

COMMISSION OF THE EUROPEAN COMMUNITIES

SIXTH REPORT  
OF THE  
MINES SAFETY AND HEALTH  
COMMISSION



SEPTEMBER 1969

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INTRODUCTION

The Sixth Report of the Mines Safety and Health Commission for 1968 contains:

1. A summary of the activities of the Mines Safety and Health Commission and its Working Parties.
2. A recapitulation of the accident statistics for 1968 with the usual comments on their trend.
3. A list of trends in safety regulations in 1967 and 1968.

The entry into practice of the recommendations of the Mines Safety and Health Commission is reported only every two years and will consequently not be mentioned in this report.

The following items have been relegated to the separate appendices: detailed tables of accident statistics, the latest terms of reference of the Working Parties, the Report on "Practical conclusions regarding the application of the theory of the stabilisation of ventilation", and the latest list of members of the Mines Safety and Health Commission and its Working Parties.



## SECTION I

### ACTIVITIES OF THE MINES SAFETY AND HEALTH COMMISSION

In 1968 the Mines Safety Commission met twice and the Restricted Committee once; the technical Working Parties and their sub-committees met 25 times - two meetings being for the Working Party on "Statistics", while the Working Parties on "Health and psychological and sociological factors affecting Safety" held four meetings.

One feature of the report year was the fusion of the Executives of the European Communities, which led to a general reduction in staff; this also affected the Secretariat of the Mines Safety and Health Commission despite the wish expressed by the European Parliament that this Secretariat should be better staffed.

The Working Party on "Accident statistics in coalmines" started work, whilst the Working Party on "Psychological factors affecting safety" continued its exchange of views between experts concerned with safety campaigns.

Certain programmes of work were terminated and the results circulated rapidly: the Working Party on "Rescue arrangements, Mine Fires and Underground Combustion" has finished its "Practical conclusions regarding the application of the theory of the stabilisation of ventilation in the event of mine fires" and the Working Party on "Electricity" has concluded an investigation of cables used to supply mobile underground equipment, and of their protection.

Within the framework of the exchange of information provided by the Commission of the European Communities, the Secretariat of the Mines Safety and Health Commission assisted a one-day conference of the interested trade unions at Harre (Belgium); at this meeting the latest results of the work of the Mines Safety and Health Commission were made known.

As in previous Reports, this first section sets out to survey, as concisely as possible, Working Party by Working Party, the origin of the work, development of the work during the meetings in 1968, and any conclusions reached, together with the outstanding problems.

### I. TECHNICAL PROBLEMS

#### A. Rescue arrangements, Mine Fires, Underground Combustion

The new Working Party which resulted from the amalgamation of the two groups on "Rescue arrangements" and "Mine fires and Underground Combustion" held three Plenary Meetings and one Restricted Meeting.

The rescue experts who were members of the old Working Party met twice; once to visit the rescue centres at FRIEDRICHSTHAL (Saar) and MERLEBACH (Lorraine).

Three meetings were held by the experts on fire-resistant liquids and shaft fires.

Finally, a restricted group of the Working Party, consisting of the Chairman and members of the Secretariat, took part in a symposium on underground combustion organised by Charbonnages de France.



## 1. Shaft Fires

The origins of this work are mentioned in the Fourth Report, page 11, and in the Fifth Report, page 8.

This work, started after the MARCINELLE disaster in 1956, consisted, amongst other things, of an experimental full-scale fire in an abandoned shaft at DORSTFELD Colliery in 1964, and also of full-scale experimental injection of cold water in the shafts at ARENBERG-FORTSETZUNG Colliery (Western Germany) in 1959, as well as in a shaft at the Charbonnages du Centre at RESSAIX (Belgium) in 1965.

Approving, in 1968, the views of the Sub-Committee and of the Working Party, the Mines Safety and Health Commission considered that it was not yet necessary to recommend further research projects in this field by reason of the reduced risk of shaft fires and because it was necessary to make research more selective owing to the situation of the coalmining industry. The Commission requested that, before finally ending the work of this Committee there should be a re-appraisal of its Recommendation of 8 April 1960 regarding the extinction of shaft fires, particularly with regard to the value of the aeromotor effect of water falling down a shaft, since the results obtained at ARENBERG and RESSAIX did not coincide.

Two Restricted Meetings made it possible to finalize certain proposals to supplement the Recommendation of 1960, but it has not been found possible to clear up during 1968 the disagreement referred to above.

## 2. Fire-resistant fluids

As stated on page 9 of the Fifth Report, a Third Report on the specifications and test conditions relating to fire-resistant fluids for hydraulic transmission was submitted for approval by the Mines Safety and Health Commission in 1968, together with a report noting the success of previous reports regarding specifications, and the numerous requests made by manufacturers and oil users, not only in respect of them mining industry, but also for other industries. This report also records the fact that difficulties have been met when using certain oils which conform to the recommended tests, because of premature wear of the bearings (20 % of normal working life).

Research is planned in Germany in an attempt to adapt existing equipment to the use of such fire-resistant fluids. The Mines Safety and Health Commission has adopted the following view:

It approves the above-mentioned Third Report and requests that it be distributed. It is well aware of the difficulties being met at present in the utilisation of certain fluids accepted as being fire-resistant, owing to the deleterious influence of such fluids on the working life of machines and mechanisms, and expresses the hope that research will be carried out to facilitate the replacement, as soon as possible, of mineral oils by the fire-resistant fluids at present known.

The Mines Safety and Health Commission has also agreed to charge the Working Party to keep watch on developments in this field (in collaboration with the Secretariat), and, should it be necessary, to re-examine, after a certain lapse of time, and together with the Committee of Experts, the criteria and testing conditions defined in the Third Report.

The Committee of Experts thus met at the end of 1968 to examine the conditions of the experimental method recommended for the determination of the degree of flame propagation in a mixture of coaldust and a fire-resistant fluid.

It has been decided to carry out research into the reasons for the discrepancies observed by the different research institutes by arranging for these four safety institutes to carry out a major series of comparative tests in which certain variables, which seem to be of an essential nature, are very carefully fixed.

### 3. Polyurethane foam seals

A Restricted Meeting of 10 experts, including one of the United Kingdom, was held at the "Centre de coordination des centrales de sauvetage" at Hasselt, to enable the members to take part in small-scale combustion tests and as full-scale roadway tests.

The aim of these tests, not subsidised by the Commission, was to find a safeguard against the rapid combustion of polyurethane and against its capacity to become electrostatically charged. The solution consists of applying a thin layer of plaster to the layer of polyurethane foam, so preventing the propagation of a fire.

The experts noted that this process considerably reduced the risk inherent in the use of polyurethane foam, but expressed the wish that the final solution from the point of view of safety should be a single fire-resisting product, so that it would no longer be necessary to apply an additional fire-resisting coating or fire-resisting layer of plaster.

The experts were informed of the circumstances of the accident at Michael Colliery (Great Britain) after which urethane, used extensively in this mine without a fire-resisting coating, was prohibited in the United Kingdom.

The experts took this information into consideration. The excellent sealing power of this material and the advantages it offers, from the points of view of safety and of health, together with the remedies, in particular the plaster layer, which greatly reduce the risk of mine fires, led the experts to express the wish that the use of polyurethane foam, which can be used without danger in restricted localities, e.g. seal stoppings, should not be banned. Widespread, systematic use of this product would have to be subjected to rigorous control.

The experts hope that the industry will further develop their current products, to meet the criteria which they undertook to draw up for submission to the Working Party in 1969.

