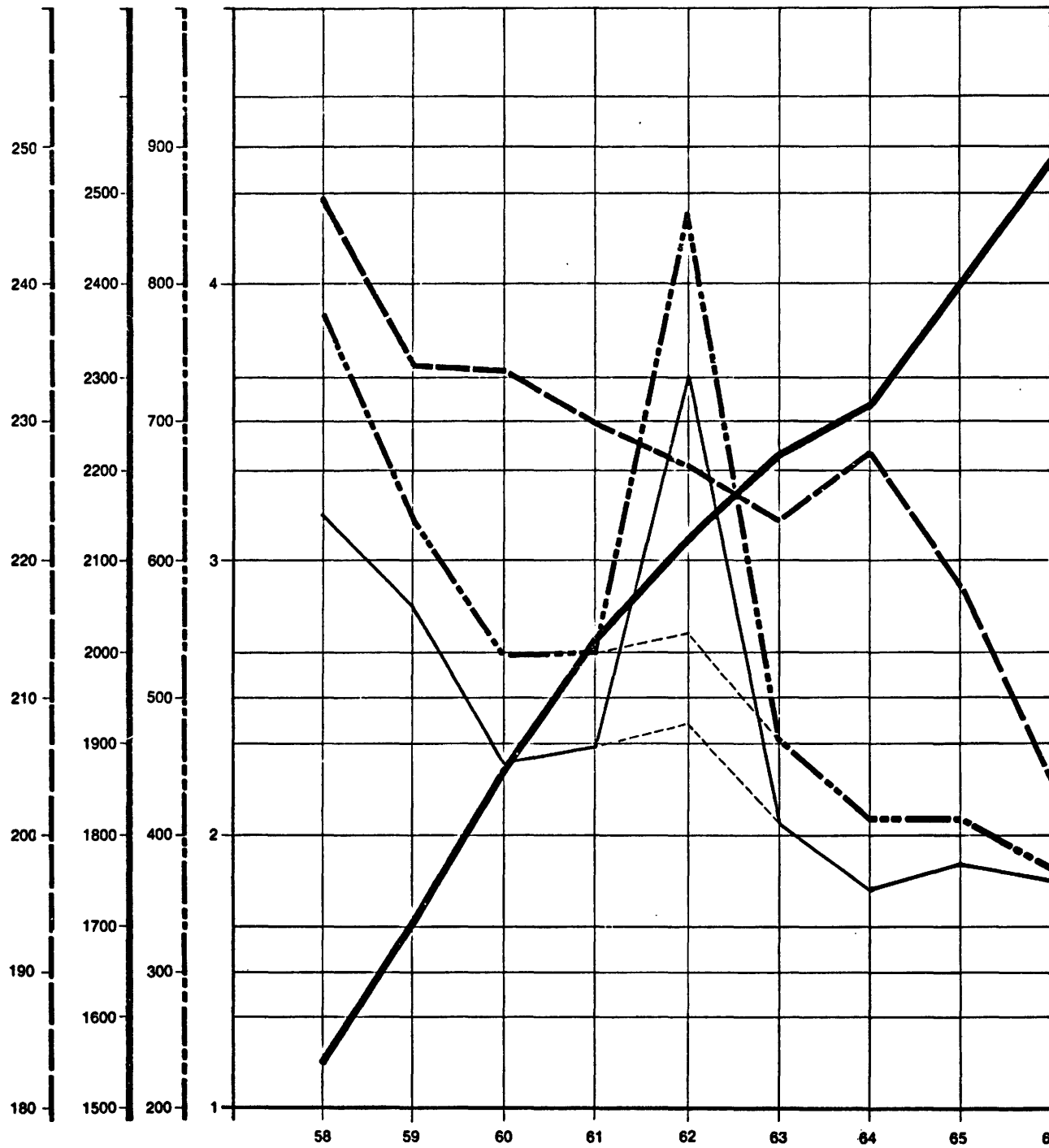
E.C.S.C. | Germany (Fed. Rep.) | Belgium | France | Italy | Netherlands

