COMMISSION OF THE EUROPEAN COMMUNITIES

SAFETY AND HEALTH COMMISSION FOR THE MINING AND EXTRACTIVE INDUSTRIES

16th REPORT

OF THE

SAFETY AND HEALTH COMMISSION

FOR THE MINING AND EXTRACTIVE INDUSTRIES

Year 1978

Doc. 3827/1/79 E LUXEMBOURG - March 1980

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SECTION I

I. INTRODUCTION

For several years, this report has been introduced by a brief review of the situation in the **coal mining industry** with a single table providing salient data on certain technical/economic and social aspects of relevance to health and safety in this sector.

This review has lost none of its importance despite the recession in the coal industry as this industry alone employs as much manpower as all the other mineral-extracting industries combined. Furthermore, as a result of the harmonization of statistics in this field, valid comparisons can be made between different years and the different Community countries.

This is not yet the case with regard to **the other mineral-extracting industries,** which work a wide variety of minerals by methods which vary widely. It has not yet been possible to draw up a single table grouping the essential data for these industries. As in last year's report, the production and manpower figures for these other mineral-extracting industries are shown separately country by country in Annex III. However, it has been possible to compile a single table for manpower, with a breakdown by method of extraction : deep mining, opencast mining, quarrying and by boreholes.

Similarly, fuel production and import figures have been brought together in a Community table covering coal, brown coal, crude oil and natural gas. The production figures are expressed in the units employed by the Statistical office of the European Communities (Eurostat).

1.1. COAL MINING ACTIVITIES

The statistics given below are drawn from the bulletin published by the Eurostat on 22 January 1979 and from information supplied by the national mining authorities (see following table).

1.1.1. In 1978, the situation in the coal-mining industry was characterized by an increase of 3 Mio t in demand despite a further drop of almost 7 Mio t in deliveries to coking plants as a result of the continuing difficulties of the steel industry.

Community production dropped less sharply than in previous years (0,9 o/o or 2 273 000 t as opposed to 2.9 o/o in 1977 and 3.6 o/o in 1976). Production in the United Kingdom indeed rose by 0.8 o/o, i.e. approximately 1 Mio t, whereas it had dropped in the previous year.

Community imports also decreased by 1.7 Mio t to 44 Mio t, i.e. 18.6 o/o of Community production.

Stocks held by producers and consumers dropped by 4.7 Mio t and 2.3 Mio t respectively (the reduction being 5.8 o/o for coal to offset the shortfall of production and imports and the increase in consumption.

This increase in demand can be attributed to the electricity generating stations, whose consumption rose by over 9 Mio t whereas coking plants reduced their consumption by 7 Mio t and the quantities consumed by other industrial and domestic customers were unchanged.

The workforce continued to decline in all countries (2.5 o/o for the Community as compared with 3 and 2.3 o/o in the preceding years).

Underground productivity, which had dropped slightly in the previous year, increased by 2.7 o/o. The productivity figures are no longer expressed in kg per manshift but in kg per man-hour. If the figures are converted assuming the same number of hours per shift in 1978 as in 1977 (8.71 hours/shift) the resulting OMS is 3 623 kg as opposed to 3 528 kg in 1977.

COAL MINING ACTIVITIES

		EUROPE IX	F. R. G.	France	Belgium	U. K.
Production (Mio t)	1976	247,7	96,3	21,9	7,2	122,2
	1977	240,4	91,3	21,3	7,1	120,7
	1978	238,1	90,1	19,7	6,6	121,7
Percentage change 1977/1976	o/o	- 2,9	- 5,2	- 2,8	- 2,3	- 1,3
1978/1977	o/o	- 0,9	- 1,3	- 7,5	- 6,8	0,8
Underground productivity per man hour in kg	1977	405,0	521	325,0	283,0	363,0
	1978	416,0	533	330,0	281,0	374,0
Underground productivity per OMS in kg	1977	3 528	4 139	2907,0	2 717,0	3 338,0
	1978	(3 623)	(4 234)	(2951,0)	(2 698)	(3 437,0)
		2,7	2,3	1,5	- 0,7	3,0
Underground workers on books (1000)	1977	372,4	123,7	39,0	17,9	191,2
	1978	363,2	120,9	35,8	17,4	188,7
Percentage change 1978/1977		-2,5	- 2,3	- 8,2	- 2,8	- 1,3
Number of working mines at the end of	1977	313	43	27,0	10,0	231,0
	1978			24,0		
Pithead coal stocks (1000 t) at the end of	1977	33,6	17,3	5,0	0,7	10,6
	1978	31,7	14,1	4,9	0,3	12,4
Percentage change 1977/1978		- 5,8	- 18,6	- 1,9	- 63,2	17,1
Percentage of outprut produced by mechanized means						
Mechanized winning	1976	97,7	98,4	86,9	97,9	98.6
	1977	95,3	98,8	87,0	100,0	93,8
	1978			87,6		
Powered supports	1976	86,9	86,3	41,7	56,5	96,5
	1977	87,4	89,6	42,1	61,1	95,2
	1978			46,8		

1.1.2. **General review of underground accidents in coal mines**

As in the previous year, this analysis can now be presented for the whole of the Community of Nine in the same form ; the number of hours was 557.16 as compared with 577.59 million in 1977.

1.1.2.1. Accidents resulting in an absence from work of between 4 and 20 days numbered 55 140 giving a frequency rate (number of accidents into number of hours worked) of 98.97 compared with 99,59 in 1977, i.e. a 0,62 o/o decrease.

1.1.2.2. Accidents resulting in an absence of between 21 and 56 days numbered 22 283 giving a frequency rate of 39.99 compared with 41.17 in 1977, i.e. a 2.88 o/o decrease.

1.1.2.3. Accidents resulting in an absence of more than 56 days numbered 6 472 giving a frequency rate of 11.62, compared with 11.49 in 1977 (an increase of 1.38 o/o).

1.1.2.4. There were 138 fatal accidents (including one group accident with 7 fatalities), compared with 116 such accidents in 1977 (including two group accidents with 18 fatalities).

The frequency rates were :

- 0.248 as against 0.201 in 1977 i.e. an increase of 23 o/o including the collective accident, although it is still below the rate for 1976 which was 0.300

- 0.237 as against 0.189 in 1977, i.e. an increase of 25 o/o excluding the collective accident.

1.1.2.5. The total number of accident victims (i.e. fatalities plus casulaties resulting in at least four days'absence from work) was 84 033, giving a frequency rate of 150,82, compared with 152,45 in 1977 - a 1,07 o/o decrease.

1.2. ALL MINERAL-EXTRACTING ACTIVITIES

1.2.1. Appended to this report are separate tables for each country covering the same headings as last year :

- **recto**
  a set of minerals selected last year as a suitable basis for an initial comparison ;

- **verso**
  a second group comprising a wider variety of minerals, which are not standard throughout the Community and which account for a considerable volume or value of production in the country in question.

1.2.2. Opposite each product are entries for the number of sites (or companies) production, and the units.

1.2.3. A distinction is made between the three methods of extraction (deep mining, opencast mining and quarrying, or boreholes.

Wherever possible, the manpower figures for these various methods of extraction do not include administrative and commercial staff nor the work force employed in downstream processing but they do include workers employed in preparation (crushing, concentration, cleaning, loading) the raw mineral for the market.

1.2.4. The following Community table was drawn up on the basis of these data on the method of extraction and work force.

WORKFORCE EMPLOYED IN THE MINERAL-EXTRACTING INDUSTRIES

Number and percentage

TYPE OF OPERATION		EUROPE IX	DEUTSCH-LAND	FRANCE	ITALIA	NEDER-LAND	BELGIQUE/ BELGIUM	LUXEMBG	UNITED KINGDOM	IRELAND	DENMARK
COAL MINES											
Deep mining	*N*........		184.024	54.814	163		23.023		248.100	265	-
	o/o.....		78,5								
Opencast mining	*N*.......		–			–		–	8.477	12	
	o/o....										
TOTAL		518.878	184.024	54.814	163	–	23.023	–	256.577	277	–
OTHER MINES											
Deep mines	*N*........		7.632	18.484	50.449	–	118	*not available*	5.165	18.626	*not available*
	o/o......		3,3								
Opencast mines........... and quarries	*N*........		35.493			> 83	11.391		39.910		
	o/o......		15,1								
TOTAL		> 188.351	43.125	18.484	50.449	> 83	11.509	~ 1.000	45.075	18.626	
Boreholes	*N*.......	> 10.712	7.338	–	–	2.463	–	–	–	> 911	–
	o/o.....		3,1								
			7.338	–	–	2.463	–	–	–	> 911	–
TOTAL	N........	> 717.941	234.487	73.298	50.612	> 2.546	34.532	~ 1.000	301.652	> 19.814	–
	o/o....		100,0								

1.3. COMMUNITY ENERGY PRODUCTION AND IMPORTS

The statistics given in the following table are drawn from the following bulletins published by the Statistical Office of the European Communities : 26.3.1979 Hydrocarbons, 14.2.1979 Natural Gas, 22.1.1979 and 16.2.1979 Coal.

1.3.1. Developments in the coal market are analysed in 1.1. In brief, there was a slight drop in production and imports despite a slight increase in consumption. This was covered by withdrawal from stocks.

1.3.2. Lignite production increased slightly in Germany in 1978 but was still lower than in 1976 and was declining in the other two producer countries, France and Italy, where the level of production is fairly low.

1.3.3. Oil production rose sharply by 33 o/o as a result of the spectacular increase in UK production ; the much lower levels of production in other countries remained fairly stable, with a drop in Germany and an increase in Italy.

Oil imports were decreasing, but total quantity available which had not varied from 1976 to 1977, increased slightly in 1978 by 6.3 Mio t.

1.3.4. In 1978, gas accounted for 18 o/o of Community internal energy consumption (7.4 o/o in 1970). It increased by 4.5 o/o which was less than the annual increase (14.3 o/o) for the period 1970-77. 71.4 o/o of consumption was covered by Community production. Development of new fields is in prospect, in particular in Ireland and Denmark, while production from existing fields, especially in the Netherlands, could decline.

PRODUCTION AND IMPORT OF COAL, GAS AND OIL IN THE COMMUNITY

		Eur. 9	D	F	I	NL	B	L	UK	Ir	Dk
COAL PRODUCTION Millions of tonnes	1976	247,7	96,3	21,9	0,2	-	7,2	-	122,2	-	-
	1977	240,4	91,3	21,3	0,1	-	7,1	-	120,7	0,05	-
	1978	238,1	90,1	19,6	-	-	6,6	-	121,7	0,03	-
COAL IMPORTS (from non Community sources).................	1976	42,6	4,3	13,8	10,0	3,8	3,5	0,1	2,4	0,5	4,2
	1977	44,2	4,0	15,6	10,3	3,8	3,2	0,1	2,	0,7	4,6
	1978	42,40	3,01	15,8	9,8	3,4	2,7	0,2	1,9	0,6	5,0
BROWN COAL Total production	1976	139,8	134,5	3,2	2,0	-	-	-	-	-	-
	1977	127,9	122,9	3,1	1,9	-	-	-	-	-	-
	1978	128,2	123,6	2,7	1,8	-	-	-	-	-	-
CRUDE OIL Production	1976	21,0	5,5	1,1	1,1	1,5	-	-	11,5	-	0,2
	1977	47,2	5,4	1,1	1,1	1,6	-	-	37,5	-	0,5
	1978	63,0	5,1	1,1	1,5	1,5	-	-	53,4	-	0,4
IMPORTS (from non Community sources)...............	1976	511,7	99,8	120,8	102,0	62,6	28,9	-	88,1	1,8	7,6
	1977	485,1	95,3	115,7	105,4	56,1	35,4	-	68,7	2,2	6,3
	1978	475,6	91,9	113,1	112,7	52,0	32,3	-	66,3	2,2	5,1
NATURAL GAS Production (in 10.000 T.J. PCS)	1976	649,2	67,6	27,7	60,0	342,1	0,1	-	151,7	-	-
	1977	649,1	67,2	29,9	52,6	340,7	0,1	-	158,5	-	-
	1978	616,7	73,5	29,4	51,1	311,1	0,2	-	151,5	-	-
IMPORTS (from non Community sources).................	1976	59,4	15,3	12,3	27,7	-	-	-	4,1	-	-
	1977	80,2	23,3	12,4	35,5	1,0	1,0	-	7,0	-	-
	1978	141,0	49,9	18,6	40,9	6,2	5,4	-	20,0	-	-
NATURAL GAS in milliards m3	1976	184,58	19,2	7,9	17,1	97,3	0,03	-	43,1	-	-
	1977	184,56	19,1	8,5	15,0	95,7	0,03	-	45,1	-	-
	1978	175,35	20,9	8,4	14,5	88,5	0,05	-	43,1	-	-
IMPORTS (from non Community sources).................	1976	16,9	4,4	3,5	7,9	-	-	-	1,2	-	-
	1977	22,8	6,6	3,5	10,1	0,3	0,3	-	2,0	-	-
	1978	40,1	14,2	5,3	11,6	1,7	1,5	-	5,7	-	-

* *Net imports i.e. Imports less exports : N.B. for petroleum products, the exports may be in a refined form.*

** *The conversion figure adopted has been that used for the Dutch gas fields of 35.17 MJ/m3 equivalent to 8 400 KCal/m3 (where volume is measured at 0o C and 1.01325 bar). Production and imports have been converted on this basis.*

1.4. GENERAL ACTIVITIES OF THE MINES SAFETY AND HEALTH COMMISSION

1.4.1. Meetings held

The Mines Safety and Health Commission met on 6 April, 11 July and 1st December 1978, preparatory meetings of the Restricted Committee being held on the previous days.

In addition, there were 25 meetings of Working Parties, of which, 6 were held at mines. The M.S.H.C. believes that these visits are most useful, not only in a technical sense, but also due to the contact between the members of the Working Parties and producers and workers on site. To advance the work of these groups, 23 meetings of expert committees, and 16 meetings of an editorial nature were held.

An information symposium was held on 28 and 29 September 1978 for the benefit of workmen's inspectors, and a conference was held on 11, 12 and 13 October 1978 on the "Medical aspects of deep-sea diving".

1.4.2. **Group accidents** (i.e. accidents resulting in the death or injury with eight weeks' absence from work of at least five victims).

- On 6 April 1978, at the Rheinische Braunkohlenwerke A.G. lignite mine erectors fell 36 m from a platform and were killed. This accident was discussed by the MSHC on 11.7.1978 *(cf. Section III).*

- On 21.11.1978, at the Bentley Mine in the United Kingdom, a man-riding train went out of control following a derailment. Seven people were killed and three others seriously injured. Discussion of this accident has had to be postponed until 1979, and will be reported on in the 17th Report.

1.4.3. Decisions of the Mines Safety and Health Commission

The following were approved :

- Proposal to Governments on two methods of "Check testing of conveyor belts with textile carcass".
  (meeting of 6.4.1978 - cf 2.1. and Annexe VI).

- Report on the "Health hazard arising from conveyor belts"
  (Meeting of 11.7.1978 - cf. 2.1.2.2.)

- Report on "Comparative testing of conveyor belts with canvass carcass during 1976. Report and test results".
  (Meeting of 11.7.1978 - cf. 2.1.2.3.)

- Proposal to Governments on "Safety techniques in the winning area".
  (Meeting of 11.7.1978 - cf. 2.9.2.; already published in Annexe VIII to the 15th Report).

- Proposal to Governements on the "Harmonization and application of safety signs at work in coal mines".
  (Meeting of 1.12.1978 - cf. 1.4.11 and Annexe VII).

- Proposal for a Council Directive on the "Harmonization of the laws of the Member States concerning electrical apparatus for use in potentially explosive atmospheres in gassy mines".
  (Meeting of 1.12.1978 - cf. 2.3.2.1.).

- With a view to preventing uncontrolled offshore blowouts of petroleum and gas, the following two proposals were submitted to the Member States' Governments :

- One on the basic information to be included in offshore drilling programmes ;

- the other on drilling wellhead safety installations offshore.
  (Meeting of 1.12.1978 - cf. 2.11.2 and annexes X and XI).

1.4.4. Also attached as annexes to this report are the following texts, which were examined on 1.12.1978, final adoption of which has had to be postponed until March 1979 :

- Proposal to Governements on the "Construction of gateside packs for long-wall faces".
  (cf 2.10 - annexe VIII)

- Report on the "Use of filter self-rescuers in coal mines in the Community of Mine".
  (cf. 2.1.3. and annexe IX).

1.4.5. **Information symposium for workmen's inspectors held in Luxembourg on 28 and 29 September 1978.**

1.4.5.1. The symposium was attended by :

- 75 workmen's inspectors from all the Community Member States (with the exception of Ireland and Denmark) ;

- A delegation from the Safety and Health Commission (the workers' representative and a government representative from each of the Member States, together with the employers'representatives from Luxembourg and Belgium) ;

- Mr. Wallin, Head of the I.L.O.'s Work Administration Department in Geneva, representing the I.L.O. ;

- Mr. Stenuit, Inspector-General of Belgian Mines, who acted as rapporteur at the symposium.

1.4.5.2. Dr. RECHT opened the information symposium by underlining the significance of this work for all industrial sectors where the question of workmen's inspectors was currently under study, with special reference to the general programme of safety and health at the workplace.

1.4.5.3. The following papers* were given :

- a description by the Secretary of the Safety and Health Commission of the history and work of the MSHC ;

- a summary, for seven of the nine Member States, of the I.L.O.'s survey conducted in 1974 of workers'participation in inspection work in mines, to which to present rapporteur, Mr. Stenuit, had contributed ;

- papers by Mr. Brinkhoff (Federal Republic of Germany), Mr. Renders (Belgium), Mr. Nowak (France), Mr. K. Walker, Mr. Fisher and Mr. Craviotto (Italy).

1.4.5.4. Another talk was given by Mr. Tracey, in which he deplored Ireland's sluggishness in this field, despite its long mining tradition.

1.4.5.5. The papers were followed, on the afternoon of 28 September, by more statements and requests for information.

1.4.5.6. These were summarized by Mr. Stenuit on 29 September.

Mr. Wallin then went on to describe the role of the I.L.O., recalling the international agreement of 1947 on cooperation between work inspection officials, employers and workers. He looked forward to a shift in inspection work in the industrialized countries over the next few years, with increasing workers' participation,as was already the case in the coal industry. In fact, the coal industry had played a pioneer role in this field, which had given rise to the I.L.O.'s 1974 survey referred to earlier.

1.4.5.7. The ensuing exchange of views concentrated on the powers of the workmen's inspector, whether based on legislation (particularly in Belgium where inspectors had the right to call a halt to work in the case of imminent danger) or resulting from the experience and personal qualities of the workmen's inspector together with other factors, as in France, the United Kingdom and the Federal Republic of Germany. The systems varied greatly from country to country, although the positive aspect of the work of workmen's inspectors had been encouraged in most countries. A case in point was the Federal Republic of Germany, where the workmen's

** see doc. 4282/79 F (other languages : E - D - I - N - DK appearing shortly)* inspectors now enjoyed a large measure of confidence compared with the suspicion with which inspectors used to be regarded.

It would appear that, in all the Member States, the workmen's inspectors are generally satisfied.

1.4.5.8. However, when it came to drawing conclusions from the symposium, there was an evident desire on the part of all the delegations to work towards a long-term harmonization of the various systems, with special reference to the powers of the workmen's inspectors.

Some delegations did not want the legal powers available to their Belgian colleagues to call a halt to work in the presence of imminent danger. There was a general feeling that the exchange of views had been extremely interesting and should be continued under the auspices of the MSHC.

One possibility would be to constitute an ad hoc committee of experts under the auspices of the Working Party on Human Factors. The I.L.O. representative thought this would be a highly important development and he hoped he would be able to play his part in the ongoing work.

1.4.5.9. The conclusions were put to the MSHC on 1 December 1978, where the question was referred to the Working Party on Human Factors.
(cf Chapter G - 2.7.)

1.4.6. Information symposium held on 12 and 13 October 1978 on the "Medical aspects of deep-sea diving". *

1.4.6.1. The symposium was organized by the MSHC Secretariat, which closely follows and participates in the work of the European Diving Technology Committee (EDTC) in collaboration with the "Industrial medicine and hygiene" Division of the Commission's Health and Safety Directorate, the European Undersea Biomedical Society and the EDTC's Medical Committee.

* *see doc. 5204/79 E - F - D - I – N - DK*

1.4.6.2. The MSHC's interest in the problem of deep-sea diving related to the risks run by divers.

1.4.6.3. 170 medical experts in diving from 19 countries examined the medical aspects of deep-sea diving (i.e. to depths of more than 400 m) in connection with prospecting for, and exploitation of, offshore oil and gas reserves. The problems presented by the enormous pressures (cf up to 40 atmospheres) experienced by divers clad in lightweight diving gear were the subject of 16 papers, discussions and round-table sessions, with attention focusing on what medical action should be taken in the case of an accident.

1.4.6.4. The information symposium proper was preceded by a seminar on the long-term health risks run by divers.

1.4.6.5. The recommendations resulting from this seminar and from the information symposium will be dealt with jointly by the medical section of the Commission's Health and Safety Directorate and the MSHC's Working Party on Petroleum and Gas.

1.4.6.6. The full record of the proceedings of the symposium has been published by the Commission of the European Communities in English, and German and French versions will be appearing shortly.*

The first contributions are already available in the six languages of the Community from the MSHC Secretariat.

1.4.7. **Title of the MSHC**

1.4.7.1. When the responsibilities of the Safety and Health Commission were extended to all the extractive industries by the Council Decision of 27 june 1974 (Annexe I), the terms of reference and the internal regulations of the MSHC did not undergo any change. At its meeting on 6.4.78 the MSHC decided on its new title in the six Community languages.

1.4.7.2. In its deliberations, the MSHC took into account its new range of activities and also the fact that while the translations of the original French title were not always exact equivalents, they had become accepted usage in the countries concerned.

* *see doc. 5204/79*

- Organe Permanent pour la Sécurité et la Salubrité dans les Mines de Houille et les autres Industries extractives.

- Ständiger Ausschusses für die Betriebssicherheit und den Gesundheitsschutz im Steinkohlenbergbau und in den anderen mineralgewinnenden Industriezweigen.

- Safety and Health Commission for the Mining and Extractive Industries.

- Organo Permanente per la sicurezza e la salubrità nelle miniere di carbone e nelle altre industrie estrattive.

- Permanent Orgaan voor de veiligheid en de gezondheidsvoorwaarden in de steenkolenmijnen en andere winningsindustrieën.

- Det Staende Udvalg for Sikkerheds- og sundhedsforhold i Miner og anden Udvindingsindustri.

1.4.8. **Safety campaigns**

At its meeting on 11 July 1978, the MSHC decided to give a boost to the safety campaigns supported by the MSHC (and for which Bfrs 1.5 million are set aside in the budget).

It was decided that this money should be spent in 1978 on safety in quarries and particularly on mobile equipment in Tuscany quarries. (cf. Chapter G - 2.7.).

1.4.9. On 11 July 1978, the MSHC adopted its 15th Report (covering 1977).

For a variety of administrative reasons - including insufficient staff in the Secretariat - it was not possible to print this report until mid-1979.

1.4.10 Examiniation of the 12th, 13th and 14th MSHC Reports by the European Parliament on 13 October 1978.

1.4.10.1. The Restricted Committee took note of the record of the relevant plenary sitting of Parliament on 30 November 1978, but the MSHC was not able to do so until 27 March 1979.

Nevertheless, the result of this examination is included in this report.

1.4.10.2. The MSHC Report was examined annually by the European Parliament up to 1974, when Parliament's Committee on the Environment, Public Health and Consumer Protection decided to examine the reports in batches of several years, together with the reports on the activities of the Steel Industry Safety and Health Commission.

1.4.10.3. The European Parliament resolution concerning the 12th, 13th and 14th Reports is reproduced in Annex XIV.

1.4.10.4. This resolution praises the work of the MSHC and deplores the inadequate level of staffing in its Secretariat in articles 1, 2, 3, 7, 10 and 11. Articles 3 and 7 impute the shortcomings of the MSHC to the lack of staff, particularly in the field of common statistics for all the extractive industries, and, in general, in non-coalmining activities resulting from the extension of the MSHC's responsibilities in 1974.

1.4.10.5. The Member of the Commission of the European Communities has undertaken to assure the efficient working of the MSHC.

1.4.10.6. The Restricted Committee, followed by the Safety and Health Commission proper, have given their full backing to the European Parliament's resolution concerning the need for more staff in the Secretariat, and have stressed the need for the Working Party on Health in Mines to resume its work, particularly on the stipulation of respirable dust limits, in view of the importance of the dust problem.

1.4.11. **Applicability to mines of Council decisions taken without consulting the MSHC.**

The 15th Report pointed out that the MSHC had obtained the agreement of the Commission of the European Communities that a directive on safety signs should not apply to mines. The MSHC now fears that there may be other Council Directives in the pipeline which have been drawn up without prior consultation of the MSHC. The case of noise limits on compressors has been cited, but, as it turns out, its scope does not extend to mines.

SECTION II

ACTIVITIES OF THE WORKING PARTIES

CHAPTER A

RESCUE ARRANGEMENTS, MINE FIRES AND UNDERGROUND COMBUSTION

2.1.1. The Working Party on its committees of experts held 18 meetings as follows:

- 4 meetings of the full Working Party, on the 31.1. - 16.6 - 11-12 Sept. and 9 Nov. 1978.

- 10 meetings of the Committees of Experts
  - on Fire-resistant conveyor belts and other long items of plant . . 5
  - on Fire-resistant fluids. 1
  - on filter self-rescuers. 2
  - for preparing a summary report on two recent fires/explosions. . 2

In addition, there were 4 meetings of an Editorial Committee for the Fire-resistant fluids.

2.1.2. In 1978, the activities of this Working Party gave rise to three decisions of the Safety and Health Commission :

2.1.2.1. **Proposal to Governments on two tests for the quality control of conveyor belts with fabric carcasses.**

The proposal was approved by the Safety and Health Commission on 6 April 1978 and is appended as Annex VI.

This document supplements the "First Report on Tests and Criteria of Flammability of Conveyor Belts with Fabric Core" which was published as Annex VI to the 12th Report of the MSHC - July 1975.

The two fairly complicated and expensive tests described in the First Report - the drum friction and propane burner tests - are used for Approval of types of fire-resistant belts.

the two tests proposed in the latest document - the Barthel burner and critical oxygen index tests - are simple tests suitable for routine quality control to check that individual belts still exhibit the same fire-resistant properties as the type approved .

(see 2.1.2.3.)

The testing stations have agreed to carry out a three-year experimental programme (as from 6 april 1978). After analysis of a sufficient mass of experimental data for the results to be significant, the two tests will be re-examined and possibly codified.

The document is submitted to the Governments as an information report as the testing stations have themselves reached agreement on the experimental programme and there is no need for government action.

2.1.2.2. **Information report on "Health hazards arising from Conveyor Belts"**

The report describes a test carried out in the Federal Republic of Germany to assess the effectiveness of self-rescuers in protecting users against the combustion products of conveyor belts and the effect of such products on the skin. The apparatus used for the first of these purposes involves animal tests using a reproduction of a mine roadway on a scale of 1 : 1 000.

In the testing stations the tests are currently supplemented by full -scale trials to assess the concentration of thermal decomposition products.

Experiments are being conducted along the same lines in non-mining sectors, and collaboration would be desirable.

2.1.2.3. **Information report on "Comparative Testing of Conveyor Belts with textile carcasses during 1976 - Report and test results".**

This document describes and compares the results of a large number of "round robin" tests carried out in 1976 in the testing stations of INIEX in Pâturages, CERCHAR in Verneuil-en-Halatte, Versuchsgrubengesellschaft mbH in Dortmund and NCB Scientific Control, Regional Laboratory in Mansfield-Woodhouse.

Each of these laboratories had supplied 24 m of 1 m wide conveyor belting with fabric carcass, which was representative of the types generally used in the country in question. In each laboratory, these belts were subjected to the following tests :

- propane burner ;
- drum friction (as described in Annex VI to the 12th Report) ;
- Tremonia laboratory fire gallery (described in DIN 22 118) ;
- Barthel Burner (NCB method of test) ;
- determination of the critical oxygen index (ASTM D 2863-74).

These tests confirmed the existence of as yet unexplained differences between the results for belts with covers of polyvinyl chloride (PVC) and chloroprene (CR). But the series of tests has helped to determine the test conditions which affect the results and steps have been taken to harmonize the methods of test in the various laboratories concerned.

A further cycle of tests would be desirable. These tests have, however, established that while the Barthel burner and oxygen index methods were not always comparable with the propane burner and drum friction tests, they at least yielded sufficiently reproducible results to be used as quality control tests. (see 2.1.2.1.).

In view of its size, the document has not been appended to the present Report, but it is available on request (in F-E-D-I-N-DK) from the Secretariat of the Safety and Health Commission. Bibliography.

2.1.3. **Work completed in 1978**

2.1.3.1. **Information Report on the Use of filter self-rescuers in European coal mines. Part III : Possibilities of improvement.**

This document was not approved until 27 March 1979 by the Safety and Health Commission at whose request it is appended as Annex IX.