### 4. Rescue by means of large-diameter boreholes

As already announced in the Fifth Report, page 10, the Mines Safety and Health Commission has approved a proposal for experiments at Community level, to be subsidised by the Commission to investigate unsolved problems regarding the drilling of large-diameter rescue holes underground.

These trials will take place at a pit which holds rescue equipment of this type available for calls from anywhere in the Community.

The Mines Safety and Health Commission proposed therefore to the Commission of the European Communities that this research should be carried out in pursuance of Article 5 of its terms of reference.

### 5. Ventilation

The Fifth Report refers on page 10 to the submission of a report on the stabilisation of ventilation in the event of a mine fire; this document generalises the theory of Professor Budryk. The Fifth Report also cites the adoption of this report by the Mines Safety and Health Commission and the circulation it received.

In 1968 a report containing conclusions was discussed at length by the Working Party, over three meetings. This document, intended for the Governments and the mining companies, envisages steps to organise ventilation surveillance, so as to improve its efficiency in present-day complicated conditions in the mines, followed by measures to be taken, both before and during a mine fire, in order to maintain complete control of the distribution of ventilation air despite the disturbance caused by this fire.

The Mines Safety and Health Commission approved these proposals, which have been forwarded to the Governments for appropriate action.

As in the case of the above-mentioned paper, it was decided to distribute this report to interested circles.

## 6. Rescue arrangements

During one meeting, the Directors of Rescue Stations exchanged their experiences with respect to the equipping of men with self-rescuers of the CO-filter type in the Community countries and the United Kingdom, to the different factors involved with this equipment (maintenance, inspection) and to the performance of the devices (including their cooling capacity), based on a document prepared by one of them in 1966. This situation report of 1966 has now been brought up-to-date and the experts have examined the possibility of standardising the requirements, particularly from the physiological point of view, for the Community and the United Kingdom. It was decided to defer this investigation until the results had been made available of tests now being carried out in Germany and in the United Kingdom with a new type of device.

The Mines Safety and Health Commission expressed the hope that it will be found possible to co-ordinate the requirements to be imposed on these CO-filter self-rescuers.

Within the framework of their periodical reciprocal exchanges, the Directors of Rescue Stations visited the Saar Rescue Station at Friedrichsthal and the Lorraine Rescue Station at Merlebach.

This has enabled them to bring up to date their knowledge on the equipment at these two stations, which could be made available to them under the reciprocal aid agreement covering disasters; this particularly referred to equipment for the remote measurements of hot points, for the location of trapped persons and the rescue equipment. They have also discussed the reopening of a fire area in the Saar coalfield and of improvements carried out in this coalfield, as well as in Lorraine, in the construction of plaster stoppings.

## B. Winding ropes and shaft guides

The Working Party met twice (once at the Tremonia Experimental Mine in Dortmund) in order to ascertain, as the Mines Safety and Health Commission had requested it to do, what means are available at this colliery to measure the dynamic forces imposed on the cage guides.

The Tremonia Experimental Mine intends to carry out research in this field, by reason of the increase in the amount wound through shafts, which results in increasing loads and speeds of translation of products, which, in turn give rise to equally high dynamic forces on the guides. The Experimental Mine hopes that the Mines Safety and Health Commission will support a request it has made to the Commission for a Community subsidy to support this research.

Since the opinions of the various delegations on this subject do not agree, the Mines Safety and Health Commission - while recognising the difficulty of dissociating technical and economic aspects from safety aspects in the field of mining, and especially in the present case - unanimously recognised that there is merit, from the point of view of mine safety, in carrying out this research.

Moreover, the Working Party studied a synoptic summary prepared by the Secretariat, examining the regulations at present in force with respect to cage suspension gear.

### C. Electricity

In five Plenary Meetings the Working Party finalised a report on the characteristics and the electrical protection of cables supplying mobile machines (coalcutters, power loaders, etc.) used underground in coalmines in the different Community countries.

This investigation is concerned with the most hazardous sector of underground electric networks, the mobile machines being generally very highly powered and the trailing cables which supply them subjected to violent jerks, which involve risks of electrocution and short-circuits which could ignite firedamp.

This is an information report for the benefit of management and engineers responsible for the electricity supply and of manufacturers of electrical equipment. It comprises a classification and a description of the cables and the main devices for electrical protection, together with a recapitulative table of the kinds of cables and of protection devices which counter the majority of faults which can affect these cables.

In addition, in the course of three Restricted Meetings, the Secretariat prepared documents on the use of trolley locomotives, on the propagation of energy from lightning into underground workings as well as on the danger of stray currents in general, all referring to work to be carried out in 1969.

### D. Flammable dust

In 1968 the Mines Safety and Health Commission agreed to extend the terms of reference (see text of terms of reference in Appendix) so as to take into account the frequent involvement of methane in dust explosions, whereas the original terms of reference only allowed the study of stone-dust barriers and of the neutralisation of coaldust to suppress dust explosions.

This extension is the result of observations put forward by the Working Party, who revealed the fact that the origin of dust explosions is very often methane explosions and that this methane can also influence the propagation of a dust explosion. Therefore there is every reason also to study methods of suppression, not only to prevent dust explosions but also methane explosions and mixed explosions of dust and methane.

### E. High Authority Competition organised for Improved Mine Safety Devices

This competition comprised two stages: the first concerned methanometers, carbon monoxide recorders and self-rescuers with integral protection, and ended in 1967; the second related to a device for detecting an oxygen deficiency and was concluded at the end of 1967 when prizes were awarded to the winning firms in the presence of the members of the Mines Safety and Health Commission. The results of this competition were distributed at the time to interested circles, according to the rules expressly laid down in the conditions of the competition.

### F. Accident statistics in the Community

Under Articles 2 and 8 of its terms of reference, the Mines Safety and Health Commission is charged with finding a method of preparing comparable statistics covering accidents in coalmines and to carry out an annual study of the statistics of accidents and events occurring at mines.

A Working Party, formed in 1957, worked out a joint scheme which has made it possible to present joint statistics since 1958.

Subsequently, in the process of using these joint statistics, the question arose as to whether the figures for the different countries were truly comparable.

The Mines Safety and Health Commission has therefore been led to set up a new Working Party responsible for listing the differences which may exist between the statistical data collected in each country and examining the possibility of allowing for this when making comparisons on a Community basis.

This new Working Party met twice during 1968.

The basic principle underlying its investigations in this field of statistics is to look for solutions which, without requiring a fundamental revision of national methods, will nevertheless allow of collecting the necessary information for a more detailed comparison of the results, in order to give better guidance to accident-prevention measures.

The Working Party began by analysing the definitions under which accidents are classified in the different countries, and by determining what was the same and what differed.

Starting from this analysis, it has begun to clarify proposed definitions which would be common to each of the countries, so in order to obtain results which are as closely comparable as possible.

In addition the Working Party has examined the extension of the present joint accident statistics to cover incapacity to work of less than 56 days, taking into account the technical possibilities in each country.

#### G. Study of Accidents

In 1968 the Mines Safety and Health Commission was informed of two accidents, which were covered by first provisional reports. In 1968 the Mines Safety and Health Commission also concluded the study of an accident which took place in 1967.

- a) Accident at the Varenne Colliery in the Loire coalfield - 3 May 1968 - firedamp and dust explosion - six killed.