CASES OF SERIOUS INJURY BELOW GROUND IN E.C.S.C. COUNTRIES, BY CAUSES OF ACCIDENT

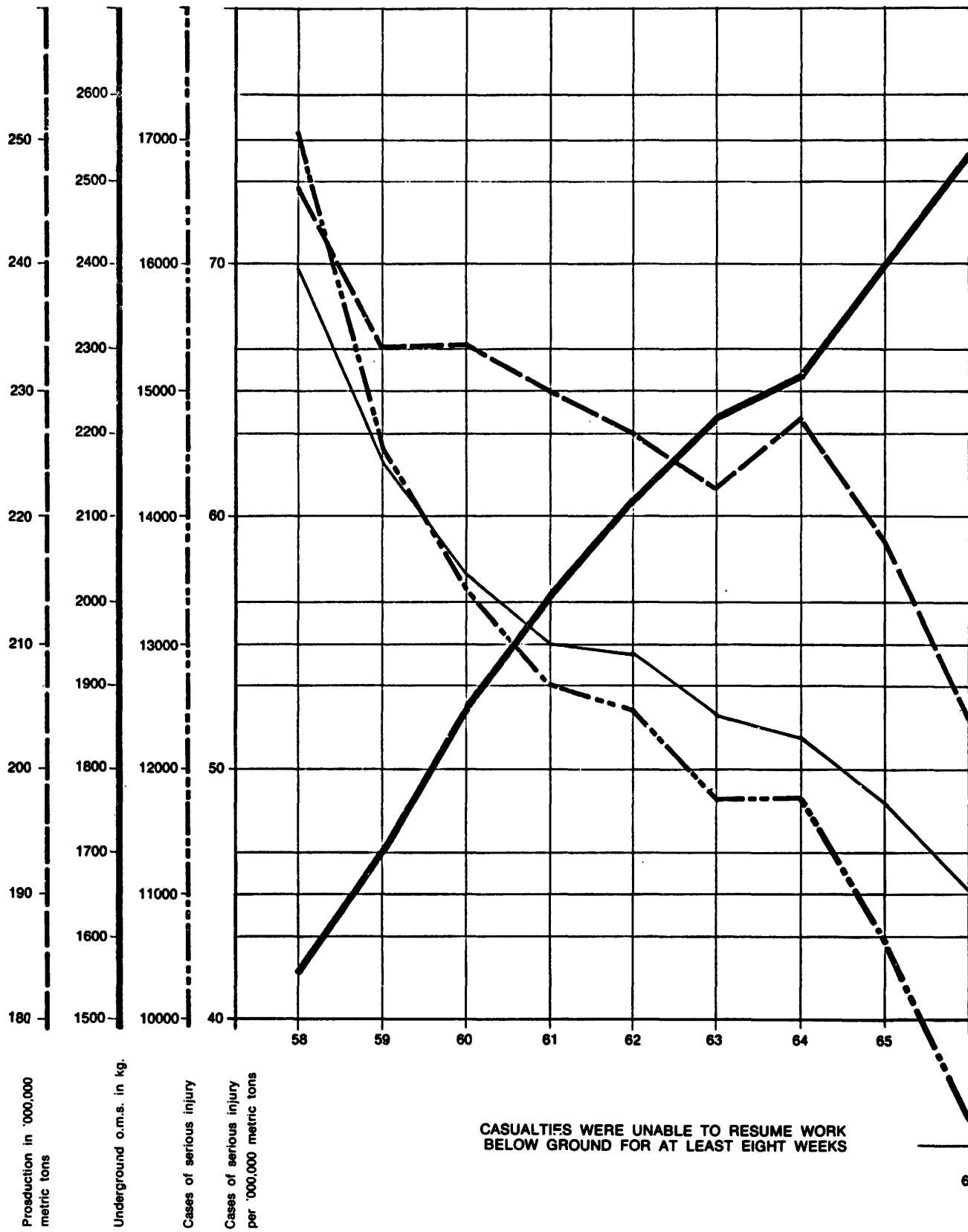
CASUALTIES WERE UNABLE TO RESUME WORK BELOW GROUND FOR AT LEAST EIGHT WEEKS



FATALITIES PER '000,000 METRIC TONS PRODUCED IN E.C.S.C. COUNTRIES



CASES OF SERIOUS INJURY PER '000,000 METRIC TONS PRODUCES IN E.C.S.C. COUNTRIES



A. Comparative Table of

numbers of persons incapacitated by underground accidents

for eight weeks or longer

years 1958-66

per '000,000 man-hours

CAUSE (1958-1962)	Germany (North Rhine/Westphalia and Saar)					Belgium					France) (excl. Provence)					Italy					Netherlands					Community				
	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962
1) Falls of ground	4.843	4.779	4.886	4.797	4.682	5.911	4.294	4.324	4.071	4.439	5.027	4.665	4.774	4.416	4.222	1.355	1.378	1.808	-	0.792	1.326	1.464	1.305	1.829	2.238	4.846	4.490	4.571	4.434	4.387
2) Haulage and transport	2.550	2.569	2.445	2.458	2.501	4.132	2.979	2.709	2.770	3.331	1.980	1.695	1.920	2.106	2.196	1.335	0.984	1.205	0.676	1.847	1.511	1.562	1.898	1.924	2.590	2.602	2.347	2.310	2.371	2.521
3) Movement of personnel	2.497	2.463	2.348	2.512	2.608	1.354	0.998	1.008	1.062	1.136	1.505	1.118	2.873	2.334	2.458	0.668	0.394	1.005	1.578	1.056	0.324	0.386	0.187	0.514	0.580	2.003	1.823	2.185	2.185	2.282
4) Machinery, handling of tools and supports	0.767	0.914	0.920	0.867	1.046	2.804	2.085	2.386	2.097	2.461	0.914	1.022	1.621	2.523	2.991	1.169	0.984	0.603	0.902	1.584	0.617	0.402	0.780	0.915	1.015	1.098	1.064	1.264	1.423	1.712
5) Falling objects	2.537	2.719	2.738	2.945	3.077	0.414	0.371	0.354	0.301	0.445	1.890	2.187	1.893	2.292	2.073	1.169	1.968	1.808	2.029	2.375	0.401	0.515	0.492	0.819	0.642	1.962	2.161	2.105	2.353	2.375
6) Explosives	0.015	0.011	0.010	0.009	0.008	0.027	0.007	0.032	0.018	-	0.043	0.051	0.031	0.017	0.051	0.167	-	-	0.225	-	-	-	-	-	-	0.023	0.020	0.017	0.012	0.018
7) Explosions of firedamp or coal dust	0.011	0.016	-	0.002	0.123	-	-	-	-	-	0.047	0.088	-	-	0.004	-	-	-	-	-	-	-	-	-	-	0.017	0.030	0.010	0.001	0.071
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	0.011	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	-	-	-
9) Underground combustion and fires	-	-	0.003	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	0.001	-
10) Inrushes of water	0.004	-	-	-	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	-	-	0.001
11) Electricity	0.010	0.014	0.012	0.014	0.006	0.011	-	0.016	0.018	0.010	0.014	-	0.004	0.029	0.004	-	-	-	-	-	-	-	-	-	0.021	0.010	0.008	0.010	0.018	0.007