It follows on from parts I and II of the same report ; Part I relating to design requirements and testing procedures (Annex X to the 13th Report), and Part II relating to maintenance and training (Annex VII to the 14th Report).*

* see off-print 3919/79 in E-F-D-I-N-DK

Part III describes the limits to possible improvements of this device, which is regarded as having reached its maximum potential. At the same time, attention is drawn to the merits of self-contained self-rescuers operating on oxygen produced by chemical reaction. (see 2.1.4.).

2.1.3.2. **Health criteria for fire-resistant fluids**

The medical experts of the Committee on Fire-resistant fluids completed their revision of the tests mentioned in the 5th Report on fire-resistant fluids. The new tests proposed do not involve any basic changes but rather a refinement of the criteria set out in the 5th Report. They will be submitted in 1979 to the Working Party and the Safety and Health Commission.

2.1.4. **New activities**

2.1.4.1. **Self-contained self-rescuers operating on oxygen produced by chemical reaction.**

A study of this topic was undertaken by the same Committee of Experts and along the same lines as for filter self-rescuers, starting with design requirements, tests and criteria to be satisfied by these devices. The first part of the study will be available at the end of 1979.

2.1.4.2. On being informed of the accidents at Schlägel und Eisen (27 Oktober 1977 - 7 dead) and Merlebach (30 september 1976 - 16 dead), the Working Party decided to set up a study and drafting group to establish the points of similarity between these two accidents, in the course of which rescue workers were killed.

2.1.5. **Work already mentioned in previous reports.**

2.1.5.1. **Fire-resistant fluids**

The Committee of Experts visited the Safety in Mines Research Establishment (SMRE) in Buxton on 13 and 14 June and studied the apparatus developed for fire-resistance testing of fluids.

This new test will be included in the 6th Report as a harmonized test. It measures the length of flame produced by the jet of atomized fluid when the igniting flame is held in the jet and permits graduated assessment and hence classification of the fire resistance of all fluids.

Revision of the 5th Report involves not only the health criteria previously mentioned but also updating of the technological criteria. This work will be completed in 1980.

2.1.5.2. **Protection of workers against oxygen deficiency and smoke.**

The Working party visited the Gardanne Colliery on 11 and 12 September 1978 to acquaint itself with a method developed there in the light of local conditions : withdrawal into cul-de-sac workings, pressurized refuge chambers. Trials of the new autonomous self-rescuers with chemically produced oxygen are in progress in this colliery. (see 2.1.3.1.)

CHAPTER B

WINDING ROPES AND SHAFT GUIDES, WINDING ENGINES AND WINCHES

2.2.1. **Number of meetings 6**

- 3 meetings of the Working Party on 21 February, 7 June and 24 October 1978
- 3 meetings of editorial committees.

2.2.2. The Working Party set up three committees of 6 to 7 experts to carry out studies and draft documents for submission to the Working Party and pursuant to its remit in the following fields :

a) highly-worked ropes and rope breaking loads, reduction of dead weight, rope testing conditions ;

b) magnetic induction testing, non-destructive materials testing ;

c) winder brakes, shaft guides, conveyance arresting devices.

2.2.3. **Work was continued on the tasks mentioned in the previous Report**

2.2.3.1. **Highly-worked ropes - Maintenance of the safety standard and improvement of the safety of highly-worked friction winding ropes of stranded construction*.**

The Working Party completed its scrutiny of this document, which will be submitted to the Safety and Health Commission in the course of 1979*. The document, which was drawn up by the Rope Testing Centre of the Westphälische Berggewerkschaftskasse in Bochum, set out the criteria for "highly-worked ropes" and prescribed additional supervisory measures and tests to offset the difficulty of determining the time of discard for such ropes (more rapid wear and marked reduction in the time elapsing between detection of the first signs of weakening and the date of discard based on a given loss of strength).

The criteria laid down also apply to flat ropes for use on reel winders but not to ropes of locked-coil construction.

* *see Annex IV* *Doc. 3171/2/77 is available in the six Community languages from the Secretariat of the Safety and Health Commission.*

2.2.3.2. **Uniform safety regulations for winding ropes and cappings**

(doc. 5379/78)

Work is continuing on harmonization. A select editorial committee was instructed to draw up a uniform definition of the strength loss factor.

2.2.3.3. **Measuring rope tension in multirope winding installations.**

(doc. 5937/78)

The Working Party began its scrutiny of this document.

2.2.4. **Studies and research**

The Working Party acquainted itself with the present status of the studies and research work which it had proposed and for which financial assistance had been provided by the Commission.

2.2.4.1. **Electromagnetic rope testing**

Comparative tests of various devices from the United Kingdom, France, Belgium, Germany, Switzerland and Poland were carried out at the SMRE in Sheffield on 6 ropes, mostly of locked-coil construction, one of which had artificial defects. These tests were carried out at the request of the Working Party to see whether the new devices permitted detection of a wider range of defects than at the time of the previous studies in 1965. The Working Party visited Sheffield in 1979 and found that the quality of detection had in fact been improved. An account of these trials will be included in the 17th Report.

2.2.4.2. **Functional and safety analysis of winding engine and winch brakes.**

The first half-yearly technical report has been submitted on this research project, which was undertaken in the Federal Republic of Germany, France and the United Kingdom following the Markham disaster.

2.2.4.3. **Rope guides.**

(Doc. 4704/78)

Financial assistance for a study of this topic was requested by the Versuchsgrube Tremonia and granted by the Commission.

CHAPTER C

ELECTRICITY

2.3.1. Number of meetings

- six meetings of the full Working Party on 11/12 January, 7/8 March, 10/11 May, 29/30 June, 20/21 September and 28/29 November 1978.

- two preparatory meetings.

2.3.2. In the course of the twelve days on which it met, the Working Party completed its scrutiny of the European Standards drawn up by CENELEC for the design of electrical equipment for use in potentially explosive atmospheres.

2.3.2.1. The Working Party considered the amendments and additions required to make the standards applicable to gassy mines.

It drafted a proposal for a directive of the Council of Ministers on free movement of electrical apparatus for gassy mines, to which the following are appended :

- the European standards, with the amendments and additions mentioned above ;
- a draft standard on intrinsically safe electrical systems, which was also drawn up by the Working Party ;
- an explanatory memorandum.

2.3.2.2. These documents were submitted to the Safety and Health Commission at its meeting on 1 December 1978 together with a report by the Working Party (doc. 3272/5/78). Unanimous agreement could not be reached on Art. 1421 of European standard EN 50.018, and its adoption was put to the vote.

2.3.2.3. The Safety and Health Commission adopted this proposal for a directive together with its annexes, with 7 delegations voting for adoption, the Danish delegation abstaining, and the German delegation voting against because particle-proof testing of flameproof enclosures was not included in Art. 1421.

The proposal for a directive of the Council of Ministers will be submitted to the Council by the Commission of the European Communities, for which the Safety and Health Commission has acted as a consultative body. This is an unusual procedure for the Safety and Health Commission because of its special terms of reference and was adopted by way of exception because gassy mines had been excluded from the scope of Council Directive 76/117/EEC of 18 December 1975 on the approximation of the laws of the Member States concerning electrical equipment for use in potentially explosive atmospheres (1) and of Council Directive 79/196/EEC of 6 February 1979 (2) providing for certain types of protection which may be employed to implement the former Directive.

It was therefore desirable that apparatus for use in mines should be subject to the same procedure as that designed for potentially explosive atmospheres above ground.

2.3.2.4. During its scutiny of the European standards, the Working Party sent Technical Committee 31 of CENELEC solutions to the following problems :

- maximum surface temperature of electrical apparatus ;
- switchgear with and without oil-immersed contacts ;
- padlocking of isolators to ensure that underground apparatus can be maintained and repaired in complete safety ;
- light alloys.

Other problems were also considered, viz :

General requirements :
- design of enclosures of plastic materials to preclude any ignition hazard resulting from electrostatic charges ;

Flameproof enclosures :
- use of insulating materials,
- plugs and sockets,
- testing of empty enclosures,
- rules relating to switchgear, lamp holders and lamp caps and to enclosures of non-metallic materials.

(1) Published OJ L 24 of 30.1.76 - pages 45/48
(2) Published OJ L 43 of 20.2.79 - pages 20/22

Intrinsic safety :

- interconnection of intrinsically safe electrical apparatus - drafting of a supplementary standard on "Intrinsically safe electrical systems".

CHAPTER D

FLAMMABLE DUSTS

2.4.1. **Number of meetings** **5**

- one meeting of the full Working party on 2.oct. 1978,
- four meetings of an editorial committee.

The Working Party continued its study of stonedusting, devoting particular attention to means of checking the proportion of inert dust, determination of the requisite percentage of non combustibles remaining the prerogative of the individual countries. Methods of checking the inert content were studied and described by a small committee.

This work is virtually completed and will be submitted to the Safety and Health Commission in 1979.

CHAPTER E

COMMON ACCIDENT STATISTICS

2.5. The Working Party met on 16 March 1978.

Once it had set up a framework for common accident statistics for the coal mines of the Community of Six, this Working Party discontinued its activities for a fairly long period. As early as 1977, the United Kingdom was able to provide its statistics of accidents in coal mines in the same form as the founder members of the Community. At its meeting on 16 March 1978, the Working Party considered a possible layout for the extension to all extractive industries of the economic and social statistics which introduce the annual Report. It was able only to touch on the more complex problem of extending the scope of the accident statistics to cover all the extractive industries.

CHAPTER F

HEALTH IN MINES

2.6. The Working Party did not meet in 1978 as the Secretariat lacked the necessary staff.

The M.S.H.C. regrets this as the subject is judged to be important, and once again it wishes to reiterate the statement that the Secretariat must be properly staffed.

CHAPTER G

HUMAN FACTORS

2.7.1. **Number of meetings 3**

- one meeting of the full working party on 16 february 1978
- one meeting of the experts on safety campaigns
- one preparatory meeting.

2.7.2. The Working Party scrutinized a study by a group of German experts on "Measures relating to the safety training of mine workers employed in the mines of the European Community". This study was subsidized by the Commission of the European Communities.

It reviews the systems, methods and arrangements for training of workers, especially in relation to safety, in each of the coal-producing countries of the European Community. The Working Party amended the document and enlarged the scope of its conclusions which are applicable not only to coal mines but also to other mines. This study will be submitted to the Safety and Health Commission in 1979.*

2.7.3. The Working Party also considered the possibility of putting into practice one of the recommendations of this study, viz. the development of training methods which would be more effective than in the past in incluencing the attitude and behaviour of workers with regard to safety and hygiene at the workplace. It proposed that a preliminary study should be carried out, with financial assistance from the Commission, by the National Coal Board**.

* *Approved on 12 june 1979* ** *Assistance granted in the course of 1979.*

2.7.4. Pursuant to the decision of the Safety and Health Commission of 11 July 78, which is mentioned in section 1.4.8., the Committee of Experts on Safety Campaings considered various aspects of safety campaigns in quarries and open-cast mines, with particular reference to propaganda media, i.e. films, slides, pamphlets and posters.

CHAPTER H

VENTILATION, FIREDAMP AND OTHER MINE GASES

2.8.1. **Number of meetings 6**

- 3 meetings of the full Working party on 8 February, 5/6 June and 31 October 1978 (held at Gardanne Mine).
- 1 meeting of the Committee of Experts on Firedamp Monitoring Instruments.
- 2 preparatory meetings.

2.8.2.1. The Working party continued and virtually completed its earlier work (described in section 2.8.3.1. of the 15th Report) on controlling the firedamp risk arising during drivage and following the abandonment of cul-de-sac and other old workings, in pursuance of the remit handed down by the Safety and Health Commission after the accidents at Lens-Liévin (27 December 1974), Houghton Main (12 June 1975) and Luisenthal (21 July 1976).

2.8.2.2. With a view to establishing the minimum requirements in respect of measures to be taken in cul-de-sac workings, it examined the report by the committee set up in the United Kingdom after the explosion at the Houghton Main Colliery (South Yorkshire). The title of this document is "Report of the National Committee to examine all aspects of the ventilation of narrow drivages".

(cf doc. 4293/78, available from the Secretariat in f - d - e).

The results of this work will be submitted to the Safety and Health Commission in 1979.

2.8.3. The Working Party began work on the additional remit handed down by the Safety and Health Commission on 11 July 1978.

"Ventilation aspects of the use of heading machines with dedusting equipment".

It studied the following documents :

- circulars from the Chief Mines Inspectorate for North Rhine Westfalia *Doc. 2917/77 and 3718/78*

- Report by the Saarbergwerke AG . . . . *Doc. 3719/78*
- Ventilation in the vicinity of heading machines with dust collection equipment by Messrs Dupré and Graumann. *Doc. 4934/78*

CHAPTER I

MECHANIZATION

2.9.1. **Number of meetings . . . .** **4**

Including one meeting of the full working party on 20 October 1978.

2.9.2. The fields which the Working Party selected are as follows :

- mechanization in the winning area, which was the subject of a recommendation (proposal to Governments) approved by the Safety and Health Commission on 11 July 1978, and appended as Annex VIII to the 15th Report.
- safety aspects of transport by conveyor belt ;
- safety aspects of transport by diesel locomotive.

The in-depth studies are carried out by a select study and drafting group which held three meetings in 1978.

2.9.3. The document drawn up always follows the same pattern : general observations (and terms of reference) ; definitions ; basis for proposals - analysis of accidents and exceptional occurrences, most frequent causes of accidents ; proposals to Governments, forming the main body of the report and comprising principles, primary safety measures, secondary safety measures and guidance on information, instructions and accident prevention.

2.9.4. The document on transport by conveyor belt has been completed and will be scrutinized by the Working Party on 5 September 1979.

The document on diesel locomotives will be submitted to the Working Party in 1980.

(see doc. 3710/77

CHAPTER J

STRATA CONTROL AND STABILITY OF GROUND

2.10.1. **Number of meetings 5**

- 2 meetings of the full working party on 21 April and 21 November 1978.
- 3 meetings of the committee of experts.

2.10.2. **Work completed**

2.10.2.1. The working party completed the drafting of an information report on "Construction of gateside packs for longwall faces" . Although the Safety and Health Commission did not scrutinize this report until 27 March 1979 it directed that it should be appended to the present Report to ensure more rapid distribution.

2.10.2.2. The report describes the various mechnized and non - mechanized methods of putting on gateside packs ; the advantages from the safety point of view consists in the improvement of roadway behaviour with a consequent reduction in falling of blocks of material and greater safety during transport of men and materials together with an improvement in ground stability at the face ends. Certain methods which eliminate leakage paths improve the ventilation and reduce the likelihood of heatings.

2.10.2.3. In view of the considerable potential of these methods, the Safety and Health Commission proposed that further tests should be carried out with various types of mechanized and pneumatic/hydraulic systems for the construction of gateside packs under as wide a range of conditions as possible and that the results should be carefully recorded and summarized. These results would be of value in preparing systems to improve general safety standards in mines.

2.10.3. **Work in progress.**

2.10.3.1. **Prevention of rock bursts**

As mentioned in the previous report, the importance of this topic was underlined by a bump which occurred at the Gardanne Colliery on 15 June 1977, killing one mineworker. The Working Party instructed a group of specialists to look into the question and to draw up a code of good practice to reduce the risk of rock bursts. This report will be scrutinized by the Working Party in 1979 in the light of other lessons to be derived from a further rock burst which has occurred this year (1979) in the Federal Republic of Germany, killing five miners.

2. 10.3·2. Work on powered supports for steep seams was resumed after receipt of the conclusions of the "Final Report of the National Committee on steep seam working in British coal mines".

This Committee had been set up following the fall of roof which occurred at Seafield Colliery on 10 May 1973.

The report is available from the Secretariat as doc. 2715/78 (e - f - d).

CHAPTER K

OIL, GAS AND OTHER MATERIALS EXTRACTED BY BOREHOLE

2.11.1. **Number of meetings** **7**

- 3 meetings of the full Working Party on 2 February, 27 June and 20 December 1978.
- 4 meetings of the Committee of Experts on Well Control, which is primarily concerned with prevention of blowouts at offshore wells.

The Working Party, which initially was composed exclusively of government representatives, was enlarged in 1978 to include representatives of the operators and workers.

2.11.2. The Committee of Experts formed in July 1977 after the blowout on the Bravo platform in the Ekofisk field on 22 April 1977 has completed the first two parts of a series of five proposals to be submitted to the Governments.

These two proposals were scrutinized by the Working Party and submitted on 1 December 1978 to the Safety and Health Commission, which adopted them in pursuance of Articles 1 and 4 of its terms of reference. They are appended to the present Report as Annexes X and XI.

- Basic information which should be contained in drilling programmes of offshore wells ;
- Drilling wellhead safety installations offshore.

2.11.3. The same Committee of Experts has also completed two further proposals to the Governments :

- Production well completion offshore *(doc. 2487/4/78)*
- Workover programme offshore *(doc. 4945/4/78)*

These proposals will be submitted to the Safety and Health Commission in 1979 after approval by the Working Party.

2.11.4. The Committee of experts has still to complete its report on training of rig personnel.

2.11.5. The Working Party will define the tasks deriving from its remit other than those concerned with blowout prevention, to which it had been instructed to give priority.

SECTION III

ACTION TAKEN BY GOVERNMENTS ON THE PROPOSALS OF THE SAFETY AND HEALTH COMMISSION FOR THE MINING AND OTHER EXTRACTIVE INDUSTRIES

Presentation of the replies to the questionnaire sent to national mines authorities every two years for updating to 1 January 1978 had to be deferred from the 15th to the 16th Report, where they are given in Annex V.

This questionnaire will be updated to 1 January 1980 and will be accompanied by a critical analysis with appropriate commentaries in the 17th Report.

SECTION IV

4.1.1. At the end of this chapter there are the following tables :

- A and B :
  Frequency rates for serious injuries (A) and fatalities (B) for each of the countries of the Community of the Six since 1958 and frequency rates for fatalities (B) since 1973 and serious injuries (A) since 1977 for the United Kingdom.

- C :
  Group accidents by cause for the Community as a whole.

- D :
  Summary tables for the Community of the Six since 1958 and the United Kingdom since 1973.

- I a and I b :
  Victims of accidents by cause and site of accident and period of incapacity in absolute figures (a) and frequency rates (b).

- 2 a :
  Victims of accidents by location and nature of injury for periods of incapacity exceeding 56 days and for fatalities in absolute figures (a). The tables of frequency rates, which are not very representative, are not included but are available from the Secretariat.

Tables 1 and 2 are given by country for the Community of the Nine, together with a Community table, and refer to 1978. They are available from the Secretariat by coalfield.

4.2. It is now possible to analyse changes between the past year and the two previous years for the Community of the Nine ; reference will no longer be made to the Community of the Six in analyses of this type. However, the distinction between the Community of the Six and the Community of the Nine is maintained in order to permit monitoring of long-term trends (21 years).

4.3. Analysis of the 1976, 1977 and 1978 statistics for the Community

As mentioned in $1.1.2., the frequency rates for the least serious accidents fell and those for serious and fatal accidents went up between 1977 and 1978, whereas between 1976 and 1977 there were decreases for all the categories of accidents (statistically significant at 95 o/o confidence level, except in the case of accidents resulting in incapacity of more than 56 days).

In the comparison between 1978 and 1977, the decreases of 0.62 o/o for accidents resulting in absence from work of 4-20 days and 2.88 o/o for those resulting in absence of 21-56 days, as well as the increases of 1.38 o/o for accidents resulting in absence of more than 56 days and 23 o/o for fatalities are not statistically significant at 95 o/o confidence level, except in the case of accidents resulting in absence from work of 21-56 days.

The situation may be summarized as static with a slight improvement.

In absolute figures, accidents resulting in more than 4 days' incapacity and fatalities totalled 84 033 among 320 996 registered workers who worked a total of 557.16 million hours. One in every 3.82 registered workers was thus injured (or killed) during 1978, which represents, to be more precise, a frequency rate of 150.82 (150.82 casualties resulting in more than 4 days' incapacity of fatalities per million hours worked). The 1977 figures were 88.058 casualties among 324.100 registered workers who worked a total of 577.59 million hours, i.e. one casulaty per 3.68 registered workers and a frequency rate of 152.45, 1.05 o/o higher than in 1978. In 1976, the frequency rate was 155.07, 1.69 o/o higher than in 1977 or 2.74 o/o higher than in 1978. (These differences are statistically significant at 95 o/o confidence level).

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

	absolute figures
- accidents resulting in absence from work of 4 - 20 days. . . . . or 65.6 o/o of the total number of accidents, with a frequency rate of 98.87.	55 140
- accidents resulting in absence from work of 21 - 56 days . . . . or 26.5 o/o of the total number of accidents, with a frequency rate of 39.99	22 283
- accidents resulting in absence from work of more than 56 days. . . . . or 7.7 o/o of the total number of accidents, with a frequency rate of 11.62	6 472
- fatalities . . . . or 0.16 o/o of the total number of accidents, with a frequency rate of 0.248.	138

This breakdown is practically identical to that for the two previous years.

4.4. BREAKDOWN OF ACCIDENTS BY MAIN CAUSES AND BY SERIOUSNESS (headings I - V of Table Ia)

4.4.1. Table with figures given as a percentage of the total of headings I - XII

CAUSE \ INCAPACITY	4 - 20 days o/o	21 - 56 days o/o	more than 56 days o/o	fatalities o/o	total o/o
I. Falls of ground	21,2 ↓	19,2 ↑	20,3 ∧	31,9 ↑	20,7 =
II. Transport and haulage	9,5 ∧	10,5	15,8 =	46,4 ↑	10,3 ∧ 0,1
III. Slipping, falling and stumbling..	26,4 ↑	30,6 ↑	26,8 ∧	8,0 ↓	27,5 ↑ 1,2
IV. Machinery, tools, etc.................	16,1 ↓	15,1 ↓	13,9 ↓	7,2 ↓	15,7 ↓ 1,0
V. Falling objects...........................	16,7 ∧	16,8	17,6 ↑	4,3 =	16,8 =
TOTAL	90,0 =	92,2 ∧	94,4 ↑	97,8 ↑	90,9 ∧ 0,2

CHANGES COMPARED WITH 1977 :

Key : No change : =
Increase : less than 0.6 o/o ∧ or greater than 0.5 o/o ↑
Decrease : less than 0.6 o/o ∨ or greater than 0.5 o/o ↓

Note : ( ) means not statistically significant or random variation in the mathematical sense of the term.

4.4.2. **Comments on the above table**

As in the two previous years, these five headings or causes of accidents together represent the same proportion (around 90 o/o) of the total number of accidents.

The breakdown of these accidents by period of incapacity for all five headings shows that this proportion increases slightly with the seriousness of the accident (90, 92.2 and 94.4 o/o for accidents resulting in 4-20, 21 - 56 and more than 56 days' incapacity respectively). The figures for fatalities do not lend themselves to a valid statistical comparison since their number is fortunately too small.

A comparison of the figures for each of the above causes of injury shows a variable trend for falls of ground and falling objects but a general increase for "slipping, falling and stumbling" and a decrease in accidents caused by machinery. This decrease could be due to the efforts being made to increase safety in this developing sector.

4.5. Accident levels **over a period of several years in the Community of the Six.**

4.5.1. For accidents resulting in absences of less than 56 days, data are available from 1971 onwards (see table below).

The variations are slight, although mathematically significant. It may be said that there has been an improvement since 1971, the reference year.

4.5.2. For accidents resulting in incapacity of more than 56 days, comparisons can be made back to 1958. After levelling off over the period 1958 - 1967, the frequency rate rose again from then until 1973, fell again in 1976 and rose again slightly in 1977 and 1978. Irrespective of the statistical value of these figures, which is only just significant, account must be taken of the progress made in both medical care and methods of first aid and transport of injured persons ; a number of persons seriously injured in 1978 would have died during the year and been classified as fatalities in 1958.

4.5.3. The decrease in fatalities last year was a very considerable and significant one. The increase this year is therefore statistically normal (in accordance with the law of large numbers) since it is not significant. The frequency rate of 0.352 is one of the best ever achieved (0.345 in 1975 and 0.293 in 1977).

ACCIDENT LEVELS SINCE 1971 (COMMUNITY OF THE SIX)

	1971	1972	1973	1974	1975	1976	1977	1978
4-20 days - actual	47 203	40 376	37 384	34 797	33 985	30 643	29 466	27 602
Frequency rate	113,96	109,31	112,77	110,97	106,67	101,77	103,90	102,15
increase/decrease on previous year. . . . . o/o	-	- 4 (s)	+ 3,17 (s)	- 1,6 (s)	- 3,9 (s)	- 4,8 (s)	+ 2,1(s)	- 1,7(s)
21 - 56 days - actual	21 116	18 531	17 325	15 875	15 454	13 923	13 388	13 240
Frequency rate	50,98	50,17	52,26	50,62	48,5	46,24	47,21	49,00
increase/decrease on previous year. . . . . o/o	-	- 1,59	+ 4,17	- 3 (s)	- 4,2 (s)	- 4,8 (s)	+ 2,1	+ 3,7 (s)
more than 56 days - actual.	6 249	5 763	5560	5 054	4 795	4 791	4 357	4 443
frequency rate.	15,09	15,60	16,77	16,12	15,05	14,92	15,36	16,44
increase/decrease on previous year. . . . . o/o	-	+ 3,4 (s)	+ 7 (s)	- 4 (s)	- 6,7 (s)	- 0,8	+ 2,9	+ 6,6 (s)
Fatalities total - actual	182	147	137	143	110	125	83	95
frequency rate.	0,440	0,399	0,413	0,456	0,345	0,415	0,293	0,352
increase/decrease on previous year. . . . . o/o	-	- 10	+ 3,9	+ 10,4	- 24	+ 20	- 29,4(s)	+ 20,1
actual without group accident. . .	162	141	128	96	110	109	66	95
frequency rate.	0,391	0,382	0,385	0,307	0,345	0,362	0,233	0,352
increase/decrease on previous year. . . . . o/o	-	- 2,3	+ 1 %	- 21 (s)	+ 12	+ 4,9	- 39,4 (s)	+ 51,1 (s)

(s) significant variation

ANNEX

Explanatory notes - Tables 1

GENERAL DEFINITIONS

1. Accident

Bodily injury resulting from a sudden and abnormal external cause in the course of work.

The Mines Safety and Health Commission's statistics should only cover victims of accidents underground, including accidents which occur when men enter and leave the cages and while the cages are in motion.

2. Fatal accident

An accident causing the death of the victim within 56 days following the accident. Victims dying more than 56 after the day of the accident should not be included in the fatal accident category but in that of accidents resulting in incapacity involving an absence from work of more than 56 days.

3. Persons covered by the statistics

Pit staff and employees of contractor firms who belong to a miners' social security scheme.

The statistics count victims and not accidents, everyone who is the victim of an accident while actually underground as well as during descent and ascent should be included. Victims can therefore only be miners, supervisors, engineers or staff belonging to contractor firms.

4. Shifts and number of hours worked

Shifts and number of hours worked by the persons on the books of the mine and other staff belonging to a miners' social insurance scheme; account should be taken both of extra shifts and overtime.

The period of reference adopted is the period of actual exposure to risk; one therefore counts extra shifts and overtime in terms of time actually worked and not of number of hours paid.

5. Accidents rates

Number of accidents per million hours worked.

The frequency rates are arrived at by dividing the number of accidents of a given category by the total number of hours spent on all types of work underground.

CAUSES OF ACCIDENTS

I. Falls of Ground and Rocks

This category of accidents covers falls of stone or coal from its natural situation

It does not cover accidents caused by falls of ground resulting from one of the factors included under another category, for example the use of explosives, explosion of firedamp or dust, or an outburst. Accidents caused by falls of stone in a caved waste should be included in this category; on the other hand, accidents during the stowing of waste should be classed in category 5 "Falls of Objects". Accidents caused by materials continuing to move after falling from their natural position are included under category I "Falls of groued and rocks", except where it is a case of materials set in motion by some external cause after first coming to rest.

II. Transport

Accidents caused by any means of transport whether stationary or in motion, used to carry men or objects at the face, in other workings, in roadways, in shafts, staple pits, etc., including accidents caused by the engines providing motive power for transport. This category includes, for example, accidents caused by lumps of coal falling from a conveyor belt or blocks of wood from a tub loaded with timber, and even those caused when lumps of coal are projected during their descent down a fixed chute. An accident caused by the gear wheels or the driving mechanism of a transport system should also be included in category II "Transport".

Electrocution caused by a trolley wire should be included in category XI "Electricity".

a) Continuous Transport

Transport equipment which can receive producca along the whole of its length and maintain a continuous flow.

b) Discontinuous transport

All other means of transport.

This category should include accidents caused particularly by skips, cages, kibbles, as well as accidents involving men or objects falling from these cages, skips or kibbles, rope haulages, locomotives, monorails, decking rams and other similar devices.

III. Falls and movement of the victim

a) While moving about the mine

Falls of men into a shaft or staple pit, falls in general, stumbles, slips, knocks and bumps, sprains of limbs, etc., whatever the cause, should be included, as long as the basic cause of the accident is the victim's movement through the mine in the course of or at the place of work and no means of transport is involved; the latter should be included in category II "Transport" or III b "Falls of victim during other activities" respectively.

b) In the course of other activities

Falls of men into a shaft or staple pit, falls in general, stumbles, slips, knocks and bumps, sprains of lims, etc., as long as the fall was caused basically by some particular activity and not by the movement of the victim about the mine, which is covered in III a.