Whilst waiting for the final conclusions of the inquiry, it is possible to record the main circumstances of this accident; they can be summarised as follows:

The accident occurred in a horizontal development road driven in coal to work a seam 10 to 15 meters thick, dipping at 45°. The deposits are gassy and subject to outbursts of coaldust. The coal is liable to spontaneous combustion. Precipitation and neutralisation of the coaldust was achieved by spraying.

The roadway was driven by means of shotfiring and had reached a length of 196 metres at the time of the accident, which occurred immediately after the firing of a shot consisting of one round of 16 shots charged with safety explosives and detonated by instantaneous detonators.

Rescue work was difficult because of the high temperature in the irrespirable atmosphere along the entire length of the roadway.

The Mines Safety and Health Commission has commissioned the Working Parties for "Rescue arrangements, mine fires and underground combustion" and "Flammable dusts", to investigate this accident. It also expressed the wish that research be carried out into means of improving the detection of the presence of firedamp immediately before shotfiring.

- b) Accident at the "Minister Achenbach" colliery - 4 October 1968 - firedamp and coaldust explosion: 17 killed.

Whilst awaiting the conclusions of the enquiry, the main circumstances of this accident can be summarised as follows:

A firedamp and coaldust explosion occurred in the working in a slightly-inclined seam, 1.6 to 1.8 metres thick, which had been started up only a few days before the accident and had only advanced about 10 metres.

To initiate caving of the roof, shots were fired in the roof of the lower part of the face; shotfiring had ceased two hours before the accident. Considerable movement in the roof and also a major outburst of firedamp were observed. The supports were steel props with aluminium-base light-alloy heads. Tests are being carried out to determine how the firedamp was ignited.

- c) Final report on the accident at No. 4 colliery of the Niederrheinische Bergwerke AG - 15 June 1967 - rock burst - 5 killed.

The main circumstances can be summarised as follows:

The accident occurred below the 387-metre level in a 245-metre face which had just started up. The seam, 1.20 metres thick, dips at 9 to 13° towards the north, this dip angle being capable of reduction by aligning the face diagonally.

The roofs consists of beds of hard sandy shale.

The face had started up a short time beforehand and had moved away from the original rise heading by 9 metres at the bottom and by 4 metres at the top. Shotfiring in the roof had been carried out three and five days before the accident, causing the roof to break regularly along the entire goaf edge.

The original supports were metal friction props due to be replaced by hydraulic powered supports: a 63-metre length of these had been installed starting from the bottom of the face.

The roof fall which buried the five men occurred along a length of 100 metres starting from the end of the powered supports.

The enquiry has indicated the presence of parallel slip faults - perpendicular and oblique to the stratification, with a parallel fault 5 metres into the roof; these faults, together with the bad position of a coalface and the disparity in the types of supports used, favoured the fall of large blocks, 3 to 5 metres thick, and subsequently caused slipping of the roof.

The Mines Inspectorate come to the following conclusions regarding this accident:

1. After the completion of the rescue work, it was not possible to re-start the face until it had been completely equipped with powered hydraulic supports with a nominal bearing load of 40 metric tons at a minimum load of 30 metric tons.
2. The directives covering caving faces, drafted by the Mines Inspectorates at Bonn and Dortmund must be reworded in the light of the knowledge gained from this accident. In doing this, the following principles will be borne in mind:
  - 2.1. Whatever the inclination of the seams thrusts movements must be expected in all the faces during the starting-up period and measures must be taken to counter such movements by applying the various methods of protection indicated in the directives.
  - 2.2. The effectiveness of the devices provided to protect against thrust movement must be maintained even during withdrawal of the supports.
  - 2.3. The supports must be set as rapidly as possible; during the starting-up period, the distance between the first row of props and the coalface must be kept as short as possible, if necessary by limiting the rate of advance.
  - 2.4. No slewing of the face is to be carried out during the starting-up period.
  - 2.5. When friction props are set and locked by hydraulic means, the locking must be carried out immediately after setting.

The Mines Safety Commission approved these conclusions and supplemented them by recommending that, in similar cases, supports should be distributed over the area so as to enable it to resist oblique thrust movements.

The wish was also expressed that it may be possible for the Mines Safety Commission to draw practical conclusions of general applicability which could emerge from the investigations and research carried out under the aegis of other departments of the Commission of the European Communities (Coal Directorate of the Directorate General for Energy) regarding the problems of supports and strata control.

## II. HUMAN FACTORS

### A. Health

As stated in the previous Report, the Working Party first took up the technical aspects in the field of health in coalmines.

In order to achieve this aim, it was agreed that each delegation would submit to the Secretariat a general report on the dust suppression methods in use in its own country: the rate of effectiveness shown by the results achieved with each of the methods used is - as far as possible - to be expressed as a percentage improvement compared with a period when that method was not in use. The documentary information supplied by the different delegations was examined in great detail during a Restricted Meeting of the Working Party.

This analysis showed that some processes are in fact more effective than others, but that in general the simultaneous use of several methods is the only means of achieving good results.

The subsequent work will consist in the establishment of a certain classification of the methods ensuring a minimum dust level which can be allowed in respect of the workers' health, to make it possible to recommend in future the use of such methods. The different delegations have moreover been asked to make known the different ways in which their specialist services operate in the dust suppression field, both at the company and the national level.

### B. Psychological and Sociological factors affecting Safety

The Working Party held two Plenary Meetings and two Restricted Meetings to finalise the safety campaign in the circumstances already outlined in the Fifth Report, page 20.

The theme selected was that of underground accidents in transport, and particularly accidents involving continuous transport systems because, unlike roof falls which are to be treated later, these accidents - accounting for fewer victims than roof falls - are more general in character; it is in addition possible to distinguish fairly precisely the influence of technical factors (organisation of work by officials), and the effect of the human factor acting on the men who perform the work. It is therefore possible to distinguish methods of prevention which apply in particular to the management, the officials and the men who carry out the work.

The Secretariat has been charged with preparing a programme and a list of material, especially audio-visual material, which the various coalfields can pool in the organisation of a campaign. A part of this material has been supplied, and was discussed by the experts during the two restricted meetings.

In addition, the Secretariat has begun to prepare a programme for the employment of foreign workers and young workers, confining themselves to the safety aspect of the problem and taking advantage of the investigations already carried out in the other departments of the Commission of the European Communities.

## SECTION II

### JOINT ACCIDENT STATISTICS

As in the two previous Reports, the statistical tables reporting serious and fatal accidents which occurred in the various Community coalfields in 1968 have been placed in a separate annex; they are as usual, classified by cause of accident for the various coalfields, the member countries and the Community.

The presentation of the recapitulatory information reproduced below is also identical with that used in previous years. In Tables A and B below, the information is grouped by cause of accident for the Community countries from 1958 to 1968; Table C, using the same sub-division -, shows the fatalities and serious accidents, i.e. those which cause the death of or serious injury to more than five victims.

The graphs 1 to 6 present the data mentioned above for all accidents, including group accidents; they are intended to show a particular statistical trend, and even perhaps a certain degree of variation.

The Working Party for "Joint Statistics for Mine Accidents" began work in 1968, with the purpose, among other things, of studying the comparability of the statistics. Whilst waiting for the conclusion of these studies, there are therefore certain reservations which still apply to the remarks which follow.

Let us, for instance, look for the number of fatalities underground per million working hours (Tables B, D and graph 1).

1968 shows a levelling-out as compared with 1967, thus consolidating the figure for the latter year; this new plateau has, for the last two years, been markedly below the plateau for the years 1961 to 1966 referred to in the Fourth and Fifth Reports. In absolute terms, the number of fatalities has continued to fall off, dropping from 269 in 1967 to 240 in 1968, i.e. a reduction of approximately 11 %, for the number of hours worked has also dropped from 587 to 522 million, i.e. also approximately by 11 %.