12) Other causes	0.487	0.522	0.457	0.503	0.488	0.260	0.255	0.260	0.301	0.331	2.956	2.768	0.793	0.362	0.240	0.334	0.591	0.603	0.451	-	0.262	0.161	0.390	0.210	0.497	0.985	1.012	0.513	0.428	0.404
TOTAL	13.721	14.007	13.819	14.109	14.539	14.924	10.989	11.089	10.638	12.161	14.380	13.594	13.909	14.079	14.239	6.197	6.299	7.032	5.861	7.654	4.441	4.490	5.051	6.212	7.583	13.551	12.954	12.986	13.227	13.781
(1963-1967)	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967
1) Falls of ground	4.663	4.894	4.732	4.721		4.432	4.417	3.574	3.568		4.177	4.308	3.941	3.927		0.366	0.893	5.572	6.360		1.742	2.017	1.923	1.688		4.337	4.509	4.215	4.186	
2) Haulage and transport	2.433	2.385	2.411	2.067		3.565	3.419	2.866	3.269		2.364	2.278	2.153	1.858		1.465	1.787	-	0.707		1.826	1.952	2.808	2.621		2.520	2.346	2.416	2.173	
3) Movement of personnel	2.646	2.744	3.032	2.852		1.066	0.961	0.771	0.936		2.368	2.383	2.087	2.239		0.732	1.787	-	0.707		0.630	0.472	0.774	0.605		2.261	2.326	2.364	2.320	
4) Machinery, handling of tools and supports	1.213	1.242	1.234	1.244		2.414	2.310	2.126	2.146		3.096	3.042	2.272	2.639		1.465	3.127	7.164	7.067		1.050	1.094	1.282	2.066		1.818	1.848	1.773	1.815	
5) Falling objects	3.038	3.242	3.344	3.272		0.547	0.397	0.292	0.349		2.278	2.074	1.839	1.785		3.296	3.574	0.796	-		0.630	0.923	0.862	0.958		2.406	2.442	2.415	2.362	
6) Explosives	0.006	0.006	0.005	0.005		0.019	0.018	-	0.013		0.009	0.013	0.037	0.010		0.366	-	-	-		-	0.021	-	-		0.010	0.011	0.013	0.007	
7) Explosions of firedamp or coal dust	0.010	-	0.014	0.013		-	0.009	0.031	-		-	-	-	0.029		-	-	-	-		-	-	-	-		0.006	0.001	0.011	0.016	
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	0.005	-		-	-	-	0.013		-	-	-	-		-	-	-	-		-	-	-	-		-	-	0.002	0.001	
9) Underground combustion and fires	-	-	-	-		-	-	0.021	-		-	-	-	-		-	-	-	-		-	-	-	-		-	-	0.002	-	
10) Inrushes of water	0.004	-	-	-		-	-	-	-		-	0.018	-	0.005		-	-	-	-		-	-	-	-		0.002	0.003	-	0.001	
11) Electricity	0.012	0.009	0.002	0.010		0.009	-	0.010	0.013		0.014	0.009	0.014	-		-	-	-	-		-	0.021	-	-		0.012	0.008	0.006	0.007	
12) Other causes	0.473	0.477	0.354	0.414		0.198	0.268	0.333	0.362		0.354	0.227	0.174	0.200		-	-	1.592	3.360		0.147	0.129	0.088	0.353		0.390	0.364	0.289	0.354	
TOTAL	14.499	14.999	15.133	14.598		12.250	11.799	10.024	10.669		14.660	14.347	13.017	12.692		7.690	11.168	15.124	18.201		6.025	6.629	7.737	8.291		13.781	13.861	13.506	13.242	