This category should only include accidents caused by the victim falling during his actual work and not during the course of moving about the mine as under category III a "Falls of victim while moving about the mine".

IV. Machines, tools and supports

a) Machines

Accidents caused by engines powering a means of transport should be included in category II "Transport". Category IV covers accidents occurring during the starting up and running of other machines.

Accidents caused by machines falling while being moved will be included in category V "Falls of objects".

b) Tools

Category IV covers accidents caused by the use of tools such as portable drills, drills on stands, hand saws, pneumatic picks, lifting gear, pushers, etc. Accidents caused by falling tools should be put into category V "Falls of objects".

c) Supports

With regard to accidents occurring during the handling of supports only those involving the setting up or removal of this equipment should be included in category IV. If a suport or one of its components falls during transport, the accident should be included in category V "Falls of objects".

Category IV only covers accidents arising from the use and movement of machines, tools and equipment; it is emphasized in the case of supports that only accidents occurring during the setting up and removal of this equipment should be included in this category.

V. Falls of objects

Accidents involving the falling or dislodging of excavated material, and of objects such as frame, timber, tools, props, pipes, materials, etc.

This category includes not only accidents caused directly by falls of excavating material or objects, but also those caused by objects falling while being handled.

VI. Explosives

Accidents occurring during the transport or handling of explosives, the charging of shot-holes, accidental or premature firing of shots, inadequate protection of personnel, unfired explosives being hit by picks or drills, mis-fires, long fires, residues and poisoning by fumes from explosives.

Where the use of explosives sets off an explosion of fire-damp or dust or even a heating or a fire, the accident should be included in category VII or IX respectively.

VII. Ignitions or explosions of firedamp and coal dust

This includes poisoning or suffocation by the gases so produced. An explosion of firedamp or coal dust brought about by the use of electricity should be classified under category VII. As a general rule, if the causes of an accident include the ignition or explosion or firedamp or dust, it should always be included in category VII.

VIII. Outbursts of gas - Deoxygenation, suffocation or poisoning by natural gases (CO_2, CH_4, CO, H_2S)

a) Outbursts of gas

Accidents caused by ejected materials of roof falls caused by sudden outbursts of gas. In accordance with the rule set out for category VII, if the outburst is followed by an explosion of firedamp, any accidents caused thereby should be included in category VII "Ignitions or explosions of firedamp or explosions of coal dust".

b) Deoxygenation and poisoning by natural gases (CO_2, CH_4, CO, H_2S)

This includes accidents caused by lack of oxygen, by suffocation (CH_4, CO_2) and by poisoning (CO, H_2S). If suffocation or poisoning is brought about by gas produced by explosives or by an explosion of firedamp or coal dust, or even by a heating or fire, the accident should be classified under those categories. If suffocation or poisoning is caused by exhaust fumes from diesel engines, the accidents should be included in category IV, "Explosives".

IX. Heatings or fires

This includes poisoning or suffocation by the gases produced, injuries from burns, roof falls, falls of objects, etc. following a heating or fire in the mine. A fire following an explosion of firedamp or coal dust should be this category.

In general, if the accident is due to several combined causes including a heating or a fire, it should always be included in category IX "Heatings or fires" unless one of the causes is the ignition or explosion of firedamp or coal dust; in this last case the accident would be included in category VII.

X. Inrushes

Accidents occurring when old workings are broken into or when dead ground is encountered. Injuries from projected material, falls of objects, falls of ground drowning, etc.

XI. Electricity

Accidents caused by electricity - burns, shocks, electrocution. If electricity causes the accidental firing of explosives, an explosion of firedamp or coal dust or a heating or a fire, the resulting accident should be included in these categories in the following order of priority :

1. Explosion of firedamp or dust
2. A heating or fire
3. Explosives

XII. Other causes

This category covers accidents which cannot be classified under categories I to XI, that is to say, accidents of which it is not possibile to establish the exact cause. This category may also be used to record accidents covered by compressed air.

SITE OF THE ACCIDENT

This means the place where the victim was at the time of the accident, which may be different from the victim's normal place of work.

1. Production faces

This comprises the working face including the part between the face or staple hole and the stowed or caved waste but does not include roads of any kind except dummy roads.

2. Headings excluding shafts and staple pits

This also covers the area where loading, timbering and steelwork are carried out immediately behind the face. In the case of slusher packing the curring area extends up to and including the line of props.

Development headings should be considered as drifts.

3. Shafts and staple pits

This also covers the immediate approach to insets especially where mine cars and stores are loaded and unloaded from the cages.

4. Other places

This heading covers all the victims of accidents not included under the three preceding headings.

PERIOD OF INCAPACITY

Accidents should be broken dowe as follows according to periods of incapacity :

- Accidents involving an absence of between 4 and 20 calendar days
- Accidents involving an absence of between 21 and 56 calendar days
- Accidents involving an absence of more than 56 calendar days
- Fatal accidents.

The day of the accident does not count. The number of days of incapacity to be taken into consideration is defined by the effective absence of the miner from work.

ANNEX

Explanatory notes - Tables 2

GENERAL DEFINITIONS

1. Accident

Bodily injury resulting from a sudden and abnormal external cause in the course of work.

The Mine Safety and Health Commission's statistics should only cover victims of accidents underground, including accidents which occur when men enter and leave the cages and while the cages are in motion.

2. Fatal accident

An accident causing the death of the victim within 56 days following the accident. Victims dying more than 56 days after the day of the accident should not be included in the fatal accidents category but in that of accidents resulting in incapacity involving an absence from work of more than 56 days.

3. Persons covered by the statistics

Pit staff and employees of contractor firms who belong to a miner's social security scheme.

The statistics count victims and not accidents; everyone who is the victim of an accident while actually underground as well as during descent and ascent should be included. Victims can therefore only be miners, supervisors, engineers or staff belonging to contractor firms.

4. Shifts and number of hours worked

Shifts and number of hours worked by the persons on the books of the mine and other staff belonging to a miners' social insurance scheme; account should be taken both of extra shifts and overtime.

The period of reference adopted is the period of actual exposure to risk; extra shifts and overtime must therefor be counted in terms of time actually worked and not of number of hours paid.

5. Accident rates

Number of accidents per million hours worked.

The frequency rates are arrived at by dividing the number of accidents of a given category by the total number of hours spent on all types of work underground.

9. Location of the injury

When an accident has resulted in multiple injuries to different parts of the body and one of the injuries is clearly more serious than the others, this accident should be classified in the group relating to the part of the body most seriously injured; for example, a fracture of the leg, together with grazing of a hand, should be classified in category VI "Lower limbs" and not in category V "Hands".

I. Head and neck

Covers in particular the skull, the scalp, brain injuries, the ears, the mouth (including the lips, teeth and tongue), the nose, the face, the neck but not the eyes which are included in category II.

II. Eyes

Also covers the eye socket and the optic nerve.

III. Trunk

Covers the back (vertebrae and adjacent muscles, the spinal marrow), the thorax (ribs, sternum, bronchi, lungs), the abdomen (including internal organs, kidneys, liver, spleen), the abdomen and the genital organs.

The shoulders and wrists are regarded as part of the upper limbs (category IV) and not of the trunk or hands (category V).

The hips and the ankles are regarded as part of the lower limbs (category VI) and not as part of the trunk or feet (category VII).

IV. Upper limbs (excluding the hands)

This includes injuries to the shoulders, including the collar bone and shoulder blades, injuries to the arms, elbows, forearms and wrists.

V. Hands

The wrists are not regarded as part of the hands but of the upper limbs (category IV).

VI. Lower limbs (excluding feet)

This includes the hips, thighs, knees, legs and ankles.

VII. Feet

The ankles are not regarded as part of the feet but of the lower limbs (category VI).

VIII. Multiple locations

This group, covering multiple locations, should only be used when the victim has suffered several injuries to different parts of his body, none of which is clearly more serious than the others.

The category may cover injuries to the head and trunk, the head and one or more limbs, the trunk and one or more limbs or an upper and a lower limb.

IX. Not specified

This group should only be used when there is no evidence of the exact location of the injury.

10. Nature of the injury

When an accident has resulted in several injuries to different parts of the body and one of them is clearly more serious than the others, the accident should be classified in the group relating to the most serious injury.

1. Amputations and enucleations

This includes traumatic avulsion of the eye.

2. Fractures with or without dislocation

This includes simple fractures; fractures with injuries to the soft parts of the body, closed or compound fractures; fractures with internal or nerve damage, fractures with luxations, contusions and crushings.

3. Luxations, twists and sprains

LUXATIONS

This covers minor luxations and dislocations, traumatic lumbago, lumbago sciatica caused by strain; it does not include luxations with fracture covered by category 2.

TWISTS AND SPRAINS

This covers ruptures, torn and lacerated muscles, tendons, ligaments and joints as well as hernia due to strain and slipped discs, except when they are associated with open wounds.

4. Concussion and internal injury

This category includes internal bruising, internal bleeding, internal lacerations and ruptures except where associated with fractures.

It does not include internal injuries accompanied by fractures which are covered by category 2.

5. Open wounds, contusions and muscular abrasions

This covers lacerations, flesh wounds, cuts, contusions, scalp wounds, loss of a nail or an ear, wounds with nerve injuries, haemarthosis, haematoma and bruises, contusions and bruises with superficial wounds. It does not include traumatic amputation, enucleations or avulsion of an eye, which are covered by category 1, compound fractures, contusions and crushings accompanying a fracture which are covered by category 2, concussion covered by 4, burns with wounds covered by 6.

6. Burns and harmful effects of electrictiy and radiation

Covers burns from fire, boiling liquid, friction, chemical substances (external burns only), burns with wounds, electrocution, electric shock and burns caused by electricity, the effect of X-rays, radioactive substances, ultra violet rays and ionizing radiation.

It does not cover burns caused by the absorption of a corrosive or caustic substance which are classified in category 7.

7. Poisoning and suffocation

This category covers the effects of the injection, ingestion, absorption or inhalation of toxic, corrosive or caustic substances.

Asphyxiation or suffocation by compression or roof fall; asphyxiation due to the suppression or reduction of oxygen in the atmosphere, the entry of a foreign bodies into the respiratory system, to carbon monoxide or other toxic gases.

8. Multiple injuries or those not specified (including complications)

This category includes those cases in which the victim has suffered several injuries of different types, none of which is clearly more serious than the others, and those which are not covered in any other category.

It also covers the various early complications of injuries and pathological reactions, which, however, should only be classified in this group when the nature of the original injury is not known.

PERIOD OF INCAPACITY

Accidents should be broken down according to two periods of incapacity :

- accidents involving an absence of more than 56 calendar days

- fatal accidents.

The day of the accident does not count. The number of days of incapacity to be taken into consideration is defined by the effective absence of the miner from work.

A.

Comparative table of number of persons incapacitated
by underground accidents for eight weeks or longer
years 1958 - 1978 per '000,000 man-hours
(frequency)

COMMUNITY VI (IX since 1977)	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
1) Falls of ground	4,846	4,490	4,571	4,434	4,387	4,337	4,509	4,215	4,186	4,060
2) Haulage and transport	2,602	2,347	2,310	2,371	2,521	2,520	2,346	2,416	2,173	2,037
3) Movement of personnel	2,003	1,823	2,185	2,185	2,282	2,261	2,326	2,364	2,320	2,354
4) Machinery, handling of tools and supports	1,098	1,064	1,264	1,423	1,712	1,818	1,848	1,773	1,815	1,790
5) Falling objects	1,962	2,161	2,105	2,353	2,375	2,406	2,442	2,415	2,362	2,638
6) Explosives	0,023	0,020	0,017	0,012	0,018	0,010	0,011	0,013	0,007	0,019
7) Explosions of firedamp or coal dust	0,017	0,030	0,010	0,001	0,071	0,006	0,001	0,011	0,016	-
8) Sudden outbursts of firedamp, suffocation by natural gases	0,002	-	-	-	-	-	-	0,002	0,001	0,003
9) Underground combustion and fires	-	-	0,002	0,001	-	-	-	0,002	-	-
10) Inrushes of water	0,002	-	-	-	0,001	0,002	0,003	-	0,001	-
11) Electricity	0,010	0,008	0,010	0,018	0,007	0,012	0,008	0,006	0,007	0,005
12) Other causes	0,985	1,012	0,513	0,428	0,404	0,390	0,364	0,289	0,354	0,337
TOTAL	13,551	12,954	12,986	13,227	13,781	13,781	13,861	13,506	13,242	13,246

COMMUNITY VI (IX since 1977)	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	4,261	4,492	4,135	4,109	4,08	4,29	4,15	3,61	3,48	2,31	2,36
2) Haulage and transport	2,139	2,118	2,016	1,953	1,93	2,11	1,91	2,28	2,14	1,82	1,83
3) Movement of personnel	2,795	3,023	3,084	3,117	3,47	3,88	3,89	3,38	3,62	3,05	3,12
4) Machinery, handling of tools and supports	1,945	1,865	2,011	1,876	1,75	2,01	1,98	2,29	2,15	1,67	1,62
5) Falling objects	2,858	3,185	3,308	3,506	3,62	3,63	3,62	3,08	3,08	1,93	2,04
6) Explosives	0,015	0,019	0,011	0,002	0,008	-	0,01	0,006	0,01	0,01	0,01
7) Explosions of firedamp or coal dust	0,002	0,004	0,025	0,007	-	-	0,02	-	-	-	0,01
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	0,003	0,003	-	0,01
9) Underground combustion and fires	0,002	-	-	-	-	0,003	0,01	0,003	-	-	-
10) Inrushes of water	0,002	-	0,009	0,002	0,003	0,009	-		0,01	-	-
11) Electricity	0,010	0,021	0,014	0,007	0,008	0,006	0,01	0,16	-	-	0,01
12) Other causes	0,341	0,333	0,434	0,509	0,73	0,84	0,53	0,37	0,40	0,70	0,62
TOTAL	14,370	15,160	15,047	15,088	15,60	16,77	16,12	15,05	14,92	11,49	11,62

B.

Underground accidents resulting in death within eight weeks

year 1958 - 1978

per '000,000 man-hours

(frequency)

COMMUNITY VI (IX since 1977)	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	0,253	0,242	0,235	0,217	0,234	0,217	0,175	0,177	0,208	0,192	0,160	0,176	0,135	0,133	0,092	0,13	0,11	0,10	0,07	0,05	0,08
2) Haulage and transport	0,147	0,141	0,146	0,168	0,124	0,167	0,178	0,149	0,160	0,128	0,115	0,145	0,132	0,104	0,141	0,12	0,08	0,11	0,09	0,08	0,11
3) Movement of personnel	0,057	0,063	0,047	0,056	0,045	0,060	0,045	0,051	0,060	0,044	0,054	0,038	0,039	0,043	0,043	0,04	0,05	0,047	0,06	0,02	0,02
4) Machinery, handling of tools and supports	0,011	0,028	0,012	0,021	0,037	0,013	0,030	0,024	0,023	0,024	0,017	0,023	0,027	0,029	0,019	0,02	0,02	0,047	0,05	0,02	0,02
5) Falling objects	0,045	0,027	0,024	0,041	0,062	0,046	0,037	0,037	0,030	0,036	0,040	0,031	0,025	0,041	0,038	0,02	0,04	0,038	0,04	0,01	0,01
6) Explosives	0,009	0,010	0,002	-	0,002	0,001	0,002	0,002	0,001	0,002	0,006	-	0,002	0,005	-	-	-	-	0,006	0,01	0,00
7) Explosions of firedamp or coal dust	0,032	0,036	0,002	-	0,375	0,001	0,001	0,053	0,030	-	0,044	-	0,037	0,005	-	-	0,13	-	0,06	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	0,016	0,010	0,006	0,003	0,007	0,005	0,002	0,006	0,004	0,012	0,006	0,004	-	0,027	0,022	0,012	-	-	0,006	-	-
9) Underground combustion and fires	-	0,003	-	0,001	-	0,003	0,005	0,005	-	-	-	-	-	-	0,003	-	-	-	-	0,01	-
10) Inrushes of water	0,002	0,002	0,001	0,006	0,005	0,005	-	0,001	-	0,002	-	-	0,011	-	0,003	0,003	-	-	-	-	-
11) Electricity	0,016	0,007	0,007	0,004	0,008	0,008	0,003	0,004	0,003	0,004	0,006	0,006	0,004	-	0,003	0,003	-	-	0,003	-	-
12) Other causes	0,023	0,021	0,024	0,029	0,032	0,021	0,014	0,013	0,017	0,015	0,012	0,015	0,016	0,053	0,035	0,06	0,02	0,003	0,02	0,01	-
TOTAL	0,610	0,590	0,507	0,546	0,932	0,547	0,492	0,522	0,536	0,457	0,460	0,438	0,429	0,440	0,399	0,413	0,456	0,35	0,42	0,20	0,25

C. COMPARATIVE TABLE OF UNDERGROUND GROUP ACCIDENTS

years 1960 - 1978

CAUSES	1960			1961			1962			1963			1964			1965			1966			1967			1968			1969			1970			1971			1972			1973			1974			1975			1976			1977			1978			1979		
	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b	N	a	b
1. Falls of ground	2	2	10	1		7	3	3	18																			1		6				2		12				2		9	1	1	5															
2. Haulage and transport													2	5	14																																								1	3	7			
3. Movement of personnel																												1		5																														
4. Machinery, handing of tools and supports																																																												
5. Falling objects																																																												
6. Explosives																																																												
7. Explosions of firedamp or coal dust							3	62	338							3	4	41	3	11	21				1		17				1	11	16										1	5	42				1		16									
8. Sudden outburst of firedamp, suffocation by natural gases																																				8																								
9. Underground combustion and fires																																																				-	7	7						
10. Inrushes of water																																																												
11. Electricity																																																												
12. Other causes																																																												
TOTAL	2	2	10	1		7	6	65	356				2	5	14	3	4	41	3	11	21				1		17	2		11	1	11	16	3		20				2		9	2	6	47															

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

D. RECAPITULATION : COMMUNITY OF THE SIX

Year	Extraction (1)	Underground o.m.s. (kg.)	Million man-hours worked	Fatalities	Serious injuries (4) (disablement for 8 weeks or over	Fatalities per m. tons	Serious injuries (4) per m. tons	Fatalities per m. man-hours	Serious injuries per m. man-hours
1958	252 278	1 634	1 260	770	17 074	3,052	67,68	0,610	13,551
1959	240 602	1 788	1 122	622	14 539	2,585	60,43	0,590	12,950
1960	239 967	1 958	1 037	526	13 459	2,192	56,09	0,507	12,986
1961	235 848	2 100	962	527	12 720	2,235	53,93	0,548	13,227
1962	233 233	2 229	901	840 (3) 541 (4)	12 418	3,602 (3) 2,320 (4)	53,24	0,932 (3) 0,600 (4)	13,781
1963	229 769	2 331	849	465	11 686	2,024	50,86	0,547	13,761
1964	235 007	2 395	841	411	11 726	1,749	49,89	0,493	13,860
1965	224 249	2 461	784	410	10 595	1,828	47,25	0,522	13,506
1966	210 189	2 611	698	374	9 247	1,779	43,99	0,536	13,242
1967	189 484	2 824	587	269	7 781	1,420	41,06	0,457	13,246
1968	181 016	3 065	522	240	7 501	1,326	41,44	0,460	14,370
1969	176 749	3 265	476	209	7 222	1,181	40,82	0,438	15,160
1970	170 355	3 442	438	188	6 591	1,104	38,69	0,429	15,047
1971	164 910	3 514	414	182	6 249	1,104	37,89	0,440	15,088
1972	151 809	3 659	369	147	5 763	1,033	26,34	0,399	15,60
1973	139 700	3 755	332	137	5 560	0,981	39,80	0,413	16,77
1974	133 300	3 742	313	143	5 054	1,073	37,91	0,456	16,12
1975	129 100	3 632	319	110	4 795	0,852	37,14	0,35	15,05
1976	125 600	3 710	301	125	4 491	0,995	35,76	0,415	14,92
1977	119.670	3.824	284	83	4.357	0,694	36,40	0,293	15,36
1978	116.383	3.829	270	95	4.443	0,816	38,18	0,352	16,44

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

UNITED KINGDOM

o/oo

1973	130 200	3 598	306	74	490	0,568	3,76	0,242	1,60
1974	109 200	3 260	268	37	417	0,339	3,82	0,138	1,555
1975	127 700	3 493	303	55	522	0,431	4,09	0,181	1,722
1976	122 100	3 407	287	45	2 407(1) 444	0,369	19,71(1) 3,64	0,157	8,387 (1) 1,536
1977	120.700	3 338	294	33	2 280	0, 273	18, 874	0, 11	7, 75
1978	121.695	3.437	287	43	2.029	0.353	16,673	0.150	7,07

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

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

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

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

(absolute figures)

COUNTRY

COAL-FIELD

YEAR 1978

MAN-HOURS WORKED (1) IX - 557.159.302

Table 1a

SITE OF THE ACCIDENT / CAUSES OF ACCIDENTS (Period of incapacity)	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (2) 6		
	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	56 days (3)	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	7387	2735	822	27	10971	3048	1075	369	15	4507	33	7	4	-	44	1245	465	120	2	1832	11713	4282	1315	44	17354			
II. TRANSPORT, TOTAL	1282	545	240	11	2078	590	265	129	2	986	133	94	48	7	282	3213	1434	603	44	5294	5218	2338	1020	64	8640	3	7	10
a) Continuous Transport	218	150	80	5	453	104	57	31	-	192	3	1	1	1	6	227	104	58	2	391	552	312	170	8	1042			
b) Discontinuous Transport	1064	395	160	6	1625	486	208	98	2	794	130	93	47	6	276	2966	1330	545	42	4903	4666	2026	850	56	7598	3	7	10
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	3875	2143	525	5	6548	2306	1177	351	1	3835	284	188	67	4	543	8107	3306	794	1	12208	14572	6814	1737	11	23134			
a) while moving about the mine	647	235	57	-	939	406	177	61	-	644	47	16	7	-	70	3389	1205	315	-	4909	4489	1633	440	-	6562			
b) in the course of other activities	3228	1908	468	5	5609	1900	1000	290	1	3191	237	172	60	4	473	4718	2101	479	1	7299	10083	5181	1297	11	16572			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	4216	1691	457	7	6371	1901	706	206	1	2814	78	32	4	-	114	2692	938	235	2	3867	8887	3367	902	10	13166			
a) Machines	599	282	110	3	994	236	139	69	1	445	12	8	-	-	20	222	95	43	2	362	1069	524	222	6	1821			
b) Tools	951	347	59	-	1357	621	204	55	-	880	46	19	4	-	69	882	307	82	-	1271	2500	877	200	-	3577			
c) Supports	2666	1062	288	4	4020	1044	363	82	-	1489	20	5	-	-	25	1588	536	110	-	2234	5318	1966	480	4	7768			
V. FALLS OF OBJECTS	4128	1805	574	3	6510	1899	684	182	-	2765	187	71	39	2	299	3010	1188	342	1	4541	9224	3748	1137	6	14115			
VI. EXPLOSIVES	22	6	3	1	32	10	2	3	-	15	2	-	-	-	2	14	4	1	-	19	48	12	7	1	68			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S). TOTAL	1	-	-	-	1	8	1	2	-	11	-	-	-	-	-	1	-	1	-	2	10	1	3	-	14			
a) Outbursts of Gas	1	-	-	-	1	3	-	2	-	5	-	-	-	-	-	1	-	1	-	2	5	-	3	-	8			
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	5	1	-	-	6	-	-	-	-	-	-	-	-	-	-	5	1	-	-	6			
IX. HEATINGS OR FIRES	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1	1	-	3	1	2	1	-	4			
X. INRUSHES	3	-	1	-	4	-	-	-	-	-	-	-	-	-	-	2	-	1	-	3	5	-	2	-	7			
XI. ELECTRICITY	3	1	-	-	4	4	-	-	-	4	-	-	-	-	-	11	9	5	-	25	18	10	5	-	33			
XII. OTHER CAUSES	1336	389	91	-	1816	756	190	37	-	983	63	25	6	-	94	3289	1105	209	2	4605	5444	1709	343	2	7498			
TOTAL	22253	9316	2713	54	34336	10522	4100	1279	19	15920	780	417	168	13	1378	21585	8450	2312	52	32399	55140	22283	6472	138	84033	3	7	10

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme

(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks)

(3) Calendar days

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

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

(frequency rates)

Table 1b

COUNTRY

COAL-FIELD

YEAR 1978 - IX

MAN-HOURS WORKED (1) 557.159.308

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (3) 6		
CAUSES OF ACCIDENTS / Period of incapacity	4 to 20 days (2)	21 to 56 days (2)	> 56 days (2)	Fatal accidents	total	4 to 20 days (2)	21 to 56 days (2)	> 56 days (2)	Fatal accidents	total	4 to 20 days (2)	21 to 56 days (2)	> 56 days (2)	Fatal accidents	total	4 to 20 days (2)	21 to 56 days (2)	> 56 days (2)	Fatal accidents	total	4 to 20 days (2)	21 to 56 days (2)	> 56 days (2)	Fatal accidents	total	56 days (2)	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	13,26	4,91	1,48	0,05	19,69	5,47	1,93	0,66	0,03	8,09	0,06	0,01	0,01	-	0,08	2,23	0,83	0,22	0,00	3,29	21,02	7,69	2,36	0,08	31,15			
II. TRANSPORT, TOTAL	2,30	0,98	0,43	0,02	3,73	1,06	0,48	0,23	0,00	1,77	0,24	0,17	0,09	0,01	0,51	5,77	2,57	1,08	0,08	9,50	9,37	4,20	1,83	0,11	15,51		0,01	
a) Continuous Transport	0,39	0,27	0,14	0,01	0,81	0,19	0,10	0,06	-	0,34	0,01	0,00	0,00	0,00	0,01	0,41	0,19	0,10	0,00	0,70	0,99	0,56	0,31	0,01	1,87			
b) Discontinuous Transport	1,91	0,71	0,29	0,01	2,92	0,87	0,37	0,18	0,00	1,43	0,23	0,17	0,08	0,01	0,50	5,36	2,39	0,98	0,08	8,80	8,37	3,64	1,53	0,10	13,64		0,01	
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	6,95	3,85	0,94	0,01	11,75	4,14	2,11	0,63	0,00	6,87	0,51	0,34	0,12	0,01	0,97	14,55	5,93	1,43	0,00	21,91	26,15	12,23	3,12	0,02	41,52			
a) while moving about the mine	1,16	0,42	0,10	-	1,69	0,73	0,32	0,11	-	1,16	0,08	0,03	0,01	-	0,13	6,08	2,16	0,57	-	8,81	8,06	2,93	0,79	-	11,78			
b) in the course of other activities	5,79	3,42	0,84	0,01	10,07	3,41	1,79	0,52	0,00	5,73	0,43	0,31	0,11	0,01	0,85	8,47	3,77	0,86	0,00	13,10	18,10	9,30	2,33	0,02	29,74			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	7,57	3,04	0,82	0,01	11,43	3,41	1,27	0,37	0,00	5,05	0,14	0,06	0,01	-	0,20	4,83	1,68	0,42	0,00	6,94	15,95	6,04	1,62	0,02	23,63			
a) Machines	1,08	0,51	0,20	0,01	1,78	0,42	0,25	0,12	0,00	0,80	0,02	0,01	-	-	0,04	0,40	0,17	0,08	0,00	0,65	1,92	0,94	0,40	0,01	3,27			
b) Tools	1,71	0,62	0,11	-	2,44	1,11	0,37	0,10	-	1,58	0,08	0,03	0,01	-	0,12	1,58	0,55	0,15	-	2,28	4,49	1,57	0,36	-	6,42			
c) Supports	4,78	1,91	0,52	0,01	7,22	1,87	0,65	0,15	-	2,67	0,04	0,01	-	-	0,04	2,58	0,96	0,20	-	4,01	9,54	3,53	0,86	0,01	13,94			
V. FALLS OF OBJECTS	7,41	3,24	1,03	0,01	11,68	3,41	1,23	0,33	-	4,96	0,34	0,13	0,07	0,00	0,54	5,40	2,13	0,61	0,00	8,15	16,56	6,73	2,04	0,01	25,33			
VI. EXPLOSIVES	0,04	0,01	0,01	0,00	0,06	0,02	0,00	0,01	-	0,03	0,00	-	-	-	0,00	0,03	0,01	0,00	-	0,03	0,09	0,02	0,01	0,00	0,12			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	0,00	-	-	-	0,00	0,01	0,00	0,00	-	0,02	-	-	-	-	-	0,00	-	0,00	-	0,00	0,02	0,00	0,01	-	0,03			
a) Outbursts of Gas	0,00	-	-	-	0,00	0,01	-	0,00	-	0,01	-	-	-	-	-	0,00	-	0,00	-	0,00	0,01	-	0,01	-	0,01			
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	0,01	0,00	-	-	0,01	-	-	-	-	-	-	-	-	-	-	0,01	0,00	-	-	0,01			
IX. HEATINGS OR FIRES	-	0,00	-	-	0,00	-	-	-	-	-	-	-	-	-	-	0,00	0,00	-	-	0,01	0,00	0,00	0,00	-	0,01			
X. INRUSHES	0,01	-	0,00	-	0,01	-	-	-	-	--	-	-	-	-	-	0,00	-	0,00	-	0,01	0,01	-	0,00	-	0,01			
XI. ELECTRICITY	0,01	0,00	-	-	0,01	0,01	-	-	-	0,01	-	-	-	-	-	0,02	0,02	0,01	-	0,04	0,03	0,02	0,01	-	0,06			
XII. OTHER CAUSES	2,45	0,70	0,16	-	3,26	1,36	0,34	0,07	-	1,76	0,11	0,04	0,01	-	0,17	5,90	1,98	0,38	0,00	8,27	9,77	3,07	0,62	0,00	13,46			
TOTAL	39,94	16,72	4,87	0,10	61,63	18,89	7,36	2,30	0,03	28,57	1,40	0,75	0,30	0,02	2,47	38,74	15,17	4,15	0,09	58,15	98,97	39,99	11,62	0,25	150,82			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme

(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks)

(3) Calendar days

1. 0,00 means 0,005 2. - means 0 mathematically.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

Table 2a

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

(absolute figures)

COUNTRY

COAL-FIELD

YEAR 1978 - IX

MAN-HOURS WORKED (1) 557.159.302 without Belgium

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twist and sprains 3			Concussion and internal injury 4			Open wounds contusion and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified (2) 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	4 to 20 days (5)	21 to 56 days (5)	> 56 days (5)	Fatal accidents	total
LOCATION OF THE INJURY																														
I Head and neck	1	1	2	76	30	106	12	0	12	28	3	31	200	4	204	2	0	2				13	2	15	4115	1239	332	40	
II Eyes	3	0	3							1	0	1	79	0	79	4	0	4				19	0	19	2337	262	106	0	
III Trunk	0	0	0	193	16	209	332	0	332	25	3	28	243	3	246	4	0	4				6	5	11	8492	3636	803	27	
IV Upper limbs (excluding the hands) (3)	1	0	1	294	0	294	68	0	68				247	1	248	2	0	2				6	0	6	4951	1673	618	1	
V Hands	112	0	112	902	0	902	67	0	67				730	0	730	7	0	7				6	0	6	12588	7637	1824	0	
VI Lower limbs (excluding feet) (4)	5	0	5	645	2	647	402	0	402				614	2	616	5	0	5				7	0	7	8838	3667	1678	4	
VII Feet	17	0	17	414	0	414	65	0	65				266	0	266	0	0	0				0	0	0	3880	2054	762	0	
VIII Multiple locations	2	2	4	73	20	93	74	1	75	9	3	12	151	6	157	2	0	2				14	4	18	2513	1026	325	35	
IX Not specified													2	0	2	3	0	3	1	6	7	18-	25	43	270	21288	24	31	
TOTAL	141	3	144	2597	68	2665	1020	1	1021	63	9	72	2532	16	2548	29	0	29	1	6	7	89	36	125	47984		6472	139	

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miner's social insurance scheme

(2) Including complications

(3) The shoulders and the ... are included under "Upper limbs"

(4) The hips and the ankles are included under "Lower limbs"

(5) Calender days

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A.