It should be noted that two group accidents in 1968 caused the death of 23 workmen, whereas in 1967 the corresponding figure for the victims was only 10. In 1968, the accidents classified under headings I to IV (Table B and graphs 1 and 3) caused 84 % of the total fatalities (92 % in 1967) are distributed as follows: Cause I, roof falls: 35 % (42 % in 1967); Causes II and III (haulage and transport, and movement of personnel); 37 % (37 % in 1967); Causes IV and V (machinery, handling of tools and falling objects): 12 % (13 % in 1967).

Now let us look at the number of serious casualties per million hours (Table A and graph 2).

After falling off in 1964, 1965 and 1966 and reaching a threshold in 1967, the rate of 14.37 shows an increase of 7.9 %, which may appear significant; however, from the statistical point of view, the rate of 14.37 deviates from the mean of the last 11 years by 0.88 whereas the standard deviation (quadratic mean) is 0.57; the deviation is therefore between 1 and 2 standard deviations. As before, it will be noted that there is the same predominance of the accident rates for categories I to V; 97.4 % of the total of casualties, distributed in three roughly equal parts: category I (roof falls) 29.5 %; categories II and III (haulage and transport, and movement of personnel) 34.5 %, and categories IV and V (machinery, handling of tools and falling objects) 33.4 %.

As shown by graph 4, the roof falls are still the most important cause of accidents; this accident rate, running against the general trend towards a reduction, this figure rose by 4.8 % in 1968.



The rates of categories II and III which also showed a trend towards reduction, also rose in 1968, to a considerable extent: 11 %.

The rates for categories IV and V have continued to rise, as during previous years, this increase being 8 % in 1968 as against 6 % in 1967.

Finally, as in the three previous Reports, the number of fatalities and serious casualties has been related in Table D to the number of tons extracted, this being done purely for indicative purposes, as has been previously stated.

As this Table and graphs 5 and 6 show, production in the Community fell off in 1968 by 4 % (as against 10 % in 1967) and the number of hours worked dropped by 11 % (16 % in 1967), while the o.m.s. rose by 7 % (8 % in 1967).

The number of fatalities per million tons fell from 1.4 during 1967 to 1.32 in 1968 (having been more than 3 in 1958) and the same rate for serious casualties, after undergoing a reduction of one-third from 1958 to 1967, has levelled out this year (41.44 against 41.06 for 1967).









C. Comparative Table of underground group accidents (see (1) below)  
years 1960-68

C A U S E (1960-1965)	Germany						Belgium						France (excl. Provence)						Italy						Netherlands						Community					
	1960	1961	1962	1963	1964	1965	1960	1961	1962	1963	1964	1965	1960	1961	1962	1963	1964	1965	1960	1961	1962	1963	1964	1965	1960	1961	1962	1963	1964	1965	1960	1961	1962	1963	1964	1965
	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b	H a b
1) Falls of ground	2	2	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>2</b>	<b>2</b>	<b>10</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
(1966-1968)	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
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	5	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>2</b>	<b>5</b>	<b>21</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>11</b>	<b>21</b>	<b>-</b>	<b>-</b>	<b>-</b>

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



D. RECAPITULATION: COMMUNITY OVERALL

Year	Extraction (1)	Underground o.m.s. (kg.)	Million man- hours worked	Fatal- ities	Serious injuries (disable- ment for 8 weeks or over)	Fatal- ities per m.tons	Serious injuries per m. tons	Fatal- ities per m. man- hours	Serious injuries per m. man- hours
1958	252,278	1,634	1,260	770	17,074	3.052	67.68	0.610	13,551
1959	240,602	1,788	1,122	622	14,539	2.585	60.43	0.590	12,950
1960	239,967	1,958	1,037	526	13,459	2.192	56.09	0.507	12,986
1961	235,848	2,100	962	527	12,720	2.235	53.93	0.548	13,227
1962	233,233	2,229	901	840(2) 541(3)	12,418	3.602(2) 2.320(3)	53.24	0.932(2) 0.600(3)	13,781
1963	229,769	2,331	849	465	11,686	2.024	50.86	0.547	13,761
1964	235,007	2,395	841	411	11,726	1.749	49.89	0.493	13,860
1965	224,249	2,461	784	410	10,595	1.828	47.25	0.522	13,506
1966	210,189	2,611	698	374	9,247	1.779	43.99	0.536	13,242
1967	189,484	2,824	587	269	7,781	1.420	41.06	0.457	13,246
1968	181,170	3,065	522	240	7,501	1.326	41.44	0.460	14,370
1969									
1970									
1971									

(1) Net extraction, slurry and dust.

(2) Incl. Luisenthal explosion.

(3) Excl. Luisenthal explosion.