B. Comparative Table of

accidents resulting in death within eight weeks

years 1958-66

per '000,000 man-hours

CAUSE (1958-1962)	Germany (North Rhine/Westphalia and Saar)					Belgium					France (excl. Provence)					Italy					Netherlands					Community				
	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962	1958	1959	1960	1961	1962
1) Falls of ground	0.268	0.290	0.263	0.216	0.280	0.223	0.213	0.299	0.266	0.246	0.235	0.192	0.186	0.219	0.167	0.167	-	0.201	0.225	-	0.262	0.064	0.034	0.114	0.062	0.253	0.242	0.235	0.217	0.234
2) Haulage and transport	0.179	0.169	0.182	0.196	0.149	0.101	0.124	0.157	0.168	0.142	0.115	0.085	0.082	0.122	0.077	-	0.197	-	-	-	0.077	0.145	0.067	0.095	0.062	0.147	0.141	0.146	0.168	0.124
3) Movement of personnel	0.094	0.097	0.070	0.086	0.059	0.011	0.027	0.008	0.035	0.010	0.007	0.018	0.027	0.008	0.043	-	-	-	-	-	-	-	-	-	-	0.057	0.063	0.047	0.056	0.045
4) Machinery, handling of tools and supports	0.010	0.027	0.012	0.027	0.037	0.005	0.014	0.016	0.027	0.047	0.018	0.040	0.016	0.008	0.030	-	-	-	-	-	0.015	0.016	-	-	0.041	0.011	0.028	0.012	0.021	0.037
5) Falling objects	0.065	0.041	0.039	0.065	0.094	0.016	-	0.008	-	0.010	0.025	0.007	0.004	0.017	0.030	-	0.197	-	-	-	-	0.016	-	-	-	0.045	0.027	0.024	0.041	0.062
6) Explosives	0.009	0.003	0.003	-	0.004	0.011	0.014	-	-	-	-	0.026	-	-	-	0.501	-	-	-	-	-	-	-	-	-	0.009	0.010	0.002	-	0.002
7) Explosions of firedamp or coal dust	0.011	0.012	-	-	0.660	-	-	0.016	-	-	0.115	0.121	-	-	0.004	-	-	-	-	-	-	-	-	-	-	0.032	0.036	0.002	-	0.375
8) Sudden outbursts of firedamp, suffocation by natural gases	0.005	0.003	0.002	0.004	0.002	0.016	0.014	-	-	0.047	0.043	0.026	0.019	0.004	-	0.167	-	-	-	-	-	-	-	-	-	0.016	0.010	0.006	0.003	0.007
9) Underground combustion and fires	-	0.003	-	0.002	-	-	0.007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	-	0.001	-
10) Inrushes of water	-	0.003	0.002	-	-	0.011	-	-	0.044	0.047	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	0.002	0.002	0.001	0.006	0.005
11) Electricity	0.022	0.008	0.002	0.005	0.010	0.021	-	0.024	-	-	-	0.011	0.012	-	0.009	-	-	-	-	-	-	-	-	0.019	-	0.016	0.007	0.007	0.004	0.008
12) Other causes	0.025	0.025	0.036	0.049	0.049	0.005	-	0.008	0.009	0.019	0.036	0.029	0.008	-	0.009	-	-	-	-	-	-	-	0.017	-	-	0.023	0.021	0.024	0.029	0.032
TOTAL	0.687	0.680	0.611	0.651	1.344	0.420	0.413	0.536	0.549	0.568	0.594	0.555	0.354	0.382	0.369	0.835	0.394	0.201	0.225	-	0.355	0.241	0.119	0.229	0.166	0.610	0.590	0.507	0.546	0.932
(1963-1967)	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967	1963	1964	1965	1966	1967