Comparative table of number of persons incapacitated
by underground accidents for eight weeks or longer
years 1958 - 1978 per '000,000 man-hours
(frequency)

FEDERAL REPUBLIC OF GERMANY	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	4,843	4,779	4,886	4,797	4,682	4,663	4,894	4,732	4,721	4,524	4,618	4,736	4,321	4,354	4,20	4,30	4,08	3,69	3,47	3,67	3,48
2) Haulage and transport	2,550	2,569	2,445	2.458	2,501	2,433	2,385	2,411	2,067	1,913	1,994	2,195	2,007	1,724	1,81	1,80	1,68	2,16	1,89	1,74	1,77
3) Movement of personnel	2,497	2,463	2,348	2,512	2,608	2,646	2,744	3,032	2,852	2,974	3,300	3,399	3,370	3,246	3,48	3,98	4,15	3,37	3,58	4,09	4,17
4) Machinery, handling of tools and supports	0,767	0,914	0,920	0,867	1,046	1,213	1,242	1,234	1,244	1,124	1,396	1,291	1,382	1,597	1,38	1,61	1,58	2,16	1,85	2,09	1,90
5) Falling objects	2,537	2,719	2,738	2,945	3,077	3,038	3,242	3,344	3,272	3,642	3,773	4,036	4,166	3,313	3,49	3,49	3,37	2,97	2,92	3,03	3,34
6) Explosives	0,015	0,011	0,010	0,009	0,008	0,006	0,006	0,005	0,005	0,017	0,011	0,007	0,008	-	-	-	0,01	-	0,01	-	-
7) Explosions of firedamp or coal dust	0,011	0,016	-	0,002	0,123	0,010	-	0,014	0,013	-	0,004	0,004	-	0,012	-	-	-	-	0,02	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	0,005	-	0,003	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	0,003	0,002	-	-	-	-	-	-	0,004	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	0,004	-	-	-	-	0,004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electricity	0,010	0,014	0,012	0,014	0,006	0,012	0,009	0,002	0,010	0,006	0,011	0,026	0,012	0,008	0,01	0,005	-	0,009	0,01	0,01	0,01
12) Other causes	0,487	0,522	0,457	0,503	0,488	0,473	0,477	0,354	0,414	0,396	0,429	0,402	0,532	0,632	0,96	0,99	0,52	0,32	0,40	0,36	0,20
TOTAL	13,721	14,007	13,819	14,109	14,539	14,499	14,999	15,133	14,598	14,599	15,540	16,096	15,798	14,886	15,31	16,19	15,40	14,69	14,16	14,99	14,87

B.

Underground accidents resulting in death within eight weeks

year 1958 - 1978

per '000,000 man-hours

(frequency)

FEDERAL REPUBLIC OF GERMANY	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	0,268	0,290	0,263	0,216	0,280	0,260	0,200	0,184	0,197	0,206	0,148	0,192	0,113	0,147	0,10	0,08	0,12	0,12	0,06	0,07	0,13
2) Haulage and transport	0,179	0,169	0,182	0,196	0,149	0,178	0,300	0,191	0,175	0,150	0,126	0,143	0,128	0,103	0,16	0,13	0,07	0,12	0,10	0,08	0,14
3) Movement of personnel	0,094	0,097	0,070	0,086	0,059	0;089	0,071	0,070	0,094	0,076	0,079	0,056	0,058	0,032	0,06	0,06	0,06	0,06	0,07	0,05	0,05
4) Machinery, handling of tools and supports	0,010	0,027	0,012	0,027	0,037	0,019	0,028	0,025	0,030	0,020	0,014	0,034	0,031	0,032	0,03	0,02	0,02	0,05	0,03	0,04	0,04
5) Falling objects	0,065	0,041	0,039	0,065	0,072	0,072	0,054	0,058	0,048	0,063	0,051	0,049	0,035	0,047	0,06	0,02	0,04	0,05	0,05	0,02	0,03
6) Explosives	0,009	0,003	0,003	-	0,004	-	0,002	-	-	-	0,004	-	-	-	-	-	-	-	0,005	-	
7) Explosions of firedamp or coal dust	0,011	0,012	-	-	0,660	0,002	0,002	0,019	0,056	-	0,061	-	-	0,008	-	-	-	-	0,01	-	
8) Sudden outbursts of firedamp, suffocation by natural gases	0,005	0,003	0,002	0,004	0,002	-	-	0,002	0,002	0,007	-	0,004	-	0,008	0,004	0,005	-	-	0,01	-	
9) Underground combustion and fires	-	0,003	-	0,002	-	0,006	0,009	0,005	-	-	-	-	-	-	-	-	-	-	-	0,04	
10) Inrushes of water	-	0,003	0,002	-	-	0,004	-	-	-	-	-	-	0,012	-	-	-	-	-	-	-	
11) Electricity	0,022	0,008	0,002	0,005	0,010	0,002	0,004	0,005	-	0,003	0,004	0,004	0,004	-	0,004	0,005	-	-	0,005	0,01	
12) Other causes	0,025	0,025	0,036	0,049	0,049	0,025	0,017	0,023	0,027	0,017	0,022	0,022	0,027	0,083	0,04	0,09	0,03	0,005	0,03	0,02	0,01
TOTAL	0,687	0,680	0,611	0,651	1,344	0,657	0,587	0,582	0,629	0,542	0,509	0,504	0,408	0,460	0,46	0,420	0,34	0,41	0,377	0,34	0,40

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

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

(absolute figures)

Table 1a

COUNTRY

COAL-FIELD

YEAR 1978 - Bundesrepublik Deutschland

MAN-HOURS WORKED (1) - 186.850.520

SITE OF THE ACCIDENT / CAUSES OF ACCIDENTS	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (2) 6		
Period of incapacity	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	56 days (3)	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	1666	1075	373	14	3128	1152	581	225	9	1967	6	6	3	-	15	236	163	49	1	449	3060	1825	650	24	5559			
II. TRANSPORT, TOTAL	172	155	93	6	426	61	60	43	-	164	40	51	25	6	122	211	235	169	15	630	484	501	330	27	1342			
a) Continuous Transport	72	69	37	3	181	20	18	14	-	52	2	-	1	1	4	23	16	20	-	59	117	103	72	4	296			
b) Discontinuous Transport	100	86	56	3	245	41	42	29	-	112	38	51	24	5	118	188	219	149	15	571	367	398	258	23	1046			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	1734	1282	317	4	3337	956	660	178	1	1795	164	150	61	4	379	1304	888	224	1	2417	4158	2980	780	10	7928			
a) while moving about the mine	-	-	-	-	-	-	-	-	-	-	6	-	2	-	8	1	-	-	-	1	7	-	2	-	9			
b) in the course of other activities	1734	1282	317	4	3337	956	660	178	1	1795	158	150	59	4	371	1303	888	224	1	2416	4151	2980	778	10	7919			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	747	603	187	5	1542	431	285	100	1	817	25	23	3	-	51	316	156	65	1	538	1519	1067	355	7	2948			
a) Machines	140	116	57	3	316	76	80	46	1	203	6	7	-	-	13	62	39	25	1	127	284	242	128	5	659			
b) Tools	283	152	20	-	455	216	104	26	-	346	18	14	3	-	35	203	78	26	-	307	720	348	75	-	1143			
c) Supports	324	335	110	2	771	139	101	28	-	268	1	2	-	-	3	51	39	14	-	104	515	477	152	2	1146			
V. FALLS OF OBJECTS	1543	978	352	3	2876	633	334	114	-	1081	59	47	26	2	134	668	382	133	1	1184	2903	1741	625	6	5275			
VI. EXPLOSIVES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	2	-	-	-	2	-	-	-	-	-	1	-	-	-	1	3	-	-	-	3			
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	-	-	-	1			
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2			
IX. HEATINGS OR FIRES	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-		1	-	-	-	1			
X. INRUSHES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
XI. ELECTRICITY	3	1	-	-	4	3	-	-	-	3	-	-	-	-	-	2	6	2	-	10	8	7	2	-	17			
XII. OTHER CAUSES	80	30	12	-	122	55	21	11	-	87	11	4	-	-	15	55	28	14	1	98	201	83	37	1	322			
TOTAL	5945	4125	1334	32	11.436	3293	1941	671	11	5916	305	281	118	12	716	2793	1858	656	20	5327	12336	8205	2779	75	23395			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme

(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks)

(3) Calendar days

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

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

(frequency rates)

Table 1b

COUNTRY

COAL-FIELD

YEAR 1978 - Bundesrepublik Deutschland

MAN-HOURS WORKED (1) 186.850.520

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (2) 6		
CAUSES OF ACCIDENTS / Period of incapacity	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	56 days (3)	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	8,92	5,75	2,00	0,07	16,74	6,17	3,11	1,20	0,05	10,53	0,03	0,03	0,02	-	0,08	1,26	0,87	0,26	0,01	2,40	16,38	9,77	3,48	0,13	29,75			
II. TRANSPORT, TOTAL	0,92	0,83	0,50	0,o3	2,28	0,33	0,32	0,23	-	0,88	0,21	0,27	0,13	0,03	0,65	1,13	1,26	0,90	0,08	3,37	2,59	2,68	1,77	0,14	7,18			
a) Continuous Transport	o,38	0,37	0,20	0,02	0,97	0,11	0,10	0,28	-	0,28	0,01	-	0,01	0,01	0,02	0,12	0,09	0,11	-	0,32	0,63	0,55	0,39	0,02	1,58			
b) Discontinuous Transport	0,54	0,46	0,30	0,02	1,31	0,22	0,22	0,16	-	0,60	0,20	0,27	0,13	0,03	0,63	1,01	1,17	0,80	0,08	3,05	1,96	2,17	1,38	0,12	5,60			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	9,28	6,86	1,70	0,02	17,86	5,12	3,53	0,95	0,01	9,61	0,88	0,80	0,33	0,02	2,03	6,98	4,75	1,20	0,01	12,94	22,25	15,95	4,17	0,05	42,43			
a) while moving about the mine	-	-	-	-	-	-	-	-	-	-	0,03	-	0,01	-	0,04	0,01	-	-	-	0,01	0,04	-	0,01	-	0,05			
b) in the course of other activities	9,28	6,86	1,70	0,02	17,86	5,12	3,53	0,95	0,01	9,61	0,85	0,80	0,32	0,02	1,99	6,97	4,75	1,20	0,01	12,93	22,21	15,95	4,16	0,05	42,38			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	4,00	3,23	1,00	0,03	8,25	2,31	1,53	0,54	0,01	4,37	0,13	0,12	0,02	-	0,27	1,69	0,83	0,35	0,01	2,88	8,51	5,71	1,90	0,04	15,78			
a) Machines	0,75	0,62	0,31	0,02	1,69	0,41	0,43	0,25	0,01	1,09	0,03	0,04	-	-	0,07	0,33	0,21	0,13	0,01	0,68	1,52	1,30	0,69	0,03	3,53			
b) Tools	1,51	0,81	0,11	-	2,44	1,16	0,56	0,14	-	1,85	0,10	0,07	0,02	-	0,19	1,09	0,42	0,14	-	1,64	3,85	1,86	0,40	-	6,12			
c) Supports	1,73	1,79	0,59	0,01	4,13	0,74	0,54	0,15	-	1,43	0,01	0,01	-	-	0,02	0,27	0,21	0,07	-	0,56	2,76	2,55	0,81	0,01	6,13			
V. FALLS OF OBJECTS	8,26	5,23	1,88	0,02	15,39	3,39	1,79	0,61	-	5,79	0,32	0,25	0,14	0,01	0,72	3,58	2,04	0,71	0,01	6,34	15,54	9,32	3,34	0,03	28,23			
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	0,01	-	-	-	0,01	-	-	-	-	-	0,01	-	-	-	0,01	0,02	-	-	-	0,02			
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,01	-	-	-	0,01	0,01	-	-	-	0,01			
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	0,01	-	-	-	0,01	-	-	-	-	-	-	-	-	-	-	0,01	-	-	-	0,01			
IX. HEATINGS OR FIRES	-	0,01	-	-	0,01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	--	0,01	-	-	-	0,01			
X. INRUSHES																												
XI. ELECTRICITY	0,02	0,01	-	-	0,03	0,02	-	-	-	0,02	-	-	-	-	-	0,01	0,03	0,01	-	0,05	0,04	0,04	0,01	-	0,09			
XII. OTHER CAUSES	0,43	0,16	0,06	-	0,65	0,29	0,11	0,06	-	0,47	0,06	0,02	-	-	0,08	0,29	0,15	0,07	0,01	0,52	1,08	0,44	0,20	0,01	1,72			
TOTAL	31,82	22,08	7,14	0,17	61,20	17,62	10,39	3,59	0,06	31,66	1,63	1,50	0,63	0,06	3,83	14,95	9,94	3,51	0,11	28,51	66,02	43,91	14,87	0,40	125,21			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.

(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).

(3) Calendar days.

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

Table 2a

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

(absolute figures)

COUNTRY
COAL-FIELD

YEAR 1978 - Bundesrepublik Deutschland
MAN-HOURS WORKED (1) 186.850.520

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twist and sprains 3			Concussion and internal injury 4			Open wounds contusion and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified (2) 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	4 to 20 days (5)	21 to 56 days (5)	> 56 days (5)	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	0	0	1	47	22	225	1	0	4	22	2	157	89	3	2229	0	0	16				1	2	3	1828	618	160	29	2635
II. Eyes	2	0	3							0	0	0	48	0	542	4	0	71				1	0	23	512	72	55	0	639
III. Trunk	0	0	0	115	13	390	12	0	100	8	3	19	75	3	1466	4	0	28				0	0	2	1044	728	214	19	2005
IV Upper limbs (excluding the hands) (3)	1	0	1	157	0	258	14	0	112				92	0	2289	2	0	42				0	0	0	1746	690	266	0	2702
V. Hands	51	0	130	557	0	2578	32	0	187				264	0	5846	5	0	36				0	0	3	4034	3823	909	0	8775
VI Lower limbs (excluding feet) (4)	2	0	2	347	2	448	99	0	437				221	2	2537	2	0	13				0	0	3	1604	1161	671	4	3440
VII Feet	7	0	9	282	0	685	55	0	714				125	0	1539	0	0	6				0	0	0	1461	1023	469	0	2953
VIII Multiple locations	0	1	1	18	15	39	1	1	2	0	3	6	15	3	188	1	0	10				0	0	0	107	81	35	23	246
IX. Not specified													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	63	1	147	1523	52	4623	214	1	1551	30	8	182	929	11	16636	18	0	222	0	0	0	2	2	34	12336	8196	2779	75	23395

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

DETAILED BREAKDOWN OF ACCIDENT VICTIMS ACCORDING TO CAUSE AND SITE

1979 - Bundesrepublik Deutschland

MAN-HOURS WORKED (*) 186.858.520

A.

Comparative table of number of persons incapacitated
by underground accidents for eight weeks or longer
years 1958 - 1978 per '000,000 man-hours
(frequency)

BELGIUM	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	5,911	4,294	4,324	4,071	4,439	4,432	4,417	3,574	3,568	3,850	3,676	5,075	4,673	3,989	4,6	4,02	3,99	2,79	2,77	2,55	3,43
2) Haulage and transport	4,132	2,979	2,709	2,770	3,331	3,565	3,419	2,866	3,269	2,960	3,220	3,169	3,018	3,365	2,8	3,33	2,43	2,39	2,98	2,21	2,74
3) Movement of personnel	1,354	0,998	1,008	1,062	1,136	1,066	0,961	0,771	0,936	0,903	1,122	1,186	1,144	1,496	1,3	1,41	1,70	1,29	1,06	0,93	1,13
4) Machinery, handling of tools and supports	2,804	2,085	2,386	2,097	2,461	2,414	2,310	2,126	2,146	2,265	1,903	2,353	1,801	2,469	1,7	2,58	2,18	1,66	1,81	1,55	1,94
5) Falling objects	0,414	0,371	0,354	0,301	0,445	0,547	0,397	0,292	0,349	0,459	0,358	1,244	1,242	1,870	1,5	1,44	1,84	1,46	1,63	1,16	1,98
6) Explosives	0,027	0,007	0,032	0,018	-	0,019	0,018	-	0,013	0,056	0,049	-	-	0,025	0,03	-	-	-	0,03	-	-
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	0,009	0,031	-	-	-	0,019	-	-	-	-	-	-	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	0,011	-	-	-	-	-	-	-	0,013	-	-	-	-	-	-	-	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	0,021	-	-	-	-	-	-	-	-	-	-	-	-	-
10) Inrushes of water	-	-	-	-	0,010	-	-	-	-	-	-	-	-	0,025	-	-	-	-	-	-	0,00
11) Electricity	0,011	-	0,016	0,018	0,010	0,009	-	0,010	0,015	-	0,016	0,019	-	-	-	0,03	0,03	0,03	-	-	-
12) Other causes	0,260	0,255	0,260	0,301	0,351	0,198	0,268	0,333	0,362	0,278	0,228	0,175	0,195	0,324	0,2	0,36	0,41	0,06	0,17	0,07	0,16
TOTAL	14,924	10,989	11,089	10,638	12,161	12,250	11,799	10,024	10,669	10,771	10,572	13,240	12,097	13,563	12,13	13,16	12,61	9,71	10,47	8,49	11,37

B.

Underground accidents resulting in death within eight weeks

year 1958 - 1978

per '000,000 man-hours

(frequency)

BELGIUM	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Eboulements	0,223	0,213	0,299	0,266	0,246	0,264	0,222	0,239	0,324	0,264	0,179	0,214	0,268	0,100	0,08	0,21	0,06	0,03	0,07	0,03	0,04
2) Moyens de transport	0,101	0,124	0,157	0,168	0,142	0,245	0,166	0,166	0,187	0,180	0,114	0,097	0,170	0,125	0,18	0,21	0,06	0,16	0,03	0,07	0,16
3) Circulation du personnel	0,011	0,027	0,008	0,035	0,010	0,057	0,028	0,011	0,025	-	0,033	-	-	0,049	0,03	-	0,03	-	0,07	0,03	-
4) Machines, maniement d'outils et de soutènement	0,005	0,014	0,016	0,027	0,047	-	0,018	0,052	0,025	0,028	0,065	-	-	0,025	-	0,03	-	0,09	0,03	0,03	0,04
5) Chutes d'objets	0,016	-	0,008	-	0,010	0,019	0,018	-	-	-	0,016	-	-	-	0,03	-	0,03	-	0,03	-	
6) Explosifs	0,011	0,014	-	-	-	-	-	-	-	-	0,016	-	-	-	-	-	-	-	-	-	
7) Explosions de grisou et de poussières	-	-	0,016	-	-	-	-	0,011	-	-	-	-	-	-	-	-	-	-	-	-	
8) Dégagements instantanés, asphyxies par gaz naturels	0,016	0,014	-	-	0,047	-	-	0,041	0,013	-	-	-	-	0,025	0,18	0,06	-	-	-	-	
9) Feux de mines et incendies	-	0,007	-	-	-	-	-	0,011	-	-	-	-	-	-	-	-	-	-	-	-	
10) Coups d'eau	0,011	-	-	0,044	0,047	0,019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11) Courant électrique	0,021	-	0,024	-	-	0,009	0,009	0,011	-	0,014	0,033	0,019	0,024	-	-	-	-	-	-	-	
12) Autres causes	0,005	-	0,008	0,009	0,019	0,028	0,009	-	0,013	0,042	-	-	-	-	0,03	0,03	-	-	-	-	0,04
TOTAL	0,420	0,413	0,536	0,549	0,568	0,641	0,471	0,542	0,587	0,528	0,456	0,330	0,462	0,324	0,53	0,54	0,20	0,29	0,24	0,193	0,28

MINES SAFETY AND HEALTH COMMISSION
Common Statistics on victims of accidents underground in coal mines

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

(absolute figures)

COUNTRY
COAL-FIELD

YEAR 1978 - BELGIUM

MAN-HOURS WORKED (1) 24.798.880

Table 1a

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (2) 6		
CAUSES OF ACCIDENTS / Period of incapacity	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	56 days (3)	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	1771	206	58	1	2036	793	98	26	0	917	26	1	1	0	28	169	19	0	0	188	2759	324	85	1	3169			
II. TRANSPORT, TOTAL	56	19	10	0	85	197	51	28	1	277	46	12	10	1	69	182	48	20	2	252	481	130	68	4	683			
a) Continuous Transport	50	16	7	0	73	57	21	10	0	88	0	1	0	0	1	37	10	3	0	50	144	48	20	0	212			
b) Discontinuous Transport	6	3	3	0	12	140	30	18	1	189	46	11	10	1	68	145	38	17	2	202	337	82	48	4	471			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	131	26	9	0	166	339	45	15	0	399	87	12	0	0	99	237	39	4	0	280	794	122	28	0	944			
a) while moving about the mine	22	6	2	0	30	66	17	3	0	86	17	3	0	0	20	18	9	0	0	27	123	35	5	0	163			
b) in the course of other activities	109	20	7	0	136	273	28	12	0	313	70	9	0	0	79	219	30	4	0	253	671	87	23	0	781			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	644	121	31	0	796	481	55	12	0	548	33	1	1	0	35	187	20	4	1	212	1345	197	48	1	1591			
a) Machines	62	20	9	0	91	34	8	1	0	43	4	0	0	0	4	15	2	1	1	19	115	30	11	1	157			
b) Tools	161	14	2	0	177	160	6	2	0	168	19	1	1	0	21	82	6	2	0	90	422	27	7	0	456			
c) Supports	421	87	20	0	528	287	41	9	0	337	10	0	0	0	10	90	12	1	0	103	808	140	30	0	978			
V. FALLS OF OBJECTS	558	91	26	0	675	560	75	9		644	96	7	6	0	109	331	32	8	0	371	1545	205	49	0	1799			
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES																												
X. INRUSHES																												
XI. ELECTRICITY																1	0	0	0	1	1	0	0	0	1			
XII. OTHER CAUSES	84	1	4	0	89	82	6	0	0	88	20	0	0	0	20	45	9	0	1	55	231	16	4	1	252			
TOTAL	3244	464	138	1	3847	2452	330	90	1	2873	308	33	18	1	360	1152	167	36	4	1359	7156	994	282	7	8439			

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

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

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

(frequency rates)

Table 1b

COUNTRY

COAL-FIELD

YEAR 1978 - BELGIUM

MAN-HOURS WORKED (¹) 24.798.880

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (²) 6		
CAUSES OF ACCIDENTS / Period of incapacity	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal acci-dents	total	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal acci-dents	total	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal acci-dents	total	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal acci-dents	total	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal acci-dents	total	56 days (³)	Fatal acci-dents	total
I. FALLS OF GROUNDS AND ROCKS	71,41	8,31	2,34	0,04	82,10	31,98	3,95	1,05	-	36,98	1,05	0,04	0,04	-	1,13	6,73	0,77	-	-	7,50	111,17	13,07	3,43	0,04	127,71			
II. TRANSPORT, TOTAL	2,26	0,77	0,40	-	3,43	7,94	2,06	1,13	0,04	11,17	1,85	0,48	0,40	0,04	2,78	7,34	1,94	0,81	0,08	10,16	19,40	5,24	2,74	0,16	27,54			
a) Continuous Transport	2,02	0,65	0,28	-	2,94	2,30	0,85	0,40	-	3,55	-	0,04	-	-	0,04	1,49	0,40	0,12	-	2,02	5,81	1,94	0,81	-	8,55			
b) Discontinuous Transport	0,24	0,12	0,12	-	0,48	5,65	1,21	0,72	0,04	7,62	1,85	0,44	0,40	0,04	2,74	5,85	1,53	0,69	0,08	8,15	13,59	3,31	1,94	0,16	18,99			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	5,28	1,05	0,36	-	6,69	13,67	1,81	0,60	-	16,09	3,51	0,48	-	-	3,99	9,56	1,57	0,16	-	11,29	32,02	4,92	1,13	-	38,07			
a) while moving about the mine	0,89	0,24	0,08	-	1,21	2,66	0,69	0,12	-	3,47	0,69	0,12	-	-	0,81	0,73	0,36	-	-	1,09	4,96	1,41	0,20	-	6,57			
b) in the course of other activities	4,40	0,61	0,28	-	5,48	11,01	1,13	0,48	-	12,62	2,82	0,36	-	-	3,19	8,83	1,21	0,16	-	10,20	27,06	3,51	0,93	-	31,49			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	25,97	4,88	1,25	-	32,10	19,40	2,22	0,48	-	22,10	1,33	0,04	0,04	-	1,41	7,54	0,81	0,16	0,04	8,55	54,24	7,94	1,94	0,04	64,16			
a) Machines	2,50	0,81	0,36	-	3,67	1,37	0,32	0,04	-	1,73	0,16	-	-	-	0,16	0,60	0,08	0,04	0,04	0,77	4,64	1,21	0,44	0,04	6,33			
b) Tools	6,49	0,56	0,08	-	7,14	6,45	0,24	0,08	-	6,77	0,77	0,04	0,04	-	0,85	3,31	0,24	0,08	-	3,63	17,02	1,09	0,28	-	18,39			
c) Supports	16,98	3,51	0,81	-	21,29	11,57	1,65	0,36	-	13,59	0,40	-	-	-	0,40	3,63	0,48	0,04	-	4,15	32,58	5,65	1,21	-	39,44			
V. FALLS OF OBJECTS	22,50	3,67	1,05	-	27,22	22,58	3,02	0,36	-	25,97	3,87	0,28	0,24	-	4,40	13,35	1,29	0,32	-	14,96	62,30	8,27	1,98	-	72,54			
VI. EXPLOSIVES																												
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL																												
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES																												
X. INRUSHES																												
XI. ELECTRICITY																0,04	-	-	-	0,04	0,04	-	-	-	0,04			
XII. OTHER CAUSES	3,39	0,04	0,16	-	3,59	3,31	0,24	-	-	3,55	0,81	-	-	-	0,81	1,81	0,26	-	0,04	2,22	9,31	0,65	0,16	0,04	10,16			
TOTAL	130,81	18,71	5,56	0,04	155,13	98,88	13,31	3,63	0,04	115,86	12,42	1,33	0,73	0,04	14,52	46,37	6,73	1,45	0,16	54,71	288,48	40,08	11,37	0,28	340,21			

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

MINES AFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

Table 2a

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

(absolute figures)

COUNTRY
COAL-FIELD

YEAR 1978 - BELGIUM
MAN-HOURS WORKED (1) 24.798.880

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twist and sprains 3			Concussion and internal injury 4			Open wounds contusion and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified (2) 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	4 to 20 days (5)	21 to 56 days (5)	> 56 days (5)	Fatal accidents	total
LOCATION OF THE INJURY																													
I Head and neck	0	1	1	3	2	5	0	0	0	1	1	2	6	0	6	0	0	0				0	0	0	0	0	10	4	14
II. Eyes	1	0	1							1	0	1	2	0	2	0	0	0				0	0	0	0	0	4	0	4
III Trunk	0	0	0	15	1	16	3	0	3	0	0	0	7	0	7	0	0	0				0	0	0	0	0	25	1	26
IV Upper limbs (excluding the hands) (3)	0	0	0	15	0	15	1	0	1				12	1	13	0	0	0				0	0	0	0	0	28	1	29
V. Hands	6	0	6	51	0	51	0	0	0				25	0	25	0	0	0				0	0	0	0	0	82	0	82
VI Lower limbs (excluding feet) (4)	0	0	0	41	0	41	1	0	1				39	0	39	0	0	0				3	0	3	0	0	84	0	84
VII Feet	4	0	4	21	0	21	1	0	1				19	0	19	0	0	0				0	0	0	0	0	45	0	45
VIII Multiple locations	0	1	1	1	1	2	0	0	0	0	0	0	3	0	3	0	0	0				0	0	0	0	0	4	2	6
IX Not specified													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	11	2	13	147	4	151	6	0	6	2	1	3	113	1	114	0	0	0	0	0	0	3	0	3	0	0	282	8	290

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

17841

A.