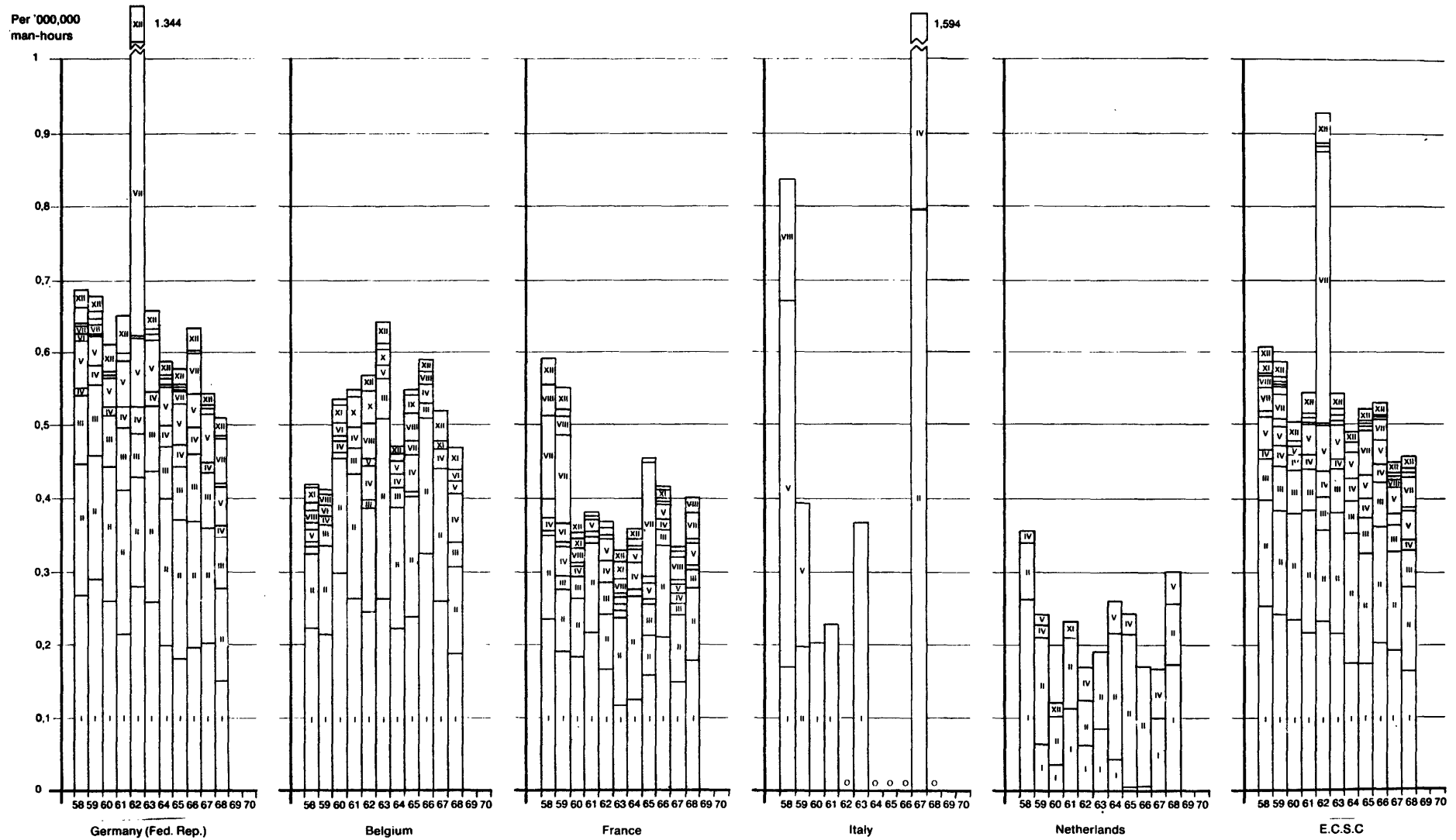
**GRAPHS  
OF FATAL AND SERIOUS CASUALTIES  
IN COMMUNITY COALMINES**

**KEY**  
to Roman figures in Graphs

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



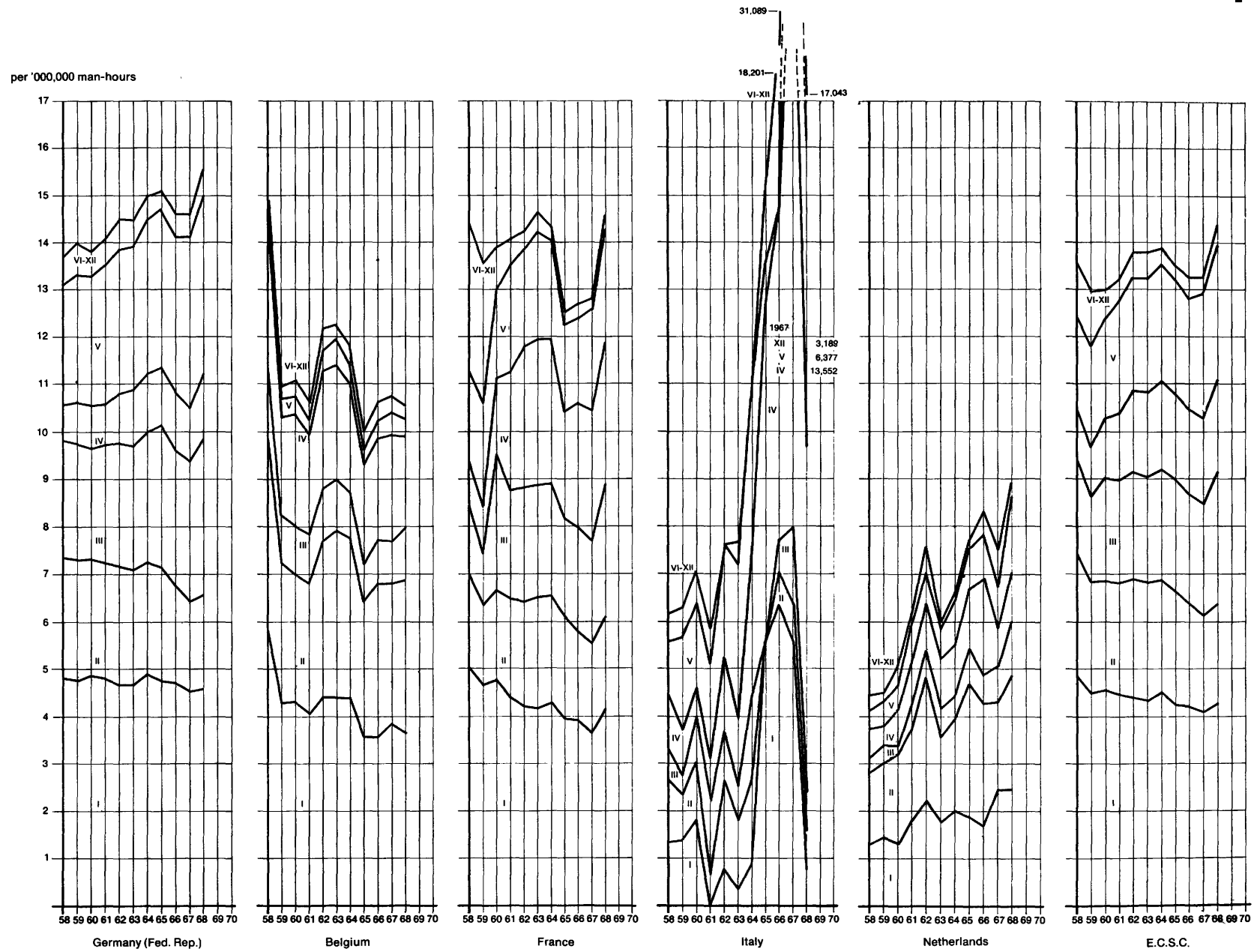
# FATALITIES BELOW GROUND IN E.C.S.C. COUNTRIES<sup>1)</sup> BY CAUSES OF ACCIDENT



<sup>1)</sup> CASUALTIES DIED WITHIN EIGHT WEEKS



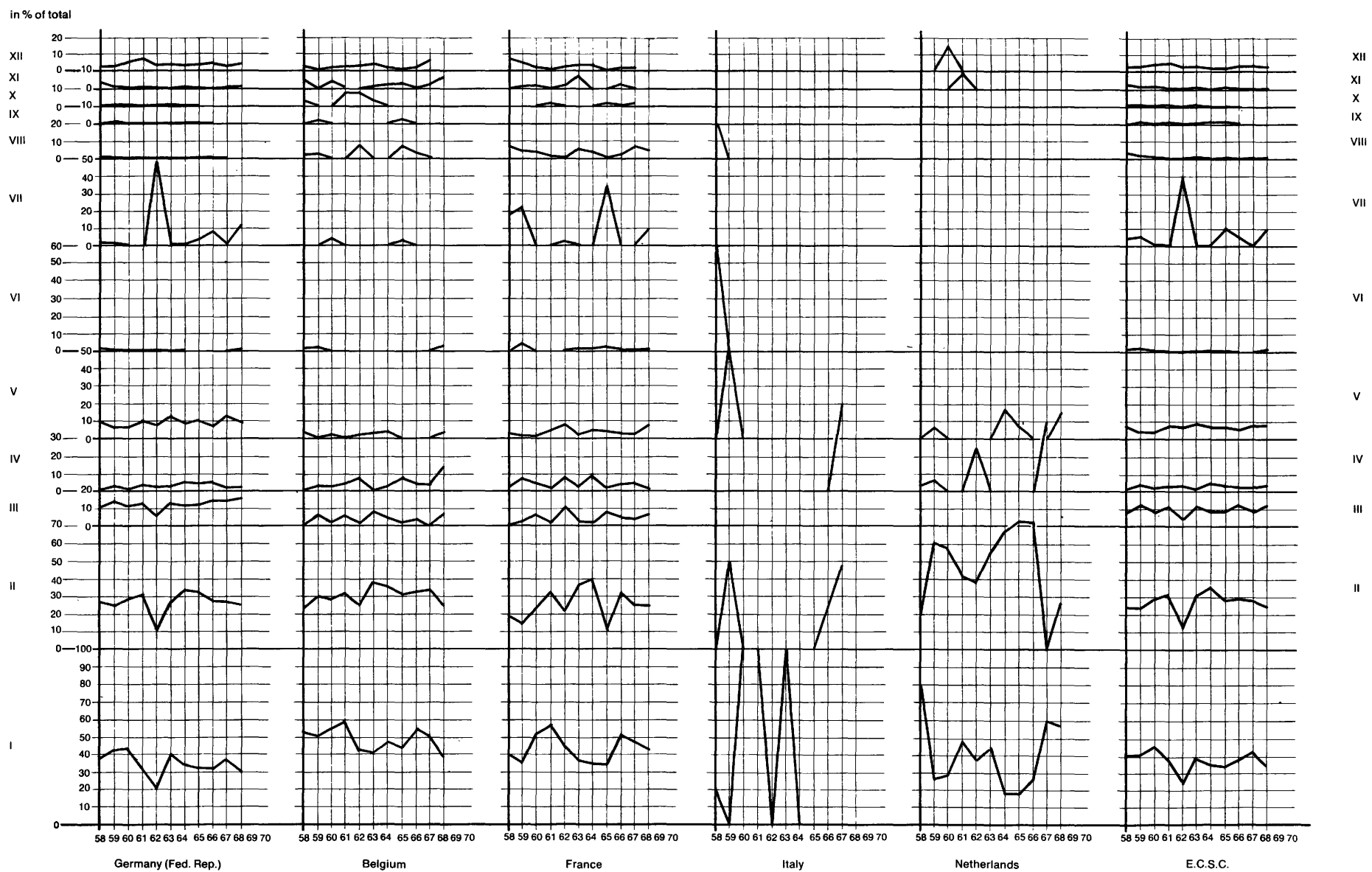
CASES OF SERIOUS INJURY BELOW GROUND<sup>1)</sup> IN E.C.S.C. COUNTRIES, BY CAUSES OF ACCIDENT