1) Falls of ground	0.260	0.200	0.184	0.197		0.264	0.222	0.239	0.324		0.120	0.127	0.164	0.214		0.366	-	-	-		0.084	0.043	0.044	0.050		0.217	0.175	0.177	0.208	
2) Haulage and transport	0.178	0.200	0.191	0.175		0.245	0.166	0.166	0.187		0.121	0.141	0.052	0.126		-	-	-	-		0.105	0.172	0.177	0.126		0.167	0.178	0.149	0.160	
3) Movement of personnel	0.089	0.071	0.070	0.094		0.057	0.028	0.011	0.025		0.009	0.009	0.042	0.024		-	-	-	-		-	-	-	-		0.060	0.045	0.051	0.060	
4) Machinery, handling of tools and supports	0.019	0.028	0.025	0.030		-	0.018	0.052	0.025		0.009	0.036	0.009	0.015		-	-	-	-		-	-	0.022	-		0.013	0.030	0.024	0.023	
5) Falling objects	0.072	0.054	0.058	0.048		0.019	0.018	-	-		0.009	0.018	0.019	0.015		-	-	-	-		-	0.043	-	-		0.046	0.037	0.037	0.030	
6) Explosives	-	0.002	-	-		-	-	-	-		0.005	0.005	0.009	0.005		-	-	-	-		-	-	-	-		0.001	0.002	0.002	0.001	
7) Explosions of firedamp or coal dust	0.002	0.002	0.019	0.056		-	-	0.011	-		-	-	0.155	-		-	-	-	-		-	-	-	-		0.001	0.001	0.053	0.030	
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	0.002	0.002		-	-	0.041	0.013		0.019	0.009	-	0.005		-	-	-	-		-	-	-	-		0.005	0.002	0.006	0.004	
9) Underground combustion and fires	0.006	0.009	0.005	-		-	-	0.011	-		-	-	-	-		-	-	-	-		-	-	-	-		0.003	0.005	0.005	0	
10) Inrushes of water	0.004	-	-	-		0.019	-	-	-		-	-	0.005	-		-	-	-	-		-	-	-	-		0.005	-	0.001	0	
11) Electricity	0.002	0.004	0.005	-		0.009	0.009	0.011	-		0.024	-	-	0.010		-	-	-	-		-	-	-	-		0.008	0.003	0.004	0.003	
12) Other causes	0.025	0.017	0.023	0.027		0.028	0.009	-	0.013		0.014	0.014	-	0.005		-	-	-	-		-	-	-	-		0.021	0.014	0.013	0.017	
TOTAL	0.657	0.587	0.582	0.629		0.641	0.471	0.542	0.587		0.330	0.359	0.455	0.419		0.366	-	-	-		0.189	0.257	0.243	0.176		0.547	0.492	0.522	0.536	

C. Comparative Table of underground group accidents (see (c) below)

years 1960-66

Germany – N. Rhine/Westph.+ Saar (1960-1963)

CAUSE (1960-1963)	1960 N	1960 a	1960 b	1961 N	1961 a	1961 b	1962 N	1962 a	1962 b	1963 N	1963 a	1963 b
1) Falls of ground	2	2	10	-	-	-	1	1	6	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	3	62	338	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	2	10	-	-	-	4	63	344	-	-	-

Belgium (1960-1963)

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

France (excl. Provence) (1960-1963)

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

Italy (1960-1963)

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

Netherlands (1960-1963)

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

Community (1960-1963)