Comparative table of number of persons incapacitated
by underground accidents for eight weeks or longer
years 1958 - 1978 per '000,000 man-hours
(frequency)

FRANCE ˣ	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	5,027	4,665	4,744	4,416	4,222	4,177	4,308	3,941	3,927	3,634	4,162	4,044	3,761	3,721	3,79	4,38	4,52	3,75	3,82	3,88	4,88
2) Haulage and transport	1,980	1,695	1,920	2,106	2,196	2,364	2,278	2,153	1,858	1,918	1,946	1,556	1,666	1,959	1,89	2,37	2,36	2,63	2,53	2,44	3,11
3) Movement of personnel	1,505	1,118	2,873	2,334	2,458	2;368	2,383	2,087	2,239	2,174	2,815	3,226	3,372	3,667	4,51	4,79	4,11	4,29	4,81	5,39	7,43
4) Machinery, handling of tools and supports	0,914	1,022	1,621	2,523	2,991	3,096	3,042	2,272	2,639	2,773	3,016	3,070	3,332	2,373	2,63	2,84	2;98	2,94	3,17	3,13	3,52
5) Falling objects	1,890	2,187	1,893	2,292	2,073	2,278	2,074	1,839	1,785	2,114	2,386	2,537	2,515	4,566	4,96	5,00	5,12	4,11	4,11	3,94	3,86
6) Explosives	0,043	0,051	0,031	0,017	0,051	0,009	0,013	0,037	0,010	0,011	-	0,050	0,016	-	0,02	-	-	0,03	-	0,03	0,05
7) Explosions of firedamp or coal dust	0,047	0,088	-	-	0,004	-	-	-	0,029	-	-	-	0,087	-	-	-	0,08	-	-	-	-
8) Sudden outbursts of firedamp, suffocation by natural gases	0,004	-	-	-	-	-	-	-	-	0,005	-	-	-	-	-	-	-	0,01	-	0,02	0,05
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,01	0,03	0,01	0,01	-	-
10) Inrushes of water	-	-	-	-	-	-	0,018	-	0,005	-	0,006	-	0,032	-	0,01	0,04	-	-	-	-	0,03
11) Electricity	0,014	-	0,004	0,029	0,004	0,014	0,009	0,014	-	0,005	0,006	0,014	0,024	0,009	0,01	-	9,01	0,03	0,03	0,02	0,03
12) Other causes	2,956	2,768	0,793	0,362	0,240	0,354	0,227	0,174	0,200	0,185	0,233	0,291	0,294	0,314	0,43	0,67	0,63	0,64	0,49	0,47	0,63
TOTAL	14,380	13,594	13,909	14,079	14,239	14,660	14,347	12,517	12,692	12,819	14,570	14,788	15,099	16,609	18,24	20,09	19,85	18,44	18,97	19,31	23,60

B.

Underground accidents resulting in death within eight weeks

year 1958 - 1978

per '000,000 man-hours

(frequency)

FRANCE [x]	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	0,235	0,192	0,186	0,219	0,167	0,120	0,127	0,164	0,214	0,159	0,177	0,149	0,143	0,117	0,07	0,20	0,11	0,06	0,09	0,09	0,14
2) Haulage and transport	0,115	0,085	0,082	0,122	0,077	0,121	0,141	0,052	0,126	0,088	0,101	0,186	0,127	0,108	0,08	0,07	0,12	0,07	0,10	0,06	0,05
3) Movement of personnel	0,007	0,018	0,027	0,008	0,043	0,009	0,009	0,042	0,024	0,016	0,025	0,014	0,016	0,072	0,01	0,01	0,01	0,03	0,03	-	-
4) Machinery, handling of tools and supports	0,018	0,040	0,016	0,008	0,030	0,009	0,036	0,009	0,015	0,016	0,006	-	0,032	0,027	-	0,02	0,03	-	0,10	-	0,02
5) Falling objects	0,025	0,007	0,004	0,017	0,030	0,009	0,018	0,019	0,015	0,011	0,031	0,014	0,016	0,045	-	0,04	0,03	0,03	0,03	0,02	0,00
6) Explosives	-	0,026	-	-	-	0,005	0,005	0,009	0,005	0,005	0,006	-	0,108	0,018	-	-	-	-	0,01	-	0,02
7) Explosions of firedamp or coal dust	0,115	0,121	-	-	0,004	-	-	0,155	-	-	0,038	-	0,127	-	-	-	0,58	-	0,23	-	0,00
8) Sudden outbursts of firedamp, suffocation by natural gases	0,043	0,026	0,019	0,004	-	0,019	0,009	-	0,005	0,027	0,019	0,007	-	0,072	-	0,01	-	-	-	-	-
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,01	-	0,01	-	-	-	-
10) Inrushes of water	-	-	-	0,004	-	-	-	0,005	-	0,005	-	-	0,016	-	0,01	-	-	-	-	-	-
11) Electricity	-	0,011	0,012	-	0,009	0,024	-	-	0,010	-	-	0,007	-	-	-	-	-	-	-	-	-
12) Other causes	0,036	0,029	0,008	-	0,009	0,014	0,014	-	0,005	0,005	-	0,007	-	0,009	0,03	-	-	-	-	0,02	-
TOTAL	0,594	0,555	0,354	0,382	0,369	0,330	0,359	0,455	0,419	0,332	0,403	0,384	0,484	0,468	0,21	0,37	0,89	0,18	0,60	0,19	0,23

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

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

(absolute figures)

Table 1a

COUNTRY

COAL-FIELD

YEAR 1978 - FRANCE

MAN-HOURS WORKED (1) 58.553.703

SITE OF THE ACCIDENT / CAUSES OF ACCIDENTS (Period of incapacity)	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (2) 6		
	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	56 days (3)	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	1143	506	183	4	1836	431	189	73	3	696	1	-	-	-	1	133	67	30	1	231	1708	762	286	8	2764			
II. TRANSPORT, TOTAL	98	65	37	-	200	61	54	30	1	146	34	22	11	-	67	218	164	104	2	488	411	305	182	3	901			
a) Continuous Transport	44	32	20	-	96	15	9	4	-	28	1	-	-	-	1	25	20	12	0	57	85	61	36	0	182			
b) Discontinuous Transport	54	33	17	-	104	46	45	26	1	118	33	22	11	-	66	193	144	92	2	431	326	244	146	3	719			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	886	496	135	-	1517	409	268	93	-	770	33	26	6	-	65	890	523	201	-	1614	2218	1313	435	-	3966			
a) while moving about the mine	293	147	45	-	485	185	105	42	-	332	24	13	5	-	42	535	277	125	-	937	1037	542	217	-	1796			
b) in the course of other activities	593	349	90	-	1032	224	163	51	0	438	9	13	1	-	23	355	246	76	-	677	1181	771	218	-	2170			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	851	398	107	1	1357	351	186	54	-	591	14	6	-	-	20	337	210	45	-	592	1553	800	206	1	2560			
a) Machines	50	46	24	-	120	54	33	16	-	103	2	1	-	-	3	16	23	9	-	48	122	103	49	-	274			
b) Tools	362	138	25	-	525	172	82	21	-	275	9	4	-	-	13	201	103	24	-	328	744	327	70	-	1141			
c) Supports	439	214	58	1	712	125	71	17	-	213	3	1	-	-	4	120	84	12	-	216	687	370	87	1	1145			
V. FALLS OF OBJECTS	655	275	86	-	1016	309	143	35	-	487	29	14	6	-	49	689	306	99	-	1094	1682	738	226	-	2646			
VI. EXPLOSIVES	-	1	-	1	2	-	1	3	-	4	-	-	-	-	-	1	-	-	-	1	1	2	3	1	7			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	1	-	-	-	1	3	1	2	-	6	-	-	-	-	-	-	-	1	-	1	4	1	3	-	8			
a) Outbursts of Gas	1	-	-	-	1	3	-	2	-	5	-	-	-	-	-	-	-	1	-	1	4	-	3	-	7			
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	1	-	-	1	-		-	-	-	-	-	-	-	-	-	1	-	-	1			
IX. HEATINGS OR FIRES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
X. INRUSHES	3	-	1	-	4	-	-	-	-	-	-	-	-	-	-	2	-	1	-	3	5	-	2	-	7			
XI. ELECTRICITY	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	3	-	2	-	5	4	-	2	-	6			
XII. OTHER CAUSES	173	40	12	-	225	141	18	6	-	165	17	6	-	-	23	193	56	19	-	268	524	120	37	-	681			
TOTAL	3810	1781	561	6	6158	1706	860	296	4	2866	128	74	23	-	225	2466	1326	502	3	4297	8110	4041	1382	13	13546			

(1) Number of hours worked by pit staff and employees of contractor firms who belong to a miners' social insurance scheme.

(2) Accidents involving more than five casualties (i.e. who either died or were unable to resume work underground for at least eight weeks).

(3) Calendar days

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MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

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

(frequency rates)

Table 1b

COUNTRY
COAL-FIELD

YEAR 1978 - FRANCE
MAN-HOURS WORKED (¹) 58.553.703

SITE OF THE ACCIDENT	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (²) 6		
CAUSES OF ACCIDENTS / Period of incapacity	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal accidents	total	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal accidents	total	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal accidents	total	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal accidents	total	4 to 20 days (³)	21 to 56 days (³)	> 56 days (³)	Fatal accidents	total	56 days (³)	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	19,52	8,64	3,13	0,07	31,36	7,36	3,23	1,25	0,05	11,89	0,02	-	-	-	0,02	2,27	1,14	0,51	0,02	3,95	29,17	13,01	4,88	0,14	47,20			
II. TRANSPORT, TOTAL	1,67	1,11	0,63	-	3,42	1,04	0,92	0,51	0,02	2,49	0,58	0,38	0,19	-	1,14	3,72	2,80	1,78	0,03	8,33	7,02	5,21	3,11	0,05	15,39			
a) Continuous Transport	0,75	0,55	0,34	-	1,64	0,26	0,15	0,07	-	0,48	0,02	-	-	-	0,02	0,43	0,34	0,20	-	0,97	1,45	1,04	0,61	-	3,11			
b) Discontinuous Transport	0,92	0,56	0,29	-	1,78	0,79	0,77	0,44	0,02	2,02	0,56	0,38	0,19	-	1,13	3,30	2,46	1,57	0,03	7,36	5,57	4,17	2,49	0,05	12,28			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	15,13	8,47	2,31	-	25,91	6,99	4,58	1,59	-	13,15	0,56	0,44	0,10	-	1,11	15,20	8,93	3,43	-	27,56	37,88	22,42	7,43	-	67,73			
a) while moving about the mine	5,00	2,51	0,77	-	8,28	3,16	1,79	0,72	-	5,67	0,41	0,22	0,09	-	0,72	9,14	4,73	2,13	-	16,00	17,71	9,26	3,71	-	30,67			
b) in the course of other activities	10.13	5,96	1,54	-	17,62	3,83	2,78	0,87	-	7,48	0,15	0,22	0,02	-	0,39	6,06	4,20	1,30	-	11,56	20,17	13,17	3,72	-	37,06			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	14,53	6,80	1,83	0,02	23,18	5,99	3,18	0,92	-	10,09	0,24	0,10	-	-	0,34	5,76	3,59	0,77	-	10,11	26,52	13,66	3,52	0,02	43,72			
a) Machines	0,85	0,79	0,41	-	2,05	0,92	0,56	0,27	-	1,76	0,03	0,02	-	-	0,05	0,27	0,39	0,15	-	0,82	2,08	1,76	0,84	-	4,68			
b) Tools	6,18	2,36	0,43	-	8,97	2,94	1,40	0,36	-	4,70	0,15	0,07	-	-	0,22	3,43	1,76	0,41	-	5,60	12,71	5,58	1,20	-	19,49			
c) Supports	7,50	3,65	0,99	0,02	12,16	2,13	1,21	0,29	-	3,64	0,05	0,02	-	-	0,07	2,05	1,43	0,20	-	3,60	11,73	6,32	1,49	0,02	19,55			
V. FALLS OF OBJECTS	11,19	4,70	1,47	-	17,35	5,28	2,44	0,60	-	8,32	0,50	0,24	0,10	-	0,84	11,77	5,23	1,69	-	18,68	28,73	12,60	3,86	-	45,19			
VI. EXPLOSIVES	-	0,02	-	0,02	0,03	-	0,02	0,05	-	0,07	-	-	-	-	-	0,02	-	-	-	0,02	0,02	0,03	0,05	0,02	0,12			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	0,02	-	-	-	0,02	0,05	0,02	0,03	-	0,10	-	-	-	-	-	-	-	0,02	-	0,02	0,07	0,02	0,05	-	0,14			
a) Outbursts of Gas	0,02	-	-	-	0,02	0,05	-	0,03	-	0,09	-	-	-	-	-	-	-	0,02	-	0,02	0,07	-	0,05	-	0,12			
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	-	0,02	-	-	0,02	-	-	-	-	-	-	-	-	-	-	-	0,02	-	-	0,02			
IX. HEATINGS OR FIRES																												
X. INRUSHES	0,05	-	0,02	-	0,07	-	-	-	-	-	-	-	-	-		0,03	-	0,02	-	0,05	0,09	-	0,03	-	0,12			
XI. ELECTRICITY	-	-	-	-	-	0,02	-	-	-	0,02	-	-	-	-	-	0,05	-	0,03	-	0,08	0,07	-	0,03	-	0,10			
XII. OTHER CAUSES	2,95	0,68	0,20	-	3,84	2,41	0,31	0,10	-	2,82	0,29	0,10	-	-	0,39	3,30	0,96	0,32	-	4,58	8,95	2,05	0,63	-	11,63			
TOTAL	65,07	30,42	9,58	0,1	105,17	29,14	14,69	5,0	0,07	48,95	2,19	1,26	0,39	-	3,84	42,12	22,65	8,57	0,0	73,39	138,51	69,01	23,60	0,22	231,34			

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

MINES AFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

Table 2a

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

(absolute figures)

COUNTRY
COAL-FIELD

YEAR 1978 - FRANCE
MAN-HOURS WORKED (1) 58.553.703

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twist and sprains 3			Concussion and internal injury 4			Open wounds contusion and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified (2) 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	4 to 20 days (5)	21 to 56 days (5)	> 56 days (5)	Fatal accidents	total
LOCATION OF THE INJURY																													
I. Head and neck	1	0	1	11	1	12	0	0	0	5	0	5	47	1	48	1	0	1				12	0	12	743	232	77	2	1054
II. Eyes	0	0	0							0	0	0	16	0	16	0	0	0				1	0	1	698	55	17	0	770
III Trunk	0	0	0	38	2	40	40	0	40	17	0	17	79	0	79	0	0	0				6	1	7	1134	807	180	3	2124
IV Upper limbs (excluding the hands) (3)	0	0	0	53	0	53	14	0	14				66	0	66	0	0	0				6	0	6	1052	380	139	0	1571
V. Hands	28	0	28	240	0	240	10	0	10				128	0	128	1	0	1				6	0	6	2260	1375	413	0	4048
VI Lower limbs (excluding feet) (4)	1	0	1	100	0	100	92	0	92				159	0	159	0	0	0				3	0	3	1273	645	355	0	2273
VII Feet	2	0	2	76	0	76	7	0	7				37	0	37	0	0	0				0	0	0	650	367	122	0	1139
VIII Multiple locations	0	0	0	24	1	25	1	0	1	9	0	9	28	0	28	0	0	0				12	2	14	251	150	74	3	478
IX. Not specified													2	0	2	0	0	0	1	3	4	2	2	4	49	30	5	5	89
TOTAL	32	0	32	542	4	546	164	0	164	31	0	31	562	1	563	2	0	2	1	3	4	48	5	53	8110	4041	1382	13	13546

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

17841

A.

Comparative table of number of persons incapacitated by underground accidents for eight weeks or longer years 1958 - 1978 per '000,000 man-hours (frequency)

ITALY	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	1,355	1,378	1,808	-	0,792	0,366	0,893	5,572	6,360	5,580	0,182	3,656	-	5,958	2,20	-	-	-			
2) Haulage and transport	1,335	0,984	1,205	0,676	1,847	1,465	1,787	-	0,707	0,797	0,812	-	-	3,404	-	-	-	-			
3) Movement of personnel	0,668	0,394	1,005	1,578	1,056	0,732	1,787	-	0,707	1,594	0,812	1,462	-	1,702	-	3,25	-	-			
4) Machinery, handling of tools and supports	1,169	0,984	0,603	0,902	1,584	1,465	3,127	7,164	7,067	13,552	7,304	8,043	6,896	2,553	-	-	-	4,00			
5) Falling objects	1,169	1,698	1,808	2,029	2,375	3,296	3,574	0,796	-	6,377	6,493	3,656	-	1,702	-	-	1,64	-		*Production*	
6) Explosives	0,167	-	-	0,225	-	0,366	-	-	-	-	-	-	-	-	-	-	-	-		*stopped*	
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
8) Sudden outburst of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12) Other causes	0,334	0,591	0,603	0,451	-	-	-	1,592	3,360	3,189	0,812	-	5,172	0,851	-	-	-	-			
TOTAL	6,197	6,299	7,032	5,861	7,654	7,690	11,168	15,124	18,201	31,089	17,043	16,817	12,068	16,170	2,20	3,25	1,64	4,00			

B.

Underground accidents resulting in death within eight weeks

year 1958 - 1978

per '000,000 man-hours

(frequency)

ITALY	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	0,167	-	0,201	0,225	-	0,366	-	-	-	-	-	-	-	-	2,20						
2) Haulage and transport	-	0,197	-	-	-	-	-	-	-	0,797	-	-	-	-	-						
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
4) Machinery, handling of tools and supports	-	-	-	-	-	-	-	-	-	0,797	-	-	-	-	-						
5) Falling objects	-	0,197	-	-	-	-	-	-	-	-	-	-	-	-	-						
6) Explosives	0,501	-	-	-	-	-	-	-	-	-	-	-	-	-	-				Production stopped		
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
8) Sudden outbursts of firedamp, suffocation by natural gases	0,167	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
11) Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
12) Other causes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
TOTAL	0,835	0,394	0,201	0,226	-	0,366	-	-	-	1,594	-	-	-	-	2 20						

A.

Comparative table of number of persons incapacitated
by underground accidents for eight weeks or longer
years 1958 - 1978 per '000,000 man-hours
(frequency)

NEDERLANDS	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	1,326	1,464	1,305	1,829	2,238	1,742	2,017	1,923	1,688	2,466	2,450	2,737	2,634	2,528	2,06	4,219	1,041				
2) Haulage and transport	1,511	1,562	1,898	1,924	2,590	1,826	1,952	2,808	2,621	1,866	2,407	2,562	2,634	1,820	2,19	2,443	2,603				
3) Movement of personnel	0,324	0,386	0,187	0,514	0,580	0,630	0,472	0,774	0,605	0,766	1,160	1,165	0,905	0,404	1,03	0,888	0,521				
4) Machinery, handling of tools and supports	0,617	0,402	0,780	0,915	1,015	1,050	1,094	1,282	2,066	0,833	1,031	1,689	1,894	3,033	1,81	1,554	4,686				
5) Falling objects	0,401	0,515	0,492	0,819	0,642	0,630	0,923	0,862	0,958	0,866	1,590	1,106	0,659	1,213	1,55	0,888	1,562	*Production stopped*			
6) Explosives	-	-	-	-	-	-	0,021	-	-	-	-	-	-	-	-	-	-				
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
11) Electricity	-	-	-	-	0,021	-	0,021	-	-	-	-	-	-	-	-	-	-				
12) Other causes	0,262	0,161	0,390	0,210	0,497	0,147	0,129	0,088	0,353	0,700	0,301	0,116	0,165	0,202	0,52	0,666	-				
TOTAL	4,441	4,490	5,051	6,212	7,583	6,025	6,629	7,737	8,291	7,497	8,939	9,375	8,891	9,201	9,15	10,659	10,413				

B.

Underground accidents resulting in death within eight weeks

year 1958 - 1978

per '000,000 man-hours

(frequency)

NEDERLANDS	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground	0,262	0,064	0,034	0,114	0,062	0,084	0,043	0,044	0,050	0,100	0,172	0,058	0,082	0,101	-	-	-				
2) Haulage and transport	0,077	0,145	0,067	0,095	0,062	0,105	0,172	0,177	0,126	-	0,086	-	0,165	-	0,26	-	-				
3) Movement of personnel	-	-	-	-	-	-	-	-	-	-	-	0,058	-	-	-	-	-				
4) Machinery, handling of tools and supports	0,015	0,016	-	-	0,041	-	-	0,022	-	0,067	-	0,117	-	-	-	-	-				
5) Falling objects	-	0,016	-	-	-	-	0,043	-	-	-	0,043	-	-	-	-	-	0,521	*Production stopped*			
6) Explosives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
7) Explosions of firedamp or coal dust	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
8) Sudden outbursts of firedamp, suffocation by natural gases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
9) Underground combustion and fires	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
10) Inrushes of water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
11) Electricity	-	-	-	0,019	-	-	-	-	-	-	-	-	-	-	-	-	-				
12) Other causes	-	-	0,017	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
TOTAL	0,355	0,241	0,119	0,229	0,166	0,189	0,258	0,243	0,176	0,167	0,301	0,233	0,247	0,101	0,26	-	0,521				

A.

Comparative table of number of persons incapacitated
by underground accidents for eight weeks or longer
years 1958 - 1978 per '000,000 man-hours
(frequency)

UNITED KINGDOM	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground																				1,05	1,02
2) Haulage and transport																				1,69	1,53
3) Movement of personnel																				2,03	1,72
4) Machinery, handling of tools and supports																				1,09	1,02
5) Falling objects																				0,82	0,82
6) Explosives	*Not available following the system of classification used in the Community of Six*																			0,01	0,01
7) Explosions of firedamp or coal dust																				-	-
8) Sudden outbursts of firedamp, suffocation by natural gases																				-	-
9) Underground combustion and fires																				-	-
10) Inrushes of water																				-	-
11) Electricity																				-	-
12) Other causes																				1,03	0,92
TOTAL																				7,75	7,07

B.

Underground accidents resulting in death within eight weeks

year 1958 - 1978

per '000,000 man-hours

(frequency)

UNITED KINGDOM	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
1) Falls of ground																				0,02	0,03
2) Haulage and transport																				0,07	0,12
3) Movement of personnel																				-	-
4) Machinery, handling of tools and supports																				-	-
5) Falling objects	*Not available following the system of classification used in the Community of Six*																			-	-
6) Explosives																				-	-
7) Explosions of firedamp or coal dust																				-	-
8) Sudden outbursts of firedamp, suffocation by natural gases																				-	-
9) Underground combustion and fires																				-	-
10) Inrushes of water																				-	-
11) Electricity																				-	-
12) Other causes																				-	-
TOTAL																				0,11	0,15

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

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

(absolute figures)

Table 1a

COUNTRY
COAL-FIELD

YEAR 1978 - UNITED KINGDOM
MAN-HOURS WORKED (1) 286.881.331

SITE OF THE ACCIDENT / CAUSES OF ACCIDENTS / Period of incapacity	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (2) 6		
	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	56 days (3)	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	2807	948	208	8	3971	672	207	45	3	927	-	-	-	-	-	707	216	41	-	964	4186	1371	294	11	5862			
II. TRANSPORT, TOTAL	956	306	100	5	1367	271	100	28	-	399	13	9	2	-	24	2602	987	310	25	3924	3842	1402	440	30	5714			
a) Continuous Transport	52	33	16	2	103	12	9	3	-	24	-	-	-	-	-	142	58	23	2	225	206	100	42	4	352			
b) Discontinuous Transport	904	273	84	3	1264	259	91	25	-	375	13	9	2	-	24	2460	929	287	23	3699	3636	1302	398	26	5362			
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	1124	339	64	1	1528	602	204	65	-	871	-	-	-	-	-	5676	1856	365	-	7897	7402	2399	494	1	10296			
a) while moving about the mine	332	82	10	-	424	155	55	16	-	226	-	-	-	-	-	2835	919	190	-	3944	3322	1056	216	-	4594			
b) in the course of other activities	792	257	54	1	1104	447	149	49	-	645	-	-	-	-	-	2841	937	175	-	3953	4080	1343	278	1	5702			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	1974	569	132	1	2676	638	180	40	-	858	6	2	-	-	8	1852	552	121	-	2525	4470	1303	293	1	6067			
a) Machines	347	100	20	-	467	72	18	6	-	96	-	-	-	-	-	129	31	8	-	168	548	149	34	-	731			
b) Tools	145	43	12	-	200	73	12	6	-	91	-	-	-	-	-	396	120	30	-	546	614	175	48	-	837			
c) Supports	1482	426	100	-	2009	493	150	28	-	671	6	2	-	-	8	1327	401	83	-	1811	3308	979	211	1	4499			
V. FALLS OF OBJECTS	1372	461	110	-	1943	397	132	24	-	553	3	3	1	-	7	1322	468	102	-	1892	3094	1064	237	-	4395			
VI. EXPLOSIVES	22	5	3	-	30	10	1	-	-	11	2	-	-	-	2	13	4	1	-	18	47	10	4	-	61			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	---	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3			
a) Outbursts of Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
b) De-oxygenation and Poisoning by natural Gases	-	-	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3			
IX. HEATINGS OR FIRES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	3	1	1	1	-	3			
X. INRUSHES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
XI. ELECTRICITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	3	1	-	9	5	3	1	-	9			
XII. OTHER CAUSES	999	318	63	-	1380	478	145	20	-	643	15	15	6	-	36	2996	1012	176	-	4184	4488	1490	265	-	6243			
TOTAL	9254	2946	680	15	12895	3071	969	222	3	4265	39	29	9	-	77	15174	5099	1118	25	21416	27538	9043	2029	43	38653			

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

MINES SAFETY AND HEALTH COMMISSION

Common Statistics on victims of accidents underground in coal mines

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

(frequency rates)