<sup>1)</sup> CASUALTIES WERE UNABLE TO RESUME WORK BELOW GROUND FOR AT LEAST EIGHT WEEKS



FATALITIES BELOW GROUND <sup>1)</sup> IN E.C.S.C. COUNTRIES,  
BY CAUSES OF ACCIDENT

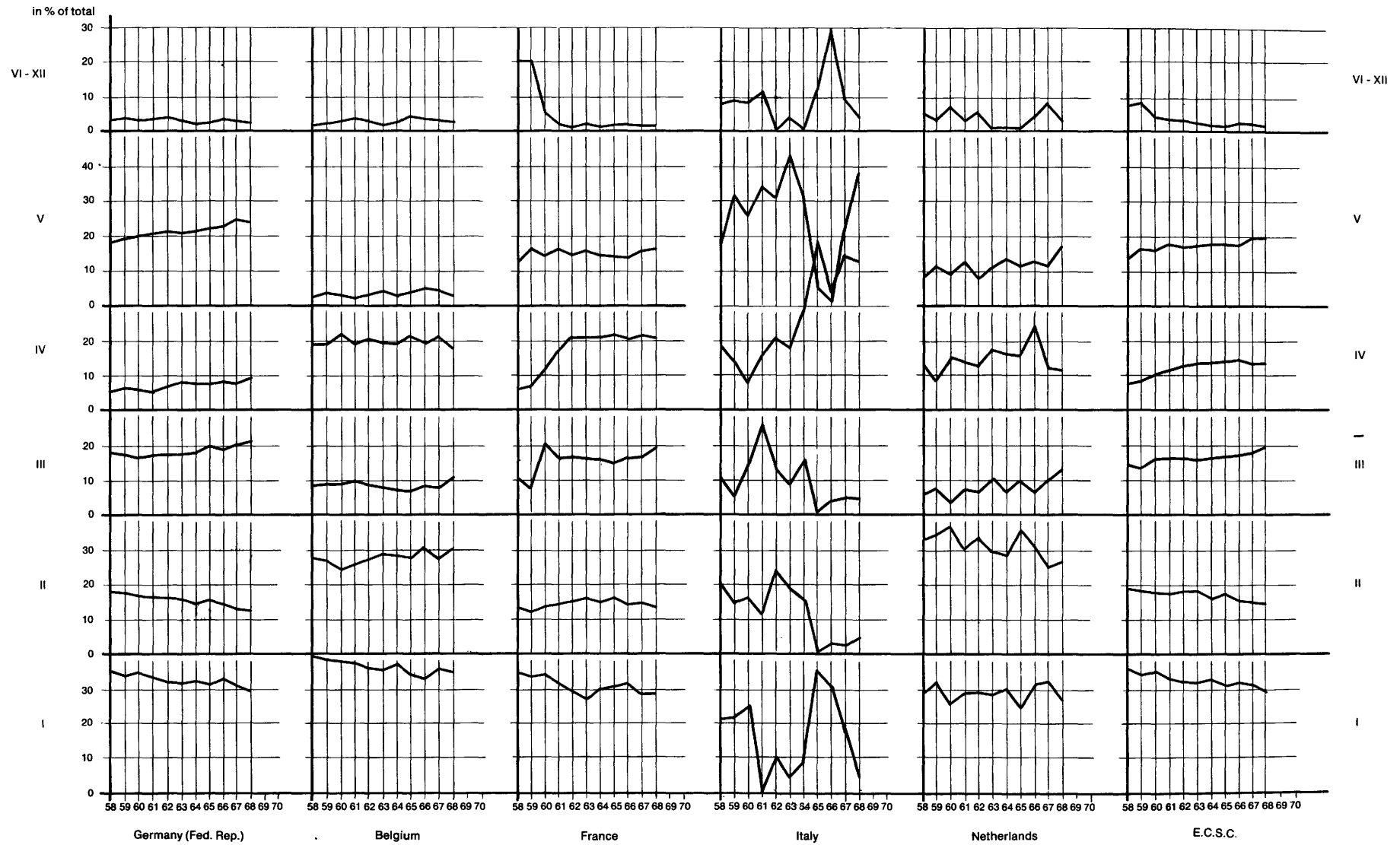


<sup>1)</sup> CASUALTIES DIED WITHIN EIGHT WEEKS





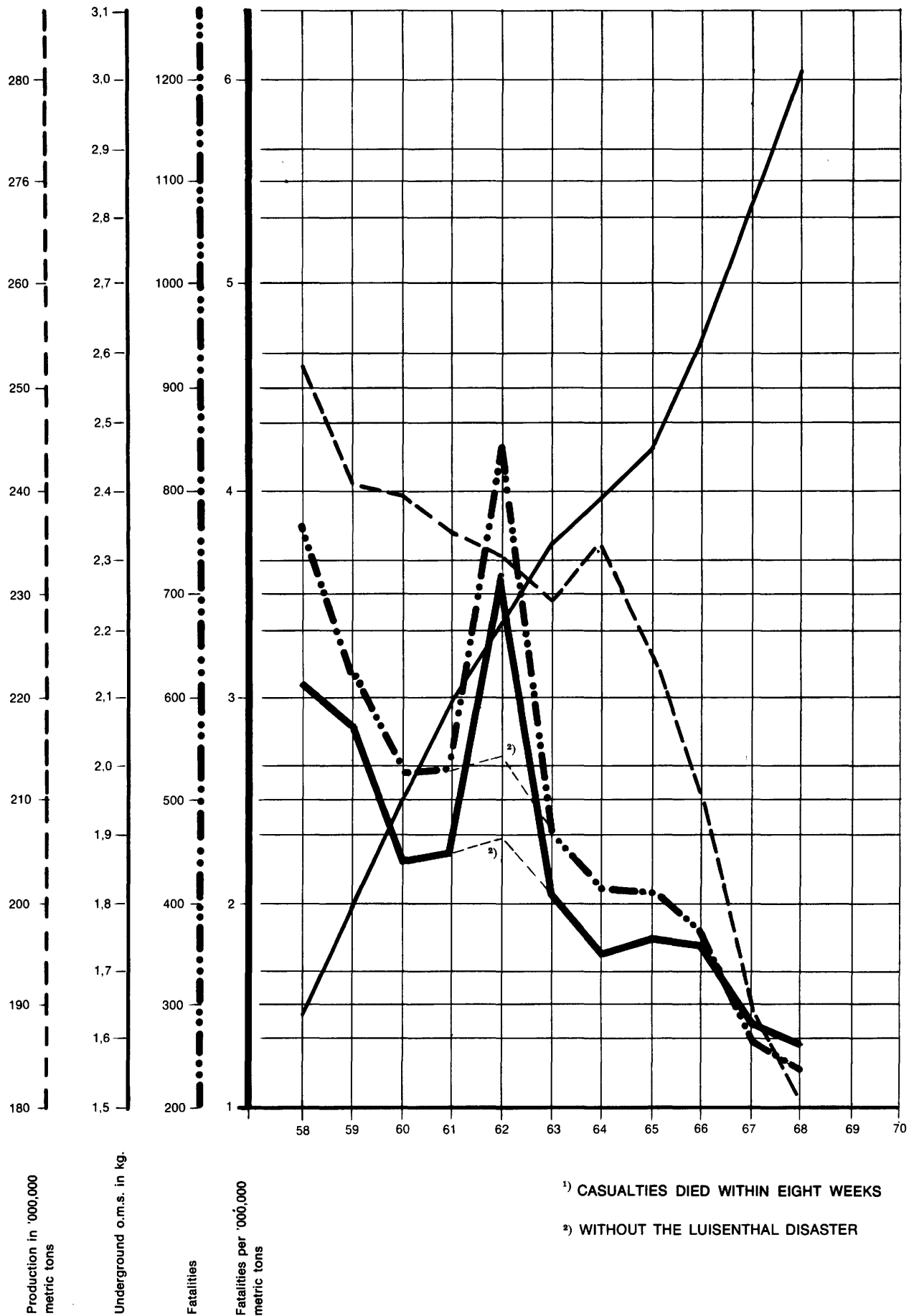
**CASES OF SERIOUS INJURY BELOW GROUND <sup>1)</sup> IN  
E.C.S.C. COUNTRIES,  
BY CAUSES OF ACCIDENT**



<sup>1)</sup> CASUALTIES WERE UNABLE TO RESUME WORK  
BELOW GROUND FOR AT LEAST EIGHT WEEKS

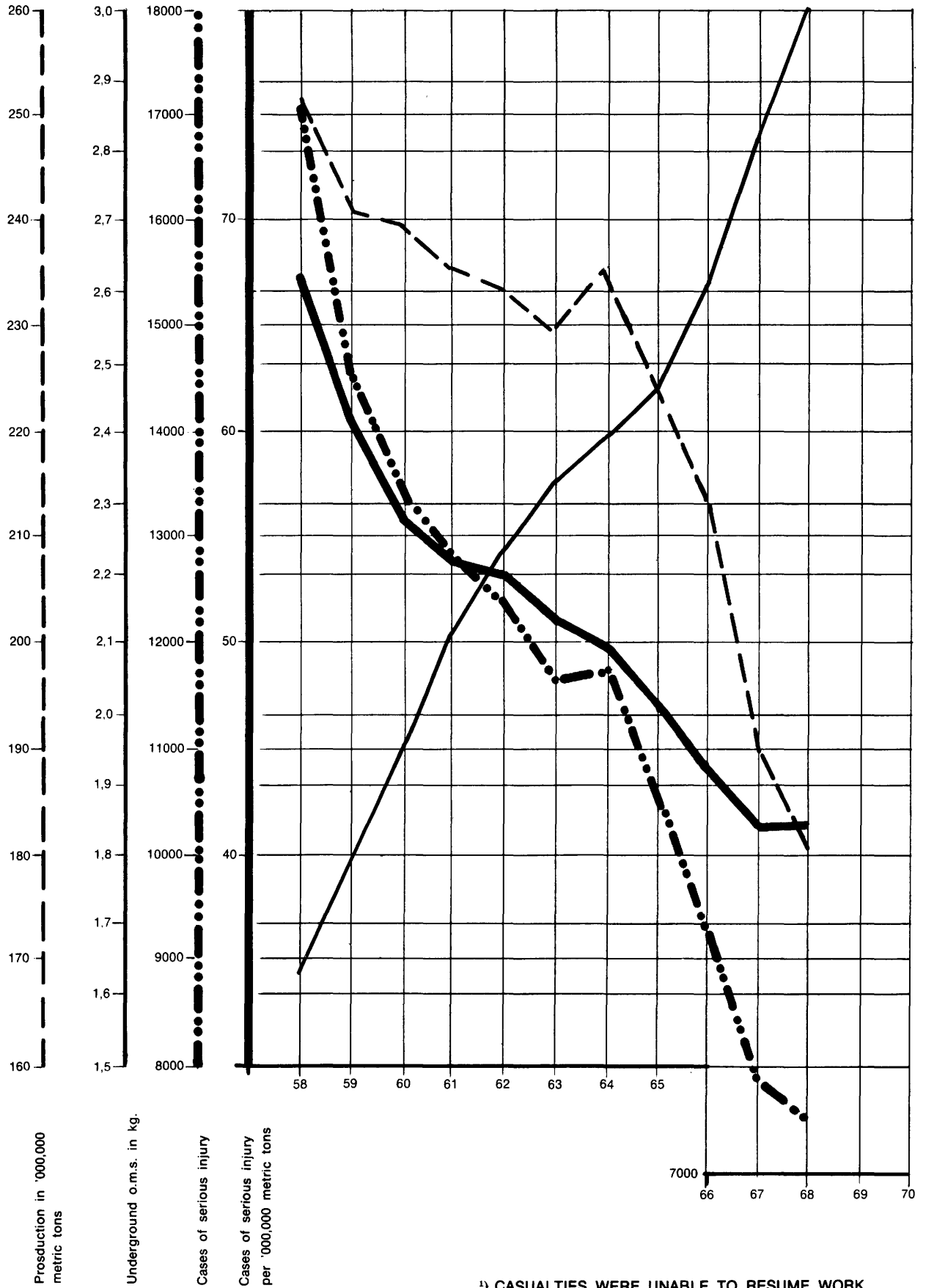


### FATALITIES <sup>1)</sup> PER '000,000 METRIC TONS PRODUCED IN E.C.S.C. COUNTRIES





**CASES OF SERIOUS INJURY <sup>1)</sup> PER '000,000 METRIC TONS  
PRODUCED IN E.C.S.C. COUNTRIES**



<sup>1)</sup> CASUALTIES WERE UNABLE TO RESUME WORK BELOW GROUND FOR AT LEAST EIGHT WEEKS



SECTION III

During 1967 and 1968 there were promulgated the following regulations with regard to safety and health in coalmines; these regulations also involve the mines and quarries in certain countries. This is a simple enumeration by country of laws, decrees, circulars and provisions which entered into force in 1967 and 1968 and which are particularly concerned with the spheres of activities of the Mines Safety and Health Commission.