CAUSE (1960-1963)	1960 N	1960 a	1960 b	1961 N	1961 a	1961 b	1962 N	1962 a	1962 b	1963 N	1963 a	1963 b
1) Falls of ground	2	2	10	1	-	7	3	3	18	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	3	62	338	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	2	10	1	-	7	6	65	356	-	-	-

Germany – N. Rhine/Westph.+ Saar (1964-1967)

(1964-1967)	1964 N	1964 a	1964 b	1965 N	1965 a	1965 b	1966 N	1966 a	1966 b	1967 N	1967 a	1967 b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-
2) Haulage and transport	2	5	14	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	1	4	8	2	5	21	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	5	14	1	4	8	2	5	21	-	-	-

Belgium (1964-1967)

(1964-1967)	1964 N	1964 a	1964 b	1965 N	1965 a	1965 b	1966 N	1966 a	1966 b	1967 N	1967 a	1967 b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	-	-	-		-		-	-	-	-	-	-

France (excl. Provence) (1964-1967)

(1964-1967)	1964 N	1964 a	1964 b	1965 N	1965 a	1965 b	1966 N	1966 a	1966 b	1967 N	1967 a	1967 b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	2	-	33	1	6	-	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	-	-	-	2	-	33	1	6	-	-	-	-

Italy (1964-1967)

(1964-1967)	1964 N	1964 a	1964 b	1965 N	1965 a	1965 b	1966 N	1966 a	1966 b	1967 N	1967 a	1967 b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-

Netherlands (1964-1967)

(1964-1967)	1964 N	1964 a	1964 b	1965 N	1965 a	1965 b	1966 N	1966 a	1966 b	1967 N	1967 a	1967 b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-
2) Haulage and transport	-	-	-	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	-	-	-	-	-	-	-	-	-	-	-	-

Community (1964-1967)

(1964-1967)	1964 N	1964 a	1964 b	1965 N	1965 a	1965 b	1966 N	1966 a	1966 b	1967 N	1967 a	1967 b
1) Falls of ground	-	-	-	-	-	-	-	-	-	-	-	-
2) Haulage and transport	2	5	14	-	-	-	-	-	-	-	-	-
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	-	-	-
5) Falling objects	-	-	-	-	-	-	-	-	-	-	-	-
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-
7) Explosions of firedamp or coal dust	-	-	-	3	4	41	3	11	21	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	2	5	14	3	4	41	3	11	21	-	-	-

(a) Casualties were unable to resume work below ground for at least eight weeks.
(b) Casualties died within eight weeks.
(c) Accidents involving more than five casualties of type (a).
(N) Number of group accidents.

SECTION III

DEVELOPMENTS IN CONNECTION WITH MINE SAFETY

No new mine safety regulations were introduced in the Community in 1966, except in Belgium, where a Royal Decree on supports and roof control was issued on 26 August 1966 tightening up the requirements fixed by the Royal Decree of 16 December 1953 regarding the duties of the under-manager and the propsetting personnel in this respect. The new Decree is in line with the Safety Conference's recommendations with respect both to the actual supports and to the fire hazard represented by the presence of combustible components.

In Germany the Bonn and Dortmund Offices of Mines issued directives concerning

1) installation of machine-driven monorails (Dortmund, 19 January 1966);
2) special measures to be observed in caving (Dortmund, 26 May 1966; Bonn, 21 June 1966);
3) provisional rules for the analysis of stone dust (Dortmund, 24 October 1966);
4) provisional rules for plastic ventilation tubes, pipes and hoses, liquid plastics, and driving and fan belts for use below ground (Dortmund, 4 November 1966).

The Saarbrücken Office of Mines issued directives concerning

1) installation, operation and supervision of methane drainage plant (15 April 1966);
2) planning and running of lamp rooms (6 September 1966);
3) provisional rules for plastic appliances to be used below ground (28 December 1966).

In France 10 top-level Decrees and 30 circulars were issued, including one Decree of 2 March 1966 on shotfiring under water and another of 7 October 1966 amending the conditions of admission for flameproof appliances (dimensions of the joints).

A full account of the position as at 1 January 1966 with regard to the implementation of the Safety Conference's recommendations and the latest information available up to then on action taken to follow up the MSHC's recommendations, directives and reports will be found in the Third Report; as naturally no major changes have occurred between that time and the end of the period under review, we feel there is no object in going into the matter in detail here.

PUBLICATIONS DEPARTMENT OF THE EUROPEAN COMMUNITIES

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