Table 1b

COUNTRY
COAL-FIELD

YEAR 1078 - UNITED KINGDOM
MAN-HOURS WORKED (1) 286.881.361

SITE OF THE ACCIDENT / CAUSES OF ACCIDENTS (Period of incapacity)	Production faces 1					Headings excluding shafts and staple-pits 2					Shafts and staple-pits 3					Other places 4					Total of accidents underground 5					Group accidents (2) 6		
	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	4 to 20 days (3)	21 to 56 days (3)	> 56 days (3)	Fatal accidents	total	56 days (3)	Fatal accidents	total
I. FALLS OF GROUNDS AND ROCKS	9,78	3,30	0,72	0,02	13,83	2,34	0,72	0,15	0,01	3,23	-	-	-	-	-	2,46	0,75	0,14	-	3,35	14,58	4,77	1,02	0,03	20,42			
II. TRANSPORT, TOTAL	3,33	1,06	0,34	0,01	4,76	0,94	0,34	0,09	-	1,39	0,04	0,03	0,00	-	0,08	9,06	3,43	1,08	0,08	13,67	13,38	4,88	1,53	0,10	19,91		02	
a) Continuous Transport	0,18	0,11	0,05	0,00	0,35	0,04	0,03	0,01	-	0,08	-	-	-	-	-	0,49	0,20	0,08	0,00	0,78	0,71	0,34	0,14	0,01	1,22			
b) Discontinuous Transport	3,15	0,95	0,29	0,01	4,40	0,90	0,31	0,08	-	1,30	0,04	0,03	0,00	-	0,08	8,57	3,23	1,00	0,08	12,89	12,67	4,53	1,38	0,09	18,68		02	
III. FALLS AND MOVEMENT OF THE VICTIM, TOTAL	3,91	1,18	0,22	0,00	5,32	2,09	0,71	0,22	-	3,03	-	-	-	-	-	19,78	6,46	1,27	-	27,52	25,79	8,36	1,72	0,00	35,88			
a) while moving about the mine	1,15	0,28	0,03	-	1,47	0,54	0,19	0,05	-	0,78	-	-	-	-	-	9,87	3,20	0,66	-	13,74	11,57	3,68	0,75	-	16,01			
b) in the course of other activities	2,76	0,89	0,18	0,00	3,84	1,55	0,51	0,17	-	2,24	-	-	-	-	-	9,90	3,26	0,60	-	13,77	14,21	4,68	0,96	0,00	19,87			
IV. MACHINES, TOOLS AND SUPPORTS TOTAL	6,87	1,98	0,46	0,00	9,32	2,22	0,62	0,13	-	2,99	0,02	0,00	-	-	0,02	6,45	1,92	0,42	-	8,79	15,57	4,54	1,02	0,00	21,14			
a) Machines	1,20	0,34	0,06	-	1,62	0,25	0,06	0,02	-	0,33	-	-	-	-	-	0,44	0,10	0,02	-	0,58	1,90	0,51	0,11	-	2,54			
b) Tools	0,50	0,14	0,04	-	0,69	0,25	0,04	0,02	-	0,31	-	-	-	-	-	1,38	0,41	0,10	-	1,90	2,13	0,60	0,16	-	2,91			
c) Supports	5,16	1,48	0,34	0,00	7,00	1,71	0,52	0,09	-	2,33	0,02	0,00	--	-	0,02	4,62	1,39	0,28	-	6,31	11,52	3,41	0,73	0,00	15,67			
V. FALLS OF OBJECTS	4,78	1,60	0,38	-	6,77	1,38	0,46	0,08	-	1,92	0,01	0,01	0,00	-	0,02	4,60	1,63	0,35	-	6,59	10,78	3,70	0,82	-	15,31			
VI. EXPLOSIVES	0,07	0,01	0,01	-	0,10	0,03	0,00	-	-	0,03	0,00	-	-	-	0,00	0,04	0,01	0,00	-	0,06	0,16	0,03	0,01	-	0,21			
VII. IGNITIONS OR EXPLOSIONS OF FIREDAMP AND COAL DUST																												
VIII. OUTBURSTS OF GAS, DE-OXYGENATION, SUFFOCATION OR POISONING BY NATURAL GASES (CO_2, CH_4, CO, H_2S), TOTAL	-	-	-	-	-	0,01	-	-	-	0,01	-	-	-	-	-	-	-	-	-	-	0,01	-	-	-	0,01			
a) Outbursts of Gas																												
b) De-oxygenation and Poisoning by natural Gases																												
IX. HEATINGS OR FIRES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,00	0,00	0,00	-	0,01	0,00	0,00	0,00	-	0,01			
X. INRUSHES																												
XI. ELECTRICITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,01	0,01	0,00	-	0,03	0,01	0,01	0,00	-	0,03			
XII. OTHER CAUSES	3,48	1,10	0,21	-	4,80	1,66	0,50	0,06	-	2,24	0,05	0,05	0,02	-	0,12	10,44	3,52	0,61	-	14,58	15,64	5,19	0,92	-	21,75			
TOTAL	32,25	10,26	2,36	0,05	44,93	10,70	3,31	0,77	0,01	14,86	0,13	0,10	0,03	-	0,26	52,88	17,77	3,89	0,08	74,63	95,96	31,51	7,07	0,15	134,70			

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

Table 2a

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

(absolute figures)

COUNTRY
COAL-FIELD

YEAR 1978 - UNITED KINGDOM
MAN-HOURS WORKED (1) 286.881.361

NATURE OF THE INJURY	Amputations and enucleations 1			Fractures with or without dislocation 2			Luxations, twist and sprains 3			Concussion and internal injury 4			Open wounds contusion and muscular abrasions 5			Burns and harmful effects of electricity and radiation 6			Poisoning and suffocation 7			Multiple injuries of those not specified (2) 8			TOTAL 9				
PERIOD OF INCAPACITY	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	> 56 days (5)	Fatal accidents	total	4 to 20 days (5)	21 to 56 days (5)	> 56 days (5)	Fatal accidents	total
LOCATION OF THE INJURY I. Head and neck	0	0	0	15	5	48	11	0	205	0	0	0	58	0	1758	1	0	5				0	0	7	1544	389	85	5	2023
II. Eyes	0	0	0							0	0	0	13	0	586	0	0	2				17	0	704	1127	135	30	0	1292
III Trunk	0	0	0	25	0	67	277	0	6241	0	0	0	82	0	2483	0	0	6				0	4	6	6314	2101	384	4	8803
IV Upper limbs (excluding the hands) (3)	0	0	0	69	0	140	39	0	777				77	0	1999	0	0	19				0	0	6	2153	603	185	0	2941
V. Hands	27	0	82	54	0	439	25	0	468				313	0	8109	1	0	23				0	0	32	6294	2439	420	0	9153
VI Lower limbs (excluding feet) (4)	2	0	4	157	0	253	210	0	3630				195	0	4478	3	0	12				1	0	13	5961	1861	568	0	8390
VII Feet	4	0	9	35	0	173	2	0	209				85	0	2166	0	0	0				0	0	2	1769	664	126	0	2559
VIII Multiple locations	2	0	6	30	3	63	72	0	1130	0	0	0	165	3	1953	1	0	11				2	2	7	2155	795	212	8	3170
IX. Not specified													0	0	0	3	0	31	0	3	7	16	23	284	221	56	19	26	322
TOTAL	35	0	101	385	8	1183	636	0	12660	0	0	0	928	3	23532	9	0	109	0	3	7	36	29	1061	27538	9043	2029	43	38653

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

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ANNEXES

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ANNEX I

TERMS OF REFERENCE AND RULES OF PROCEDURE

OF THE MINES SAFETY COMMISSION

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

COUNCIL OF MINISTERS

DECISION

of 9 July 1957

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

For the Council,

J. REY

President.

RULES OF PROCEDURE

of the Mines Safety Commission

CHAIRMAN

Article 1

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

Article 2

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

MEMBERS

Article 3 (1)

The Commission shall consist of 36 members appointed by the Governments; each country shall have four members, of whom two shall be representatives of that country's Governments, one of the employers and one of the workers.

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

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

I.L.O. PARTICIPATION

Article 4

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

ORGANIZATION

(a) Restricted Committee

Article 5

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

Article 6

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

Article 7

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

Article 8 (1)

The Restricted Committee shall be convened by the Chairman.

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

(b) Working Parties

Article 9

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

Article 10

The Working Parties shall decide their own modus operandi.

Article 11

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

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

SECRETARIAT

Article 12 (1)

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

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

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

WORKING PROCEDURE

Article 13

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

Article 14 (1)

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

The Chairman may allow advisers to speak.

Article 15

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

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

Article 16

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

Article 17 (1)

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

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

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

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

THE COUNCIL

DECISION *(1)*

of March 11, 1965

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

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

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

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

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

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

DECIDE:

Article 1

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

Article 2

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

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

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

For the Council

M. MAURICE-BOKANOWSKI

President

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

ANNEX

TERMS OF REFERENCE FOR THE MINES SAFETY COMMISSION

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

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

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

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

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

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

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

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

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

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

COUNCIL DECISION

of 27 June 1974

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

(74/326/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

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

Having regard to the draft of the Commission;

Having regard to the Opinion of the European Parliament [1];

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

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

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

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

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

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

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

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

HAS DECIDED AS FOLLOWS:

Article 1

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

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

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

(1) OJ No C 40, 8. 4. 1974, p. 64.
(2) OJ No 28, 31. 8. 1957, p. 487/57.
(3) OJ No 46, 22. 3. 1965, p. 698/65.
(4) OJ No C 13, 12. 2. 1974, p. 1.

Article 2

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

2. It shall apply :

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

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

Done at Luxembourg, 27 June 1974.

For the Council

The President

K. GSCHEIDLE

ANNEX II

TERMS OF REFERENCE

OF THE VARIOUS WORKING PARTIES

OF THE SAFETY AND HEALTH COMMISSION

(Update September 1979)

C - VENTILATION, FIREDAMP AND OTHER MINE GASES

Chairman : Mr RHYDDERCH

A. <u>General terms of reference</u>

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

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

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

B. <u>Special terms of reference</u>

1. Examination of the special requirements for workings with auxiliary ventilation in which dust control and air conditioning equipment is used

2. Examination of controlled partial recirculation of air in drivages.

3. Presentation of proposals for the selection of combinations of suitable materials for the impellers and housings of auxiliary fans.

C

4. Preparation of a report on "Methane under armoured conveyors".

5. Preparation of a second report on "Ignitions of firedamp by power loaders and heading machines" including proposals to the Governments on automatic methane monitoring, ventilation of the space between the roadhead and the body of the machine, horizon control and automatic extinguishing of ignitions.

6. Preparation of a report on "Heavy gas emissions".

7. Preparation of a report on "Effects of firedamp on the risk of explosion with coal dusts (in collaboration with the Working Party on "Flammable Dusts").

8. Drafting of uniform requirements and specifications for the design and use of CH_4 monitoring instruments.

9. Preparation of a report on "Use of diesel engines underground in mines".

10. Drafting conclusions concerning outbursts of coal and gases.

D - WINDING ROPES AND SHAFT GUIDES, WINDING ENGINES AND WINCHES

Chariman : Mr LINTZEN

Terms of reference

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

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

3. Arrangements for the installation and inspection of capels.

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

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

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

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

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

E - STRATA CONTROL AND ROCK MECHANICS

Chairman : Mr J.S. MARSHALL

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

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

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

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

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

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

F - E L E C T R I C I T Y

Chairman : Mr STASSEN

Terms of reference

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

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

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

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

5. Study of the problem of stray currents.

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

7. To follow the development of techniques designed to eliminate entirely the production of sparks on electrical contact lines (battery motors excluded).

9. The Mines Safety and Health Commission instructs the Working Party on Electricity :

F -

9.1. to continue to take due note of the results of the work of the CENELEC Committee of Experts entrusted with harmonizing the rules covering the design of electrical equipment for use in explosive atmosphere ;

9.2. to propose, if appropriate, modifications to the above documents of CENELEC to make them applicable to coal mines in countries of the European Community ;

9.3. to prepare the models of the certificates of conformity and control for Group I electrical apparatus (in collaboration with D.G. III of the EC - Commission) ;

9.4. to compare the rules covering installation and use of underground electrical equipment now current in each to the Community countries, particularly in respect of the dangers of firedamp ignition ; to ensure that the rules are uniform or to examine the equivalence of certain rules, so that such equipment can be used without modification in all the Community countries.

G - HUMAN FACTORS AFFECTING SAFETY

Chairman : Mr LINTZEN

Terms of reference

1. Community safety campaigns.

2. Recommendation on the employment of foreign and young workers.

3. Practical measures for the prevention of accidents, taking into account psychological and sociological factors.

4. Ways in which workers participate in the inspection of mining activities with regard to safety and health.

I - M E C H A N I Z A T I O N

Chairman : Mr MEDAETS

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

In particular, it is to :

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

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

K - OIL, GAS AND OTHER MATERIALS EXTRACTED BY BOREHOLE

Chairman : Mr DE KORVER

A. Terms of reference

1. In the light of information available on safety and health hazards and the causes of accidents during prospecting, boring and extracting to obtain petroleum, gas and other materials in the Community countries ; the working party is instructed in particular :

a) to evaluate lessons to be drawn from several serious accidents which occurred during the evacuation of platforms off shore : recommandation on exercises for the rescue of men falling over board, for the evacuation of platforms, fire fighting, etc...

b) to form a study and editorial group which will study the problem of accident statistics in the specific field outlined under 1. in collaboration with the working party on Common Accident Statistics ;

c) to make proposals in the field of initial and refresher training for personnel of all ranks ;

d) to maintain contacts with the organizations and conferences working in this field, in particular with the "London Conference of Safety and Pollution Safeguards in the Development of North West European Offshore Mineral Resources" and particularly with its group III, with the "Inter-Governemental Maritime Consultative Organization", with the "International Labour Office" and the "European Diving Technology Committee".

B. Special terms of reference

The Committee of experts on "Well Control", which prepared the proposals on the prevention of blowouts, is instructed to update or elaborate these recommandations in line with technical progress.

L - COMBUSTIBLE DUSTS

Chairman : Mr. KOCH

Terms of reference

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

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

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

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

M - HEALTH IN MINES

Chairman : Mr RHYDDERCH

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

1. To update the general directives concerning airborne dust control methods in coal mines during the use of power loaders and heading machines, particularly in connection with powered supports, underground crushers and rubber tyred transport vehicles.

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

3. Establishment of airborne dust thresholds. Definition of categories of permissible dustiness. Steps to be taken when faced with various categories of dustiness, especially in coal mines.

4. Among the medical problems in the control of ambient health hazards to workers in mines and other extractive industries priority must be given to the study of the following factors : climate, noise, vibration, visibility and gas, in particular radon and H_2S.

N - RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Chairman : Mr COENDERS

A. <u>General terms of reference</u>

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

Exchange of experience between the Community countries on :

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

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

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

B. <u>Special terms of reference</u>

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

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

   a) methods and apparatus for the early detection of combustion, heatings and pit fires,

   b) CO self-rescuers employing filters oxygen and more

N generally methods to protect personnel in noxious atmospheres (gas, fumes, oxygen deficiency etc.)

c) Oxygen deficiency warning devices,

d) Fires in long plant,

e) Sealing off abandoned workings,

f) Specifications and testing conditions for fire-resistant fluids for mechanical power transmission.

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

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

1. Improve borehole rescue techniques,

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

D. Studies to be completed on the following subjects :

1. Effects of a fire in shafts,

2. Resources to be applied to combat the danger of explosion during firefighting : nitrogen and others.

0 - COMMON ACCIDENT STATISTICS

Chairman : Mr KOCH

Terms of reference

1. To extend the tables of accident statistics under ground, prepared for coal mines to all the extractive industries.

The working party shall determine the conditions for this extension and examine how the condensed statistics on socioeconomic items might be presented for all the extractive industries.

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

2.1. To decide on suitable mathematical statistical systems,

2.2. To evaluate, with their aid, chronological differences in frequency together with differences from country to country or coalfield to coalfield.

ANNEX III

COMPOSITION OF THE SAFETY AND HEALTH COMMISSION

FOR THE MINING AND EXTRACTIVE INDUSTRIES

AND OF ITS WORKING PARTIES

* *have left*
** *new members*

Updated on 1st december 1979

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- MINES SAFETY AND HEALTH COMMISSION			
- RESTRICTED COMMITTEE			
- SECRETARIAT	Secretary: Mr J. LECLERCQ		43012743(2740)
- WORKING PARTIES			
C	Ventilation, Firedamp and Other Mine Gases	Mr Obst	43012736(2735)
D	Winding Engines, Rope and Shaft Guides	Mr Wetekam	43012738(2729)
E	Strata Control and Stability of Ground	Mr Walker	43012744(2729)
F	Electricity	Mr Obst	
G	Human Factors	Mr Obst	
I	Mechanization	Mr Wetekam	
K	Oil, Gas and other Materials extracted by Borehole	Mr Gillardin	43012733(2729)
L	Flammable Dusts	Mr Wetekam	
M	Health in Mines	Mr Gillardin	
N	Rescue Arrangements, Mine Fires and Underground Combustion	Mr Walker	
O	Common Accident Statistics	Mr Gillardin	

- Committees of Experts

C1	Firedamp Monitoring Instruments	Mr Obst	
C2	Diesel Engines	Mr Obst	
D1	Winding Ropes	Mr Wetekam	
D2	Winding Engines	Mr Wetekam	
E1	Rock Mechanics	Mr Walker	
G1	Community Safety Campaigns	Mr Obst	
K1	Prevention of Blowouts	Mr Gillardin	
N1	Stabilization of Ventilation in the Event of Fire below Ground	Mr Walker	
N2	Fire-resistant Fluids	Mr Walker	
N3	Fire-resistant Conveyor Belts and Other Long Items of Plant	Mr Walker	
N4	Filter Self-rescuers	Mr Walker	
N5	Signs at work	Mr. Walker	

A. - ORGANE PERMANENT / SAFETY AND HEALTH COMMISSION/ STAENDIGER AUSSCHUSS/ORGANO PERMANENTE / PERMANENT ORGAAN / DET STAENDE UDVALG

Président/Chairman/Vorsitzender Presidente/Voorzitter/Formand :	**Henk VREDELING**		
Secrétaire/Secretary/Sekretär Segretario/Secretaris/Sekretaer :	**Jules LECLERCQ**	ORGANE PERMANENT Bâtiment Jean Monnet - A 2 Rue Alcide de Gaspéri L – LUXEMBOURG Grand duché de Luxembourg	*Tél. 43011/2743*

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REPUBLIQUE FEDERALE D'ALLEMAGNE / FEDERAL REPUBLIC OF GERMANY/ BUNDESREPUBLIK DEUTSCHLAND /REPUBBLICA FEDERALE TEDESCA / BONDSREPUBLIEK DUITSLAND / FORBUNDSREPUBLIEKKEN TYSKLAND				
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Regeringsrepraesentant	Repraesentant for arbejdsgiverne	Repraesentant for arbejdstagerne	Teknisk radgiver	Observator

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C. AERAGE, GRISOU ET AUTRES GAZ DE MINE
VENTILATION, FIREDAM AND OTHER MINE - GASES
WETTERFUEHRUNG, GRUBENGAS UND ANDERE IM BERGBAU AUFTRETENDE GASE
VENTILAZIONE, GRISU' ED ALTRI GAS DI MINIERA
VENTILATIE, MIJNGAS EN ANDERE IN DE MIJNEN VRIJKOMENDE GASSEN
VENTILATION OG GRUBEGAS

Groupe de travail - Working party - Arbeitsgruppe - Gruppo di lavoro - Werkgroepen - Arbejdsgrupperne

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- J.P. LARREUR	
- M. DOLIGEZ	
- R. BONAZZA	Italia
- G. BULGARELLI	
- M. CARTA	
- Th. M. JANSEN	Nederland
- L.D. RHYDDERCH*	United Kingdom
- W. BROCKLEHURST	
- R.A. SWIFT	
- A. BULMER	
- W.R. MONKS	
- A.G. JOHNSTON	

* *a quitté /has left /*
** *nouveau membre /new member/*

C1

Appareils de mesure CH 4
CH 4 monitoring instruments
CH 4 Messgeräte
Apparecchi di misura CH 4
Metingsapparaten CH 4
Apparater til maling af grubegasforekomster

Comité d'experts - Committee of experts - Sachvertaendigenausschüsse - Comitati di esperti
Deskundigen-Comités - Ekspertgrupperne

- M. BOUTONNAT	Verneuil-en-Halatte (France)
- Dr EICKER	(Bochum (Bundesrepublik Deutschland)
- Dr Alan JONES	Sheffield (UK)
- M. GREGOIRE	Bruxelles (Belgique)

D - CABLES D'EXTRACTION ET GUIDAGES, MACHINES D'EXTRACTION ET TREUILS
WINDING ROPES AND SHAFT GUIDES, WINDING ENGINES AND WINCHES
FOERDERSEILE UND SCHACHTFUEHRUNGEN, FOERDERMASCHINEN UND HAESPEL
CAVI DI ESTRAZIONE E GUIDAGGI, MACCHINE D'ESTRAZIONE ED ARGANI
MACHINES, LIEREN EN OPHAALKABELS EN LEIBOMEN
HEJSEVAERKER, HEJSETOVE, OG SKAKTSTYR

- Dr. Ing. R. LINTZEN . . . . Deutschland
- Ing. H. ARNOLD . . . . Deutschland
- Dipl. Ing. H. ROEHLINGER . . . . Deutschland
- Dipl. Ing. R. HELFFERICH . . . . Deutschland

- G. MIGNION . . . . Belgique
- G. VAN GUCHT . . . . Belgique
- M. VERWILST . . . . Belgique

- Marcel BOULICAULT . . . . France
- C. POIRIER . . . . France
- M. POILEVE . . . . France
- M. LAMATY . . . . France

- Prof. Dott. Ing. C. MORTARINO . . . . . . Italia

- Ir. VAN BLARICUM . . . . Nederland

- T.L. WALL . . . . United Kingdom
- J. HOPKINSON . . . . United Kingdom
- P. WOOD . . . . United Kingdom
- G. CREW . . . . United Kingdom

D1 - *Comités d'Experts/Committee of experts/Sachvertändigenausschüsse/ Comitati di esperti /Deskundigen-Comités/Ekspertgrupperne*

Câbles d'extraction

Winding ropes

Förderseile

Cavi di estrazione

Ophaalkabels

Transportkabler

- Dipl. Ing. H. GRUPE .... Deutschland
- Dipl. Ing. W. GOETZMANN .... Deutschland
- Dipl. Ing. W. SLONINA .... Deutschland

- P. BURGUN .... France
- M. BOULICAULT .... France

D2 - *Comités d'Experts/Committee of experts/Sachvertändigenausschüsse/*
Comitati di esperti /Deskundigen-Comités/Ekspertgrupperne

Machines d'extraction

Winding engines

Fördermaschinen

Macchine di estrazione

Ophaalmachines

Hejsevaerker

- Dr. Ing. H. ARNOLD	Deutschland
- E.A. HAHN	Deutschland
- Dipl. Ing. W. SLONINA	Deutschland
- M. POILEVE	France
- M. LAMATY	France
- J. HOPKINSON	United Kingdom
- P. WOOD	United Kingdom
- G. MIGNION	Belgique
- Ir. VAN BLARICUM	Nederland

E - **CONTROLE DES EPONTES ET STABILITE DES TERRAINS**
STRATA CONTROL AND STABILITY OF GROUND
HANGENDBEHERRSCHUNG UND STANDFESTIGKEIT DES GEBIRGES
CONTROLLO DELLE SALBANDE E STABILITA' DEI TERRENI
BEHEERSING VAN HET NEVENGESTEENTE
HAENGEVAEGSKONTROL OG FJELDSTRABILITET

- G. THIELEN .... Deutschland
- U. GROTOWSKY .... Deutschland
- A. KEUSGEN .... Deutschland
- H. RITTER .... Deutschland
- H. HARNISCH* .... Deutschland
- Gerhard HURCK** .... Deutschland

- A. DENTENEER .... Belgique
- G. LECLERCQ .... Belgique
- A. RENDERS .... Belgique

- J.F. RAFFOUX .... France
- M. GOUILLOUX .... France
- L. TOURRAND .... France
- H.enri POCHELSKI .... France

- Ing. Carmelo LATINO .... Italia
- Prof. Dr. Ing. R. COTZA .... Italia
- M. TARABOCCHIA .... Italia

- A. SCHUSTER .... Luxembourg

- J.S. MARSHALL** .... United Kingdom
- W.J.W. BOURNE .... United Kingdom
- B. DALE .... United Kingdom
- R.T. PURVIS .... United Kingdom
- R. ANDERSON .... United Kingdom

- C.B. BERGLUND .... Sweden

F. ELECTRICITE - ELECTRIFICATION - ELEKTRIFIZIERUNG ELETTRICITA' - ELECTRICITEIT - ELEKTRICITET

- W. SCHOETTELNDREIER	Deutschland
- L. GEBHARDT	Deutschland
- F. KILLING	Deutschland
- K.D. HERMS	Deutschland
- E. BALTZER	Deutschland
- W. PROCH	Deutschland
- J. STASSEN	Belgique
- L. RUY	Belgique
- J. BRACKE	Belgique
- J. LEYS	Belgique
- A. GHISLAIN	Belgique
- P. TAMO	Belgique
- N. TRETIAKOW,	France
- F. VIN*	France
- M. STAIN**	France
- A. MONOMAKHOFF	France
- M. MONTAGNE	France
- E.A.R. HOEFNAGELS	Nederland
- S. LUXMORE	United Kingdom
- R. HARTILL	United Kingdom
- L. DAVISON	United Kingdom
- G. HEATHERINGTON	United Kingdom
- H. HARRISON	United Kingdom
- N. O'RIORDAN	Ireland

Observateurs/observers :

- H. TRONNIER	Belgique
- J.Ch. JANSEN	Belgique

G. FACTEURS HUMAINS - HUMAN FACTORS - MENSCHLICHE FAKTOREN - FATTORI UMANI - MENSELIJKE FACTOREN PSYKOLOGISKE OG SOCIOLOGISKE FAKTORERS INDFLYDELSE PA SIKKERHEDEN

- Dr. Ing. R. LINTZEN .... Deutschland
- H. BERG .... Deutschland
- Dr. Ing. H. SCHRAER .... Deutschland
- F. JUNG .... Deutschland
- J. REDEKER .... Deutschland

- Y. PUT .... Belgique
- E. DE GROOT .... Belgique
- M. JANSEN .... Belgique
- E. VANDENDRIESSCHE .... Belgique

- H. DESVIGNE .... France
- G. DERAMAUX .... France
- G. HASSON* .... France
- Raymond THOMAS** .... France
- M. LARREUR** .... France
- M. TRICOIRE** .... France

- Dott. Carlo MICHELAZZI .... Italia
- Umberto CUTTICA .... Italia
- Nicolas DE PAMPHILLIS .... Italia

- A. SCHUSTER .... Luxembourg
- A. RAUCHS .... Luxembourg

- Th. M. JANSEN .... Nederland
- C. CREMER* .... Nederland

- C.F. NEALE .... United Kingdom
- J. L. COLLINSON .... United Kingdom
- M. OWENS .... United Kingdom

G1 - Comités d'Experts /Committee of experts / Sachvertändigenaussüsse / Comitati di esperti / Deskundigen Comités / Ekspertgrupperne

Campagne de sécurité communautaires

Security campaigns

Gemeinschaftliche Werbefeldzüge für die Betriebssicherheit

Campagne comunitarie di sicurezza

Communautaire veiligheidscampagnes

Sikkerhedskampagner pa fællesskabsplan

- Dr. Ing. R. LINTZEN . . . . Deutschland
- Dr. Ing. LEVIN . . . . Deutschland

- L. COLINET . . . . Belgique

- Dr. Ing. Ugo VIVIANI . . . . Italia

- Th. M. JANSEN . . . . Nederland

I. MECANISATION - MECHANIZATION - MECHANISIERUNG - MECCANIZZAZIONE MECHANISATIE - MEKANISERING

- F. K. BASSIER	Deutschland
- Dr. K. BECKER	Deutschland
- K. TRAEGER........................	Deutschland
- H. HARNISCH*	Deutschland
- Gerhard HURCK**	Deutschland
- U. KROPP	Deutschland
- J. MEDAETS	Belgique
- F. DECKERS	Belgique
- M. MAUFORT	Belgique
- S. CANTARELLI*	Belgique
- Jan OLYSLAEGERS**	Belgique
- L. TOURRAND	France
- M. L. POIRIER......................	France
- P. GEIGER*.........................	France
- Marcel GRAGEZ......................	France
- R. ISNER	France
- Ing. G.B. NARBONE	Italia
- Dr. Ing. COPPOLA	Italia
- E.A.R. HOEFNAGELS..................	Nederland
- H.W. KIBBELING....................	Nederland
- W.J.W. BOURNE....................	United Kingdom
- H.D. JONES......................	United Kingdom
- G. MONTGOMERY..................	United Kingdom
- R.A. BONELL	United Kingdom

K. PETROLE, GAZ ET AUTRES MATIERES EXTRAITES PAR FORAGE
OIL, GAS AND OTHER MATERIALS EXTRACTED BY BOREHOLE
ERDOEL, ERDGAS, UND SONSTIGE DURCH BOHRUNG GEWONNENE MINERALIEN
PETROLIO, GAS D'ALTRI MATERIALI OTTENUTI PER ESTRAZIONE DA POZZI
AARDOLIE, AARDGAS EN ANDERE DOOR BORINGEN GEWONNEN DELFSTOFFEN
OLIE, GAS OG ANDRE VED BORING UDVUNDNE PRODUKTER

- F.J. ROELLEKE .... Deutschland
- K. BOEHM .... Deutschland
- E. RUST .... Deutschland

- Ph. DOM .... Belgique
- P. CAJOT .... Belgique
- Prof. BRYCH .... Belgique

- F. MACART .... France
- F. WANECQ .... France
- P. ODIER .... France

- Th. M. JANSEN .... Nederland
- J.W. DE KORVER .... Nederland
- de Heer OORTMAN-GERLINGS .... Nederland
- de Heer VAN DER SCHALK .... Nederland
- de Heer L.F. HEEZEN .... Nederland

- E.G. CRISWICK .... United Kingdom
- C.F. NEALE .... United Kingdom
- P. SELWOOD .... United Kingdom
- W. REID .... United Kingdom
- J. WILSON (consultant) .... United Kingdom

- J. CHESTER .... Ireland

- P. SCIUTO .... Italia
- M. GASPARINI .... Italia

- Mr. DAN BUCH .... Denmark
- Johan BLOU .... Denmark
- S. FONSSKOV .... Denmark
- K. SPRUNK-JANSEN .... Denmark

Observateurs /Observers/

- D. MEIER-HANSEN .... Norway
- E. HELLEN, BIT .... BIT/ILO
- Th. NEYMAN .... Sweden

K 1 - *Comité d'experts / Committee of experts / Sachverständigenausschüsse / Comitati di esperti/ Deskundigen-Comités / Ekspertgrupperne*

MAITRISE DES PUITS - WELL CONTROL - BOHRLOCKSICHERUNG - CONTROLLO DEI POZZI PUTCONTROLE - KONTROL MED EFTERFORSKNING OG UDVINDING AF HYDROKARBONER

- F.J. ROELLEKE........................... Deutschland
- A. KLOCKNER........................... Deutschland

- Prof. BRYCH........................... Belgique

- A. PUYO........................... France
- M. MATHEUS........................... France

- J.W. DE KORVER........................... Nederland
- J. SALOMONS........................... Nederland
- de Heer OORTMAN-GERLINGS........................... Nederland
- de Heer W. EYKHOUT........................... Nederland
- de Heer VAN DER MIJLE........................... Nederland

- A. S. CURLET........................... United Kingdom
- E. O. JONES........................... United Kingdom

- M. GASPARINI........................... Italia

- P. H. STEEN........................... Danemark
- B. SVENDSEN........................... Danemark

- J. KAUFMANN........................... Norway
- D. MEIER-HANSEN........................... Norway
- Mr. HARDING........................... Norway

L. POUSSIERES INFLAMMABLES - COMBUSTIBLE DUSTS
ENTZUENDLICHE STAEUBE - POLVERI INFIAMMABILI
ONTVLAMBAAR KOLENSTOF - BRANDFARLIGT STØV

- F. GROSS	Deutschland
- K. REINKE	Deutschland
- M. KOPKE	Deutschland
- M. SCHNIER	Deutschland
- K. ROESGEN	Deutschland
- D. REEH	Deutschland
- P. GOFFART	Belgique
- J. BRACKE	Belgique
- J. MAYNE	Belgique
- L. KOCH	France
- M. GILTAIRE	France
- R.F. BERNARD	France
- M. SCHWEITZER	France
- Michel DOLIGEZ	France
- M. NOWAK	France
- M. STAIN*	France
- Th. M. JANSEN	Nederland
- J. BLUNT	United Kingdom
- A.J.S. AINSWORTH	United Kingdom
- Dr. A.F. ROBERTS**	United Kingdom
- Dr. W.L. MURRAY*	United Kingdom
- Tom McGEE	United Kingdom
- S.J. CRIDDLE	United Kingdom
- J.C. NIXON	United Kingdom

M.