FEDERAL REPUBLIC OF GERMANYI. Land Rhine-WestphaliaA. Regulations

Mining regulation with regard to electrical equipment dated 1.4.1968 (Dortmund, Bonn).

B. Directives and provisions of major importance from the Dortmund and Bonn Mines Inspectorates)

1. Provisions with regard to the examination of pneumatic-stowing tubes and their couplings, as used in pneumatic-stowing equipment, dated 28.12.1966 (Dortmund), dated 26.1.1967 (Bonn).
2. Directives with regard to the inspection, maintenance and repair or portable CH<sub>4</sub>-metering equipment, dated 28.2.1967 (Dortmund).
3. Provisions with regard to the investigation of incidents during work caused by falls of stones, of coal, roof falls or falls in roadways as well as rock bursts, dated 19.7.1967 (Dortmund), dated 23.1.1968 (Bonn).
4. Directives with regard to the destruction of explosives, dated 21.8.1967 (Dortmund).
5. Directives with regard to the construction and use of loading machines underground, dated 21.9.1967 (Dortmund) and 24.10.1967 (Bonn).
6. Administrative procedure for the erection of mobile bridges and other lifting devices in mining use, dated 2.10.1967 (Dortmund).
7. Directives with regard to methane drainage installations, dated 26.7.1967 (Dortmund), and dated 23.2.1968 (Bonn).
8. Directives with regard to the lowering of loads in pits being sunk, dated 15.2.1968 (Dortmund).
9. Requirements with regard to shaft guide installations, dated 10.9.1968 (Dortmund) and dated 22.1.1969 (Bonn).
10. Requirements with regard to emergency shaft guide installations, dated 10.9.1968 (Dortmund), and dated 22.1.1969 (Bonn).



## II. Saar

### A. Regulations

1. Regulation concerning the prerequisite conditions for convoking workers in accordance with paragraph 74 of the general mining law of 20.9.1967 (Journal Officiel, page 778) promulgated by the Minister for Economic Affairs, transport and agriculture.
2. Mining regulation from the Saarbrücken Mines Inspectorate with respect to the modification of the mining regulation of 1.10.1946 of the Saarbrücken Mines Inspectorate with regard to coalmines, dated 20.11.1967 (Journal Officiel, page 938).
3. Mining regulation of the Saarbrücken Mines Inspectorate with respect to modification of the mining regulation of 20.2.1958 of the Saarbrücken Mines Inspectorate regarding the main man-riding systems in shafts, dated 20.11.1967 (Journal Officiel, page 960).
4. Mining regulation of the Saarbrücken Mines Inspectorate with respect to modification of the mining regulation of 30.6.1960 of the Saarbrücken Mines Inspectorate with respect to medium and small man-riding systems in pits, dated 20.11.1967 (Journal Officiel, page 963).
5. Mining regulation of the Saar and Rhine-Pfalz Mines Inspectorate with respect to electrical equipment, dated 1.8.1968 (Journal Officiel, page 525).

### B. Regulations, arrangements, directives and rules (promulgated by the Saarbrücken Mines Inspectorate)

1. Arrangements to avoid the propagation of coal dust explosions in coalmines underground, dated 8.12.1967 - I 4006/34/67.
2. Arrangements to avoid water bursts or outbursts of noxious gases, dated 12.12.1967 - I 3300/4/67.
3. Modification of regulations with regard to the protection of health against the deleterious effects of dust, dated 20.12.1967 - I 4703/14/67.
4. Directives with respect to the preparation of the ventilation report, dated 20.12.1967 - I 3903/6/67.
5. Directives with respect to the use of CO-metering and -indicating devices, in coalmines, dated 20.7.1968 - I 4010/4/68.
6. Directives with respect to the use of torch-cutting equipment, welding, brasing and milling equipment in coalmines, dated 20.7.1968 - I 4205/1/68.

## BELGIUM

### A. Laws, Royal decrees and ministerial decrees

6. 1.1967 Ministerial decree with respect to the carrying underground of shot-firing cartridges with caps attached (Code des mines, minières et carrières, page 157).
17. 3.1967 Royal decree modifying the Royal decree of 29.4.1958 with respect to safety and health equipment in mines, mining workings and underground quarries (Code des mines, page 43 etc., footnotes).
25. 7.1967 Law modifying the coordinated laws of 31.12.1958 with respect to workers' delegates as inspectors in coalmines (Code des mines, page 255 etc.).

10.11.1967 Royal decree No. 84 merging the Institut national des mines and the Institut national de l'industrie charbonnière (Inichar) (Code des mines, page 373).

B. Circulars with respect to application issued by the General Inspector of Mines

29. 3.1967 Circular 156b with regard to the application of the Royal decree of 16.9.1965 with regard to dust-suppression measures in underground workings in coalmines with regard to the special list envisaged in article 4.

18.12.1967 Circular 158 with respect to support and strata control in coalmines.

9. 5.1968 Circular 159 with respect to the application of type III explosives and type IV explosives.

FRANCE

The decrees, application orders of these decrees, and circulars have not been classified separately, for the sake of simplicity.

3. 1.1967 Decree determining the conditions of application of the decree of 12.9.1964 with respect to industrial medicine services in the mines: staff, accommodation and equipment (DM/HZ No. 58).
21. 2.1967 Decree determining the rules for approval and certification of exploders intended for use in mines (DM/HZ No. 61).
22. 3.1967 Decree and circular with respect to measures against alcohol addiction
31. 3.1967 in mines, mine workings and quarries (DM/H No. 165 - 67 241).
5. 5.1967 Decree approving the use of mobile or semi-stationary machines in underground workings in mines producing fuel, operating under voltages of 1,000 volts (DM/HZ No. 62).
1. 9.1967 Decree with respect to the checking of the insulation between polarity conductors or various phase conductors in mines producing fuel. Exemption from periodical checking provided that permanent supervision of the insulation is provided (DM/HZ No. 64).
25. 4.1968 Decree with respect to electrical equipment housed in safety flameproof housings. Protection of various boxes containing electrical gear by means of "upstream" circuit-breakers (DM/HZ No. 74).
24. 6.1968 Circular relating to the treatment of shotfiring incidents in mine and quarries (introduction of a new cartridge and cap into the shothole) (DM/H No. 249).
28. 9.1968 Decrees and circulars modifying the first heading (surface installation) and articles 96 or 97 of the general regulations (replacement of red
- 18.10.1968 light by a reflector arrangement at the tail end of a convoy) (68.8.64, 68.8.65 and DM/H No. 362).
- 9.10.1968 Decree and circular with respect to the use of methanometers by miners' delegates (DM/HZ No. 76 and DM/H No. 355).
- 9.10.1968 Decree and circular with respect to the use of flexible electrical cables in mines (DM/HZ No. 77 and DM/H No. 356).

NETHERLANDS

1. Supplementary provisions of application of the mines regulation regarding methane drainage (No. 230 of 24 November 1967).
2. Regulation provisions of application of the mines regulation regarding ventilation (No. 228 of 21 November 1968).
3. Supplementary provisions with respect to safety flame lamps (No. 108 of 6 June 1968).
4. Supplementary provisions for electrical equipment and electric coal apparatus at colliery surface sites (No. 98 of 21 May 1968).
5. Supplementary provisions of the mines regulation in respect of measures against fires in surface workings (No. 120 of 24 June 1968).