SALUBRITE DANS LES MINES DE HOUILLE
HEALTH IN COAL MINES - GESUNDHEITSSCHUTZ IM STEINKOHLENBERGBAU
SALUBRITA' NELLE MINIERE - GEZONDHEIDSVOORWAARDEN – SUNDHEDSBESKYTTELSE I MINER

- Dr Andreas KEUSGEN .... Deutschland
- A. AUGST .... Deutschland
- A. STEBEL .... Deutschland

- J.B. CAZIER .... Belgique
- G. DEGUELDRE .... Belgique

- C. JAGUSINSKI .... France
- B. SCHNELL .... France
- B. GRISARD .... France

- R. BONAZZA .... Italie
- F. BIAGIOLI .... Italia

- Th. M. JANSEN .... Nederland

- E. MULLER .... Luxembourg

- B. GODDARD .... United Kingdom
- L.D. RHYDDERCH .... United Kingdom
- Tom McGEE .... United Kingdom

N. SAUVETAGE, INCENDIES ET FEUX DE MINES
RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION
GRUBENRETTUNGSWESEN
SALVATAGGIO, INCENDIO E FUOCHI DI MINIERA
REDDINGSWEZEN, MIJNBRANDEN EN ZELFONTBRANDING
REDNINGSVÆSEN OG MINEBRANDE

- Dipl.-Ing. A. COENDERS .... Deutschland
- K. REINKE,....................... Deutschland
- A. SCHEWE* .... Deutschland
- K. PALM .... Deutschland
- R. MUELLER....................... Deutschland
- Prof. Dr. THOENES.................... Deutschland

- J. STASSEN....................... Belgique
- J. MAYNE .... Belgique
- J. BRACKE .... Belgique

- R. GRISARD........................ France
- M. POILEVE .... France
- J. CRETIN......................... France
- J. CEREDE .... France
- M. CHEVILLARD...................... France
- R. KOWALIK........................ France
- L. VIELLEDENT .... France
- Camille ROGEZ .... France

- Dott. Ing. E. ORU .... Italia
- Prof. Ing. P. PIGA .... Italia
- M. BRIGNONE....................... Italia

- R.T. PURVIS .... United Kingdom
- J. BLUNT .... United Kingdom
- L. MURRAY .... United Kingdom
- Dr. D. MAKOWER .... United Kingdom
- A. BULMER......................... United Kingdom
- E. ROBSON......................... United Kingdom

N1

Comités d'experts / Committee of experts / Sachvertändigenausschüsse
Comitati di esperti / Deskundigen-Comités / Ekspertgrupperne

Stabilisation de l'aérage - Stabilization of ventilation - Stabilisierung der Wetterführung
Stabilizzazione della ventilazione - Ventilatie - stabilisatie - Stabilisering af ventilationen

- Dipl. Ing. W. BOTH . . . . Deutschland
- Dipl. Ing. E. SCHUBERT . . . . Deutschland

- R. STENUIT . . . . Belgique
- E. JACQUES . . . . Belgique

- J. CRETIN. . . . . France
- E. SIMODE . . . . France
- M. CHAMPAGNAC . . . . France

- O. SAMMARCO . . . . Italia

- H. DAVEY. . . . . United Kingdom
- Dr. A.F. ROBERTS . . . . United Kingdom

N2

Comités d'experts / Committee of experts / Sachvertändigenausschüsse

Comitati di esperti / Deskundigen-Comités / Ekspertgrupperne

Liquides difficilement inflammables - Fire resistant fluids - Schwer entflammbare Hydraulikflüssigkeiten - Liquidi difficilmente infiammabili - Moeilijk ontvlambare hydraulische vloeistoffen - Svært antændelige hydrauliske væsker

- Dipl. Ing. a. COENDERS	Deutschland
- Dipl. Ing. A. SCHEWE*	Deutschland
- Dr. H.W. THOENES	Deutschland
- Dipl. Ing. K. GRUMBRECHT	Deutschland
- Prof. Dr. C.A. PRIMAVESI	Deutschland
- Prof. Dr. BENTHE	Deutschland
- K. TRAEGER	Deutschland
- Ch. FRENAY	Belgique
- J. BRACKE	Belgique
- Prof. DAENENS	Belgique
- G. BLANPAIN	France
- R. PLOUCHARD	France
- Dr. AMOUDRU	France
- Dr. MARTIN	France
- M. LE BOUFFANT	France
- L. POIRIER	France
- Ir. VAN BLARICUM	Nederland
- I.A. HOWIESON	United Kingdom
- Dr. D. CUTLER	United Kingdom
- J.B. HALL	United Kingdom
- Dr. J.S. McLINTOCK	United Kingdom
- Dr. SMITH	United Kingdom

N3

Comités d'experts / Committee of experts / Sachvertändigenausschüsse
Comitati di esperti / Deskundigen-Comités / Ekspertgrupperne

Moyens de transport de grande longueur difficilement inflammables
Fire-resistant conveyor belts and other items of long plant
Schwer entflammbare Betriebsmittel grosser Länge
Mezzi di trasporto di grande lunghezza difficilmente infiammabili
Moeilijk brandbare transportmiddelen van grote lengte
Brandsikre bandtransportører

- A. COENDERS . . . . Deutschland
- K. PALM . . . . Deutschland
- W. BOTH . . . . Deutschland
- K. GRUMBRECHT . . . . Deutschland
- H. KOEHNE . . . . Deutschland

- J. MAYNE . . . . Belgique
- J. BRACKE . . . . Belgique

- M. TCHOULAKIAN . . . . France
- N. BOUTIER . . . . France
- M. DELCLAUX . . . . France

- Dr. D. CUTLER . . . . United Kingdom
- F. N. SANDERS . . . . United Kingdom
- L. WALKER . . . . United Kingdom
- W.M. ROBERTSON . . . . United Kingdom

O. STATISTIQUES COMMUNES D'ACCIDENTS DANS LES MINES DE HOUILLE
COMMON STATISTICS OF ACCIDENTS
GEMEINSAME UNFALLSTATISTIKEN
STATISTICHE COMUNI DI INFORTUNIO
GEMEENSCHAPPELIJKE STATISTIEKDER MIJNONGEVALLEN
FÆLLES ULYKKESSTATISTIKKER

- K. ROESGEN . . . . Deutschland
- G. STRAKERJAHN . . . . Deutschland

- J. DE BACKER . . . . Belgique

- Louis KOCH . . . . France
- R. RIVIERE . . . . France
- R. GRISARD . . . . France
- M. LANDIER . . . . France

- Dott. Ing. M. PERSOD . . . . Italia
- Ing. G.B. NARBONE . . . . Italia

- Ir. Th. M. JANSEN . . . . Nederland

- J.S. MARSHALL . . . . United Kingdom

- Anders KJAER . . . . Denmark

BUNDESREPUBLIK DEUTSCHLAND - REPUBLIQUE FEDERALE D'ALLEMAGNE
FEDERAL REPUBLIC OF GERMANY - REPUBBLICA FEDERALE TEDESCA
BONDSREPUBLIEK DUITSLAND - FORBUNDSREPUBLIKKEN TYSKLAND

		Groupes de travail - Working parties Arbeitsgruppen - Gruppi di lavoro Werkgroepen - Arbejdsgrupperne
Dr. - Ing. H. ARNOLD	Leiter der Seilprüfstelle der Westfälischen Berggewerkschaftskasse Dinnendahlstrasse, 9 Postfach 2749 4630 BOCHUM	D - D2
Grubeninspektor Anton A U G S T	Bergwerksgesellschaft WALSUM A.G. Dr. W. Roelen-Strasse 129 4103 WALSUM	M
Dipl.-Ing. Dr. Erhard BALTZER	Schaltwerk-Abt. TP N5 Postfach 140 1000 BERLIN 13	F
Dr. Ing. F.K. BASSIER	Bergwerksdirektor Bergbau A.G. Niederrhein Bergwerksdirektion Walsum Postfach 88 4132 KAMP-LINTFORT	I
Dr. Ing. Karl BECKER	Seilprüfstelle der Westfälischen Westfälischen Berggewerkschaftskasse Dinnendahlstr. 9 4630 BOCHUM	I
Prof. Dr. med. BENTHE	Pharmakologisches Institut der Universität Hamburg Martinistr. 52 2000 HAMBURG	N2

BUNDESREPUBLIK DEUTSCHLAND - REPUBLIQUE FEDERALE D'ALLEMAGNE
FEDERAL REPUBLIC OF GERMANY - REPUBBLICA FEDERALE TEDESCA
BONDSREPUBLIEK DUITSLAND - FORBUNDSREPUBLIKKEN TYSKLAND

		Groupes de travail - Working parties Arbeitsgruppen - Gruppi di lavoro Werkgroepen - Arbejdsgrupperne
Ministerialrat H. BERG	Ministerium für Wirtschaft, Mittelstand und Verkehr Land Nordrhein-Westfalen Haroldstrasse 4 4000 DUESSELDORF	A- G -
Dipl.-Ing. K. BOEHM	c/o DEUTSCHE TEXACO A.G. Uberseering 40 2000 HAMBURG 60	K
Dipl. Berging. Walter BOTH	Hauptstelle für das Grubenrettungswesen des Steinkohlenbergbauvereins Schönscheidstr. 28 4300 ESSEN-KRAY	N1 - N3 -
Dipl.-Ing. Albert COENDERS	Präsident des Landesoberbergamtes des Landes Nordrhein-Westfalen Goebenstrasse 25 - 27 4600 DORTMUND	B - N - N2 - N3 - N4
Dr. EICKER	Prüfstelle für Grubenbewetterung der Westfäl. Berggewerkschaftskasse Hernerstrasse 43 - 45 4630 BOCHUM	C1 -
Dipl.Ing. Lothar GEBHARDT	Steinkohlenbergbauverein Frillendorferstr. 351 4300 ESSEN	F
Bergwerksdirektor Dipl.Ing. Paul GöTTIG	Eschweiler Bergwerks-Verein - Grube Westfalen - 4730 AHLEN/Westf.	C
Dipl.-Ing. Willi GöTZMANN	Seilprüfstelle der Westfälischen Berggewerkschaftskasse Dinnendahlstr. 9 4630 BOCHUM	D1
Bergdirektor Fritz GROSS	Oberbergamt für das Saarland und das Land Rheinland-Pfalz am Staden 17 6600 SAARBRUECKEN	L

**BUNDESREPUBLIK DEUTSCHLAND - REPUBLIQUE FEDERALE D'ALLEMAGNE
FEDERAL REPUBLIC OF GERMANY - REPUBBLICA FEDERALE TEDESCA
BONDSREPUBLIEK DUITSLAND - FORBUNDSREPUBLIKKEN TYSKLAND**

		Groupes de travail - Working parties Arbeitsgruppen - Gruppi di lavoro Werkgroepen - Arbejdsgrupperne
Dipl.-Ing. U. GROTOWSKY	Bergwerksdirektor der Bergbau AG Gelsenkirchen Bergwerksdirektion Hugo Postfach 1727 4650 GELSENKIRCHEN	E
Dipl.-Ing. Klaus GRUMBRECHT	Versuchsgrubengesellschaft mbH Tremoniastrasse 13 4600 DORTMUND	N2 - N3
Dipl.-Ing. H. GRUPE	Seilprüfstelle der Westfälischen Berggewerkschaftskasse Dinnendahlstr. 9 4630 BOCHUM	D1 -
Bergdirektor E.A. HAHN	Landesoberbergamt Nordrhein-Westfalen Goebenstrasse 25 4600 DORTMUND	D2 -
Dipl.-Ing. R. HELFFERICH	Geschäftsführer der Deilmann-Haniel GmbH Haustenbecke 1 4600 DORTMUND-KURL	D -
Dr.-Ing. K.D. HERMS	Bergbau AG Niederrhein Verwaltung Homberg Postfach 17 02 60 4100 DUISBURG 17	F
Dipl.-Ing. Kaspar HORNEFFER	Bundesministerium für Arbeit und Sozialordnung 5300 BONN	A - B -
Bergwerksdirektor Ass. d. Bergf. Gerhard HURCK	Mitglied des Grubenvorstandes der Gewerkschaft Auguste Victoria, Victoriastrasse, 43 4370 MARL Krs. Recklinghausen	A - E - I
Fritz JUNG	IG Bergbau und Energie Hauptverwaltung Alte Hattinger Strasse 19 4630 BOCHUM	G
Regierungsdirektor Dr.Ing. A. KEUSGEN	Bundesministerium für Wirtschaft und Finanzen Villemonbler 76 5300 BONN-DUISDORF	E - M -
Dipl.-Ing. Fritz KILLING	Berggewerkschaftliche Versuchsstrecke und Sprengsachverständigenstelle Beylingstrasse 65 4600 DORTMUND-DERNE	F

BUNDESREPUBLIK DEUTSCHLAND - REPUBLIQUE FEDERALE D'ALLEMAGNE
FEDERAL REPUBLIC OF GERMANY - REPUBBLICA FEDERALE TEDESCA
BONDSREPUBLIEK DUITSLAND - FORBUNDSREPUBLIKKEN TYSKLAND

		Groupes de travail - Working parties Arbeitsgruppen - Gruppi di lavoro Werkgroepen - Arbejdsgrupperne
Ing. Alfred KLOCKNER	c/o Gewerkschaften Brigitta und Elwerath Betriebsführungsgesellschaft mbH Postfach 510360 Riethorst 12 3000 HANNOVER 51	K1 -
Ing. Hermann KöHNE	Bergbau-Forschung GmbH. Frillendorferstr. 351 4300 ESSEN-KRAY	N3 -
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FORM

to be returned to

SECRETARIAT
MINES SAFETY AND HEALTH COMMISSION
Bâtiment Jean Monnet - A2
Rue Alcide de Gaspéri
LUXEMBOURG - Kirchberg

Grand Duchy of Luxembourg.

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

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

- ADD - CORRECT - DELETE:

SURNAME: ....

Christian name: ....

Duties: ....

....

Address: ....

Postcode and town: ....

....

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

Office: ....

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

....

to the list of:

- THE MINES SAFETY AND HEALTH COMMISSION in his capacity as* G E W TA
- THE RESTRICTED COMMITTEE id.
- of the following WORKING PARTIES **:

Ventilation, Firedamp and other Mine Gases	Winding Engines, Ropes and Shaft Guides
Strata Control and Stability of Ground	Electricity
Human Factors	Mechanization
Oil, Gas and Other Materials extracted by borehole	Flammable Dusts
Health in Mines	Rescue Arrangements, Mine Fires and Underground Combustion
Common Accident Statistics	

Date and signature:

....

* Government/Employers'/Workers' representative or Technical Adviser

** Delete where appropriate

ANNEX IV

MAINTENANCE OF THE SAFETY STANDARD AND IMPROVEMENT OF THE SAFETY OF HIGHLY-WORKED FRICTION WINDING ROPES OF STRANDED CONSTRUCTION

Adopted by the Working Party on 21 February 1978
Adopted by the
Mines Safety and Health Commission for the Mining and Extractive Industries
on 27 March 1979
and sent to Governments
as an information report in accordance with
Art. 3 and 6 of its terms of reference

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Maintenance of the safety standard and improvement of the safety of highly-worked friction winding ropes of stranded construction

1. Introduction

1.1 Definition of the problem

Shaft winding is of key importance in the transport systems of mines with main and staple shafts. With the constant increases in daily output capacity brought about by rationalization, the demands made on shaft winding installations, and especially central winding installations, are becoming more and more stringent.

To meet these demands shaft winding capacity is stepped up primarily by increasing the payload of the system and only to a limited extent by increasing the winding speeds.

But with larger payloads, the loading and unloading times are considerably longer, with a consequent increase in the length of the winding cycle. The shortest decking times for skip winding installations are in the region of 15 seconds with a payload of 25 t, and they increase to approx. 32 seconds with 42 t payload.

Figure 1 shows the present situation as regards the ratio of payload to maximum rope tension in the payload compartment (S_1) as a function of depth, for major single, two, four and six-rope winding installations in North Rhine-Westphalia. The diagram clearly shows how the percentage of payload in total compartment weight goes down as the mining depth increases.

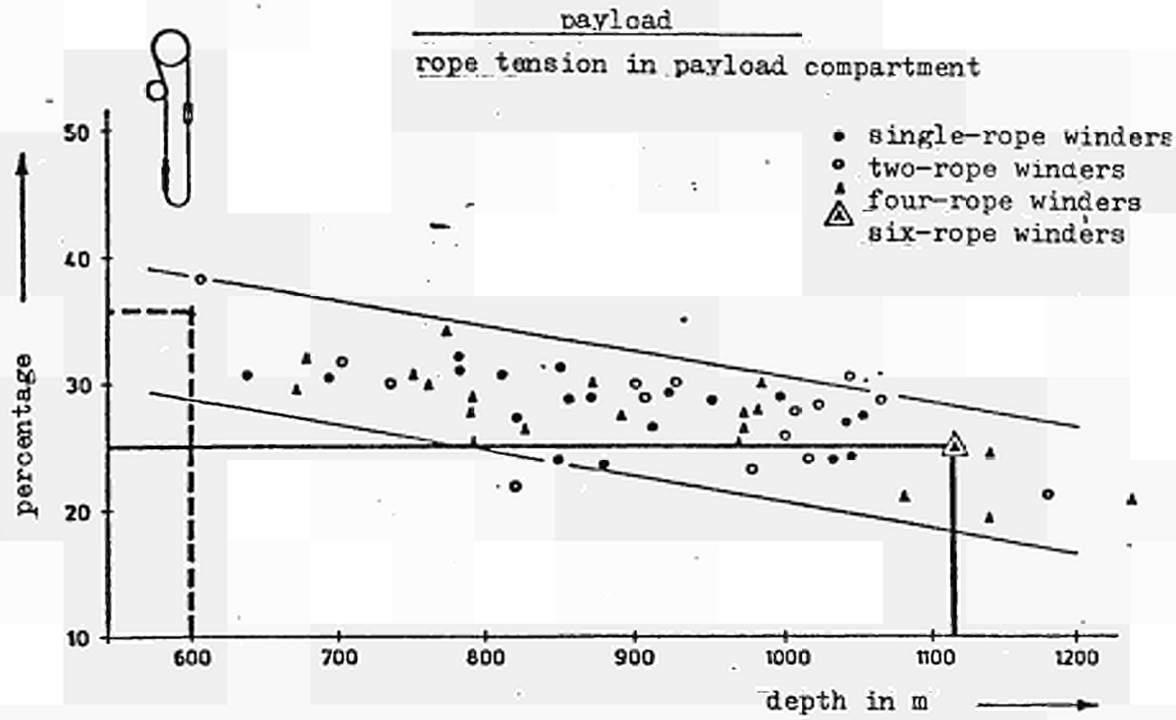


Figure 1 Ratio of payload to rope tension in the payload compartment vs. depth, in major single, two, four and six-rope winding installations in North Rhine-Westphalia.

Figure 2 shows, for the same installations, the marked increase in rope weight as a percentage of total compartment weight (S_1), again as a function of depth.

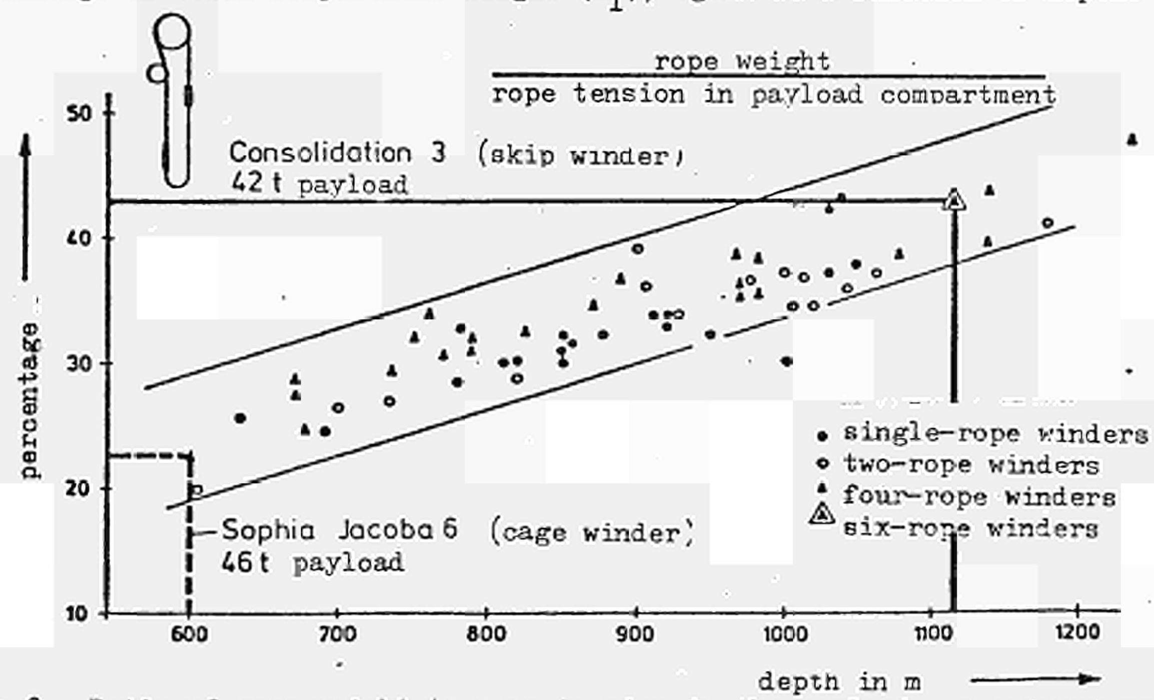


Figure 2 Ratio of rope weight to rope tension in the payload compartment vs. depth, in major single, two, four and six-rope winding installations in North Rhine-Westphalia.

It is clear from both these diagrams that increasing mining depth is the greatest obstacle to raising the capacity of shaft winding installations. The greater depths not only increase the length of the winding cycle, but also, more particularly, the dynamic stresses exerted on the moving load-bearing parts of the shaft winding installation.

With increasing dynamic stresses, that is, in this case, with an increase in undulating loading, the service life of the material decreases. This is particularly significant in the case of winding ropes which are so worked that they will attain the endurance limit. This relationship can be illustrated by means of fatigue strength diagrams.

Figure 3 shows how, in the case of a high-strength material with a certain surface structure, the fatigue resistance drops as dynamic loading increases.

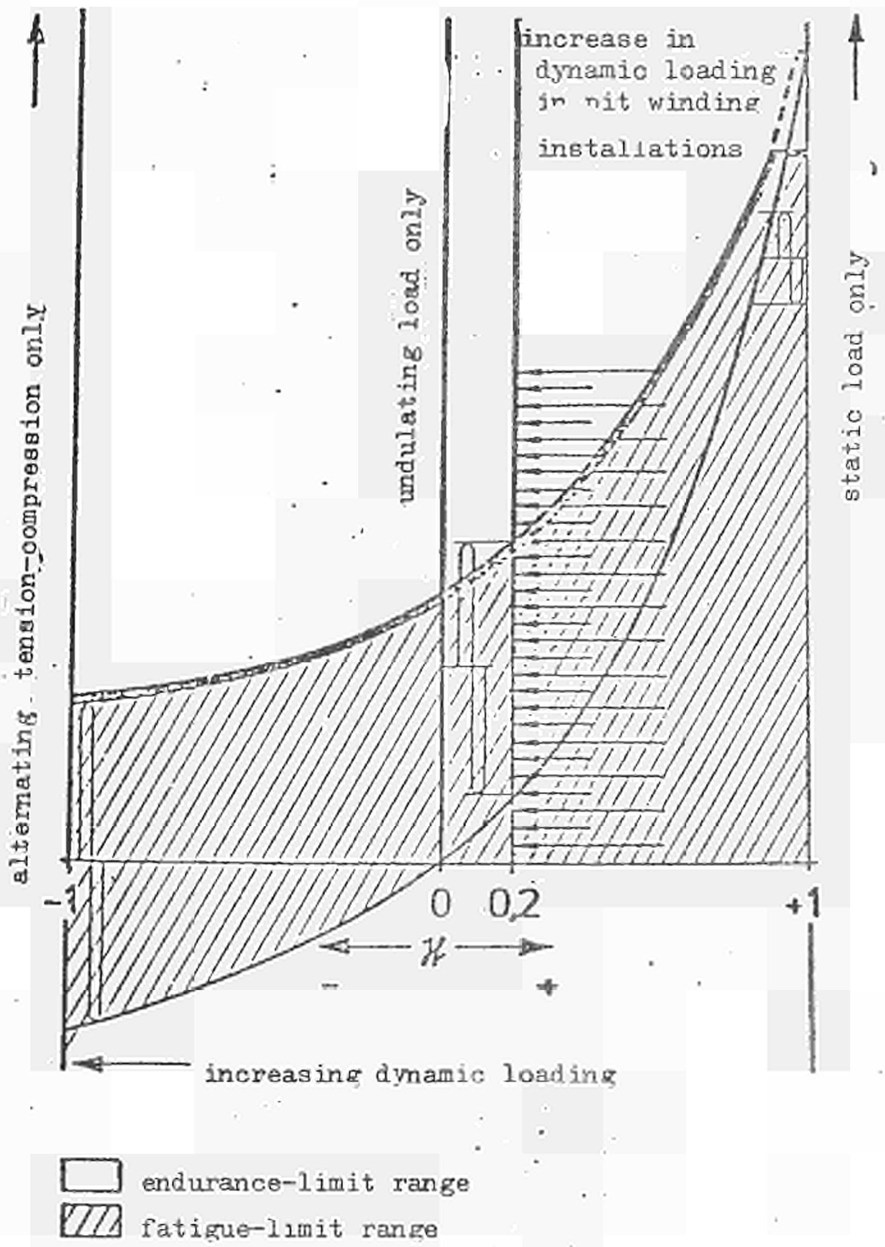


Figure 3
Increase in undulating load on winding ropes, cappings and load-bearing parts of winding installations, especially due to increase in depth

The values under static loading are shown on the right-hand ordinate, and the dynamic (cyclic) load increases as one moves towards the left. The left-hand ordinate represents straightforward push-pull loading (alternating tension/ compression) of the same value and the middle ordinate represents undulating loads. The arrows pointing left show the area of the increase in undulating loads in the moving parts of a shaft winding installation. It is clear from the fall in the fatigue strength curve that it is necessary either to reduce the stress applied to the material by increasing the load-bearing cross-sections, thus remaining within the material's fatigue limits, or to accept reduced service life of the part if the stress is further increased.

Because the daily number of winds in single-purpose central shaft winding installations is 2-3 times that in normally-worked installations (on average), there is a further complicating factor, from the point of view of safety, in highly-worked installations. This is as follows: the period available for determining the time of discard of load-bearing parts - especially winding ropes - is drastically reduced.

In the past it took 3-5 years of winding for a winding installation to reach a rope work figure of 600 tkm/kg rope, but nowadays a central winding installation reaches 400-600 tkm/kg rope in the course of a single year. Because of the higher rope work per year and the increase in dynamic stresses, the intervals between the emergence of detectable rope impairment and the discard time have become ever shorter. A distinction is therefore made in the Federal Republic of Germany between normally-worked and highly-worked winding ropes.

Figure 4 provides an illustration of this problem in the case of shaft winding ropes. The breaking strength is shown on the vertical axis and the number of winds on the horizontal axis. The left-hand curve represents the general limit, in normal situations, for highly-worked winding ropes and the right-hand curve that for normally-worked ropes.

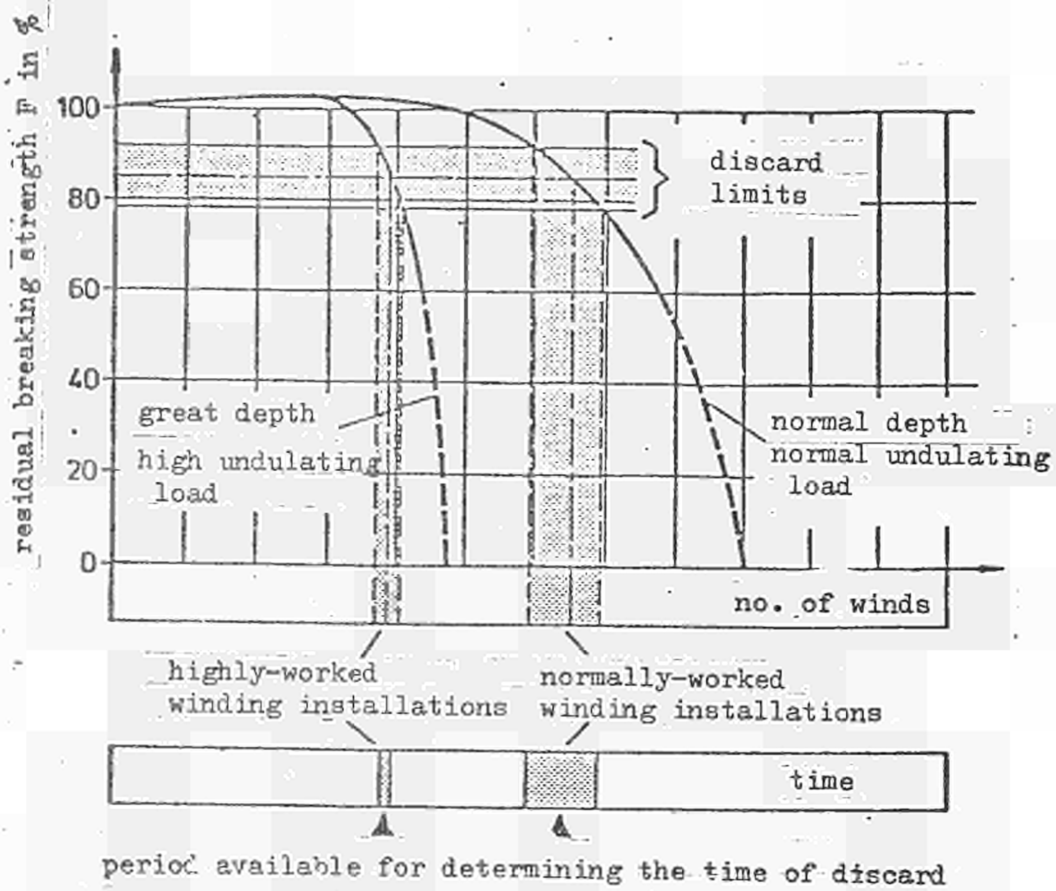


Figure 4 Breaking strength drop curves for highly-worked and normally-worked winding ropes, with periods available for determining the time of discard

The time scale below the horizontal axis referring to the number of winds shows the periods of time available for determining the time of discard. It is clear that in the case of highly-worked ropes, the time available is extremely short. In extreme cases it can be as low as 1/9 of the usual observation time available. For this reason, new and/or supplementary inspection measures are necessary in order to maintain the safety standard.

1.2 Criteria for highly-worked winding ropes

To obtain an outline for the whole of the Community of the reasons for failure of highly-worked winding ropes, the first step was to decide on the criteria for the definition of highly-worked winding installations. The criteria were based on conditions obtaining in the Community and were divided into two groups:

Group I: Here the winding frequency alone is sufficient for the installation to be classified as a highly-worked winding installation.

Group II: For installations with winding frequencies below that in Group I, there are also additional criteria, any one of which is sufficient, in combination with a certain winding frequency, for the installation to be classified as a highly-worked winding installation.

The criteria are shown in Figure 5.

I. Winding frequency alone	II. Winding frequency and additional criteria
Winding frequency: $\geq$ 500 winding cycles/ working day	1. Winding frequency*) $\geq$ 400 - $<$500 winding cycles/working day
	2. Additional criteria: a) Quasistatic undulating load $\geq$ 160 N/mm^2 **) b) Diameter ratio D/d $<$ 100***) (driving sheave diameter/rope diameter) c) Fleet angle (between the rope and the plane of the driving sheave) $>$ 1°30' d) Acceleration $a_b \geq 1.2$ m/sec^2 or Retardation $a_v \geq 1.2$ m/sec^2 e) Oscillation behaviour if the additional dynamic forces are greater than 25% of the static stresses f) Tread pressure between rope and driving sheave, head sheave or deflecting sheave $\geq$ 200 N/cm^2

Figure 5

*) A winding cycle is one complete journey in a shaft until the direction of wind is changed, excluding decking operations at the terminal point. Manriding is not normally included.

**) 1 N/mm^2 $\triangleq$ 10 kgF/cm^2 (formerly 10 kg/cm^2)

***) In the UK, the D/d limit is set at $<$ 95 owing to the measuring system employed.

2. <u>Factors affecting rope safety and rope life incorporated in the criteria.</u>

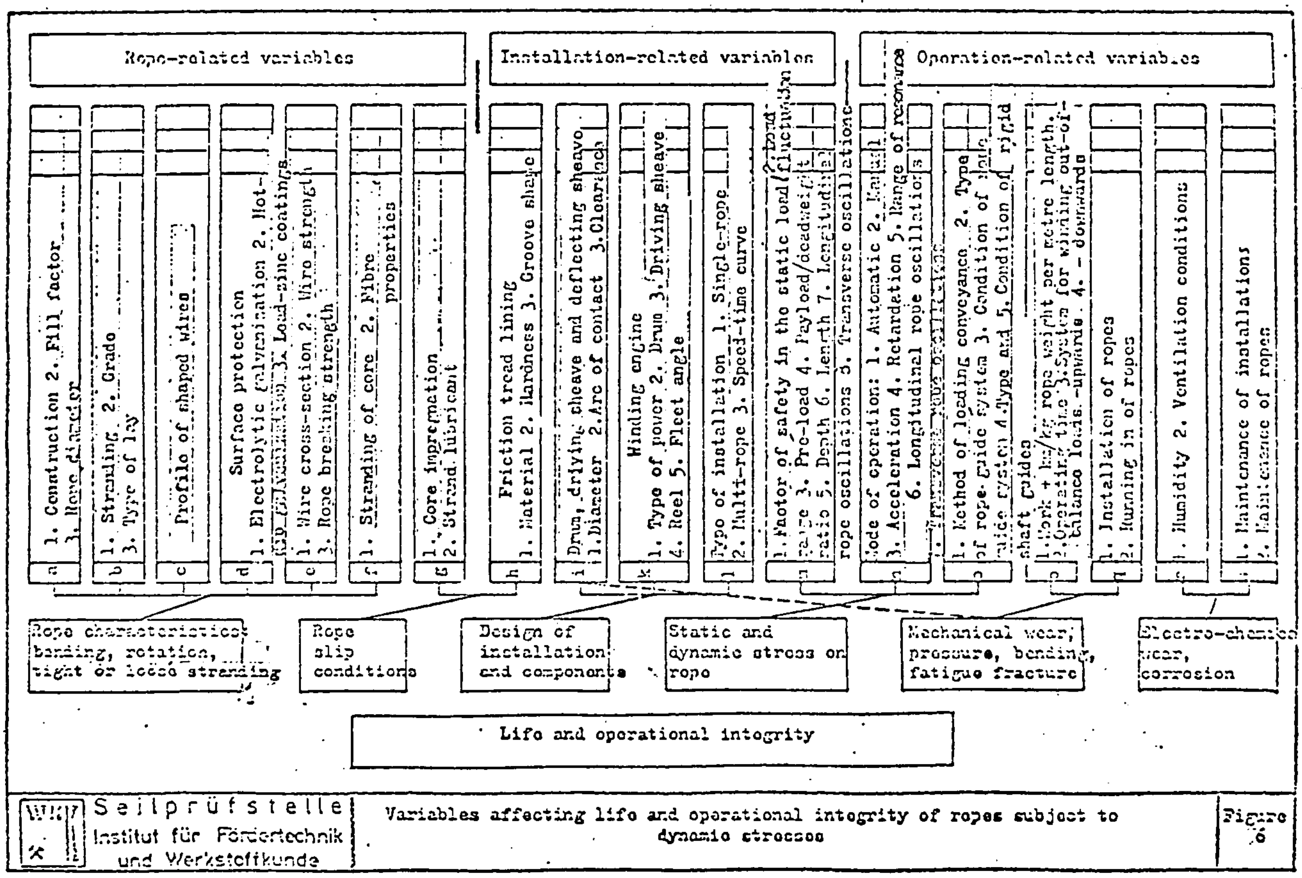
The factors affecting rope life are broken down into three groups, namely

rope-related,

installation-related, and

operation-related

variables. (See Figure 6).



2.1 Quasistatic undulating load during a winding cycle (Figure 5, 2a)

As a result of greater winding depths, payloads, rope weights, acceleration and retardation forces the variation in the stress to which a rope is subjected in the course of a wind is increasing, which means that the stresses imposed on the rope wires above the capping fluctuate within wider limits. Determination of the quasistatic undulating load (in the rope cross sections immediately above the cappings) is shown in Figure 7.

$$\delta_{\text{undulation}} = \frac{\text{payload + balance rope weight}}{\text{metal cross-section of rope}}$$

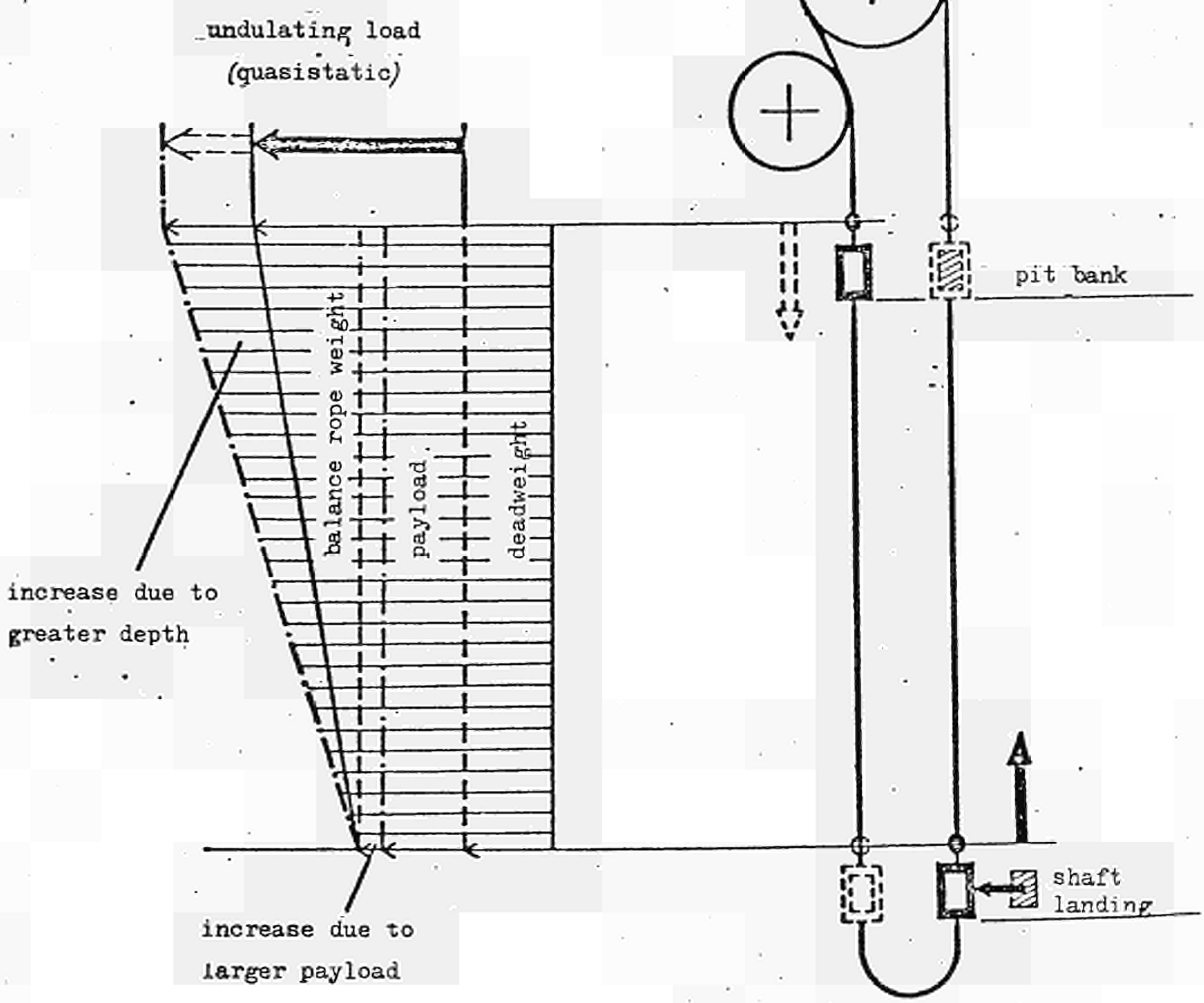


Figure 7 Quasistatic undulating load in shaft winding installations with balance ropes

2.2 Influence of the D/d ratio (Figure 5, 2b)

The effect on rope life of the D/d ratio - driving sheave (or head sheave or deflecting sheave) diameter D to rope diameter d - is all the more pronounced if the tread pressure between rope and rope groove is high. The number of stress reversals to which a rope is subjected during a winding cycle also affects the life of the rope. For example, the life of a winding rope on a tower winder with deflecting sheaves and a D/d ratio of 100 would be the same as that of a winding rope on a tower winder without deflecting sheaves and with a D/d ratio of 80 to 90 (if all other parameters for the two installations were comparable).

2.3 Influence of the fleet angle (Figure 5, 2c)

Since the fleet angle α (Figure 8), has an influence on rope life which becomes more significant as the angle increases, it has been taken as an additional criterion for highly-worked installations. It is considered significant if it is over 1°30'.

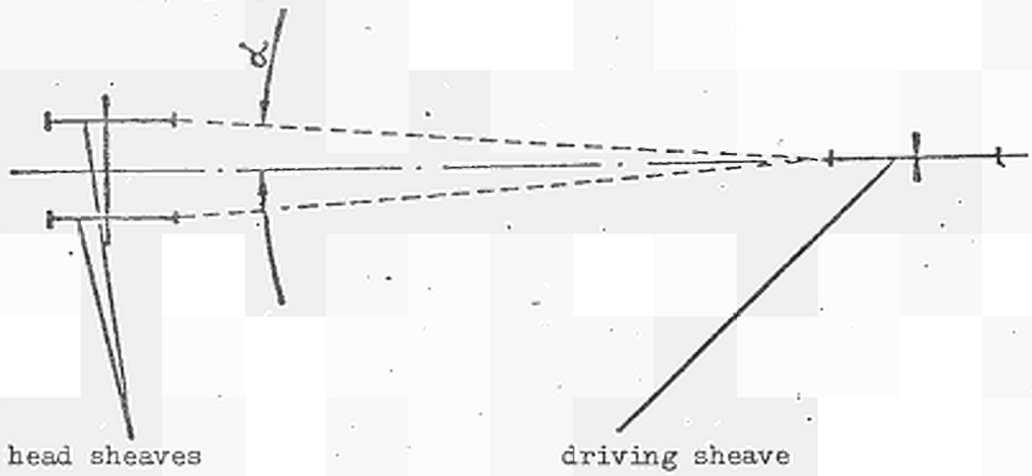


Figure 8 Fleet angle α with side-by-side head sheaves (ground-mounted winding engine)

2.4 Effect of acceleration and retardation (Figure 5, 2d)

In installations subject to high acceleration and retardation forces, drive transmission from the friction tread to the winding rope, especially in the case of thick ropes, causes increased internal wear and damage to the rope construction by displacement of wires, strands and layers. This danger is proportionate to the degree of utilization of the coefficient of static friction between the friction tread and the lubricated rope, i.e. depends on how close to the rope slip limit the installation is operated.

As rope diameter increases it becomes more difficult to produce strong, non-spinning ropes which conform to the operating requirements. Figure 9 shows the torsional moments of various rope constructions as a function of the rope's tractive force. In multi-strand ropes relative displacement of the strand layers may occur. The same applies to wire core ropes and locked-coil ropes, in which the wire layers may move in relation to each other.

All the torque curves shown in Figure 4 were determined for ropes with the outer strand layer in right hand lay. The torque measured was that applying in the non-rotating gripping device.

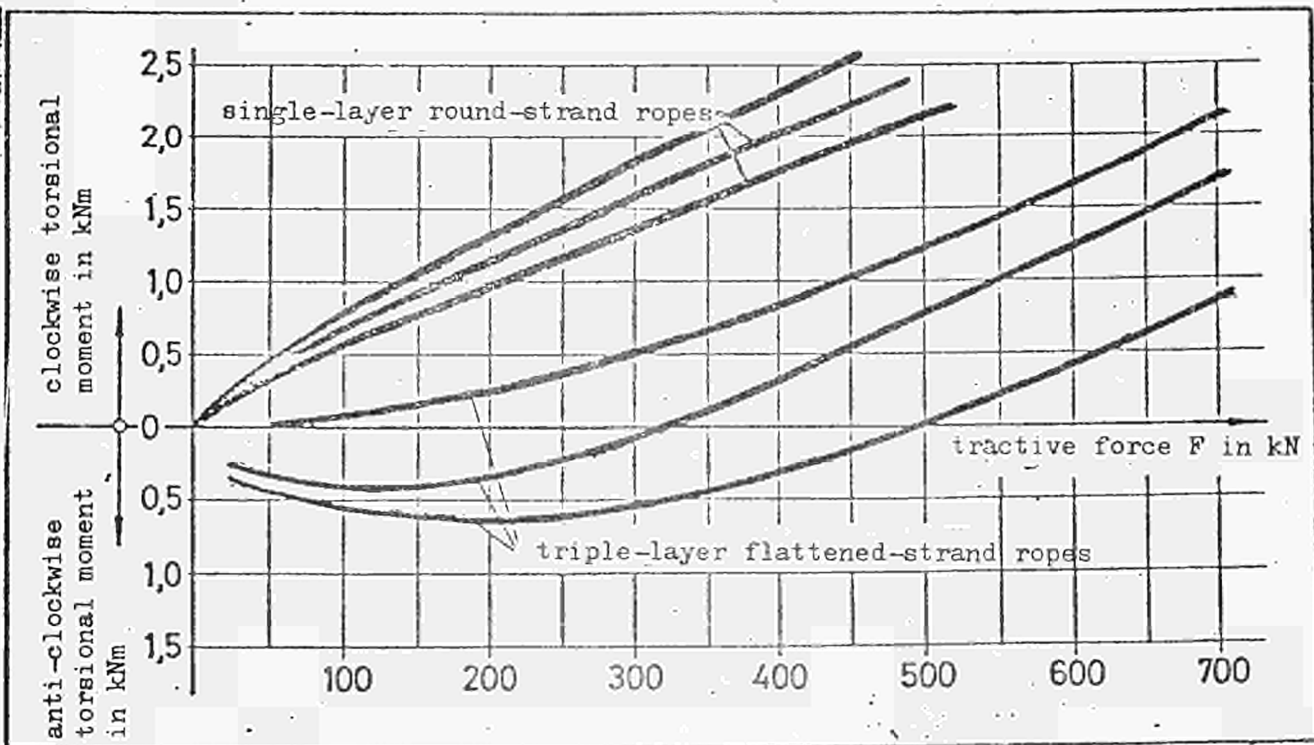


Fig. 9

Torsional moment of rope as a function of tractive force

Seilprüfstelle
Institut für Fördertechnik und Werkstoffprüfung

2.5 Detrimental vibrations in the winding system (Figure 5, 2e)

The greater the winding depths, the poorer the condition of the shaft guides and the more irregular the running of driving and non-driven sheaves, the higher will be the level of vibration in the winding system. Vibrations which reduce the rope life are also induced by harsh braking and by abrupt transitions between the acceleration, full-speed and retardation phases. There are various methods for measuring such vibrations. Efforts are being made to develop a uniform measurement procedure.

2.6 Detrimental tread pressure (Figure 5, 2f)

The tread pressure between the rope and the driving sheave, head sheave or deflecting sheave has a detrimental effect on rope life from 200 N/mm^2 upwards, or in some cases even earlier (Figure 10).

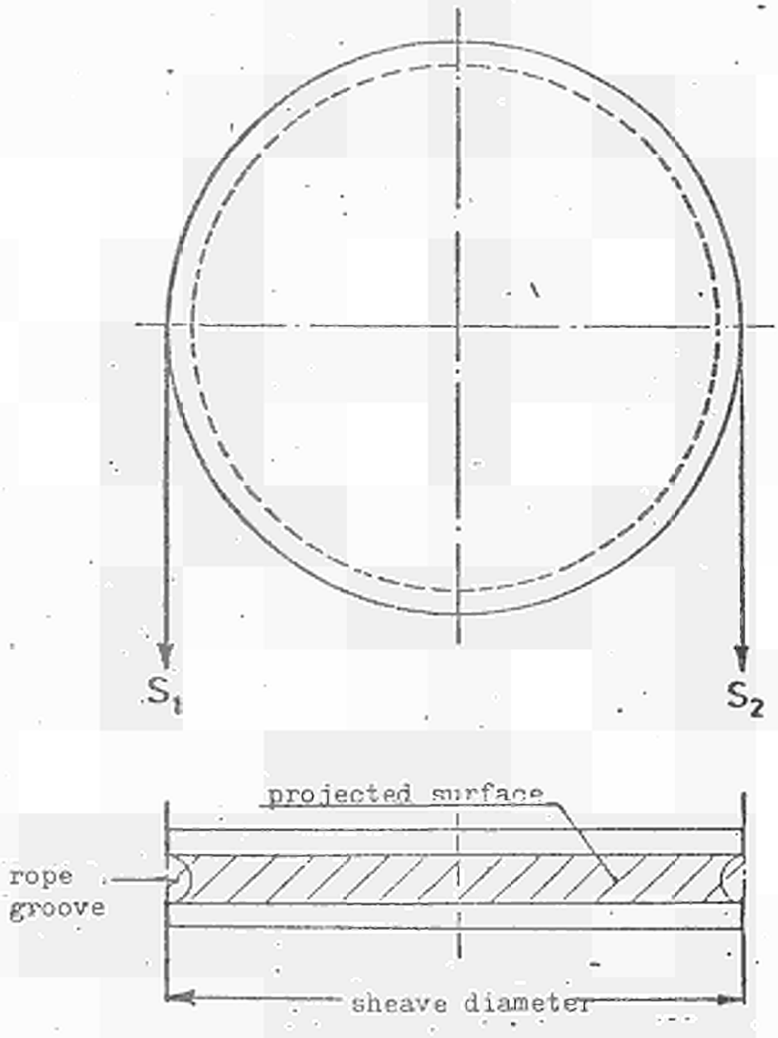


Figure 10 Determination of tread pressure

3. Other variables and their effects on the safety and service life of highly-worked winding ropes of stranded construction

Various cases of damage to the ropes of highly-worked friction winding installations showed some years ago that such ropes often reach their discard limits very rapidly after the first damage has occurred. These field observations were then reproduced on test rigs and in mines.

3.1 Difficulties in the determination of discard limits

It is a basic fact that the determination of the discard limits during service life for winding ropes in highly-worked installations, which may carry out over 900 winding cycles a day, involving high payloads and depths of 1000 m and more, is far more difficult than in the case of winding ropes under normal stresses, if only because of the short time the breaking strength of the rope takes to drop to an unacceptable level.

Figure 11 shows the breaking strength drop curves for loads of 10% and 20% of the breaking strength of the rope. The additional dynamic forces are already included. The breaking strength drop curves for highly-worked winding ropes of stranded construction lie within the closely hatched section of Figure 11.

The horizontal stippled band across Figure 11 indicates the limits of discard. The two vertical panels running through the diagrams (Figure 11) show the significant difference between the numbers of winding operations which correspond to the discard limits for highly-worked as against normally-worked ropes. Within the area of these two vertical columns one can also observe the different shape of certain characteristic curves indicating the condition of the rope, namely those for rope torsional moment Md (Figure 11), rope elongation (Δ L in Figure 11) and wire breakage (Figure 11). A further difficulty is that at the beginning of the discard period, ropes appear to be in better condition than is actually the case.

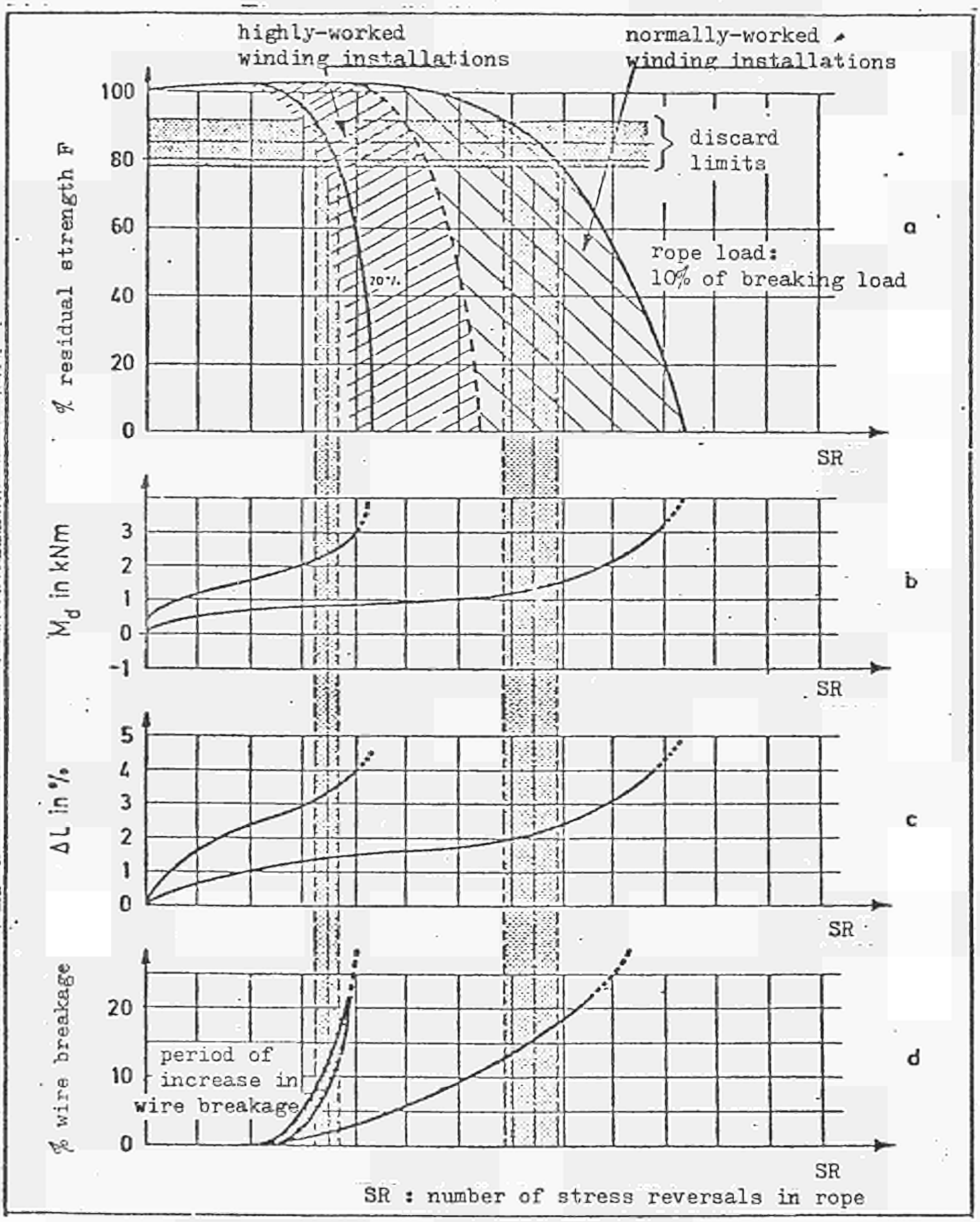


Figure 11 Difference in the periods during which a rope may be observed to be due for discard in highly-worked as against normally-worked winding installations

3.2 Some causes of wire fatigue

Movement within the rope assembly may lead to severe loosening, and thus to overloads on wires, and pressure and wear points which cannot readily be detected. High undulating loads and major differences in the strength of the wires also lead - particularly in highly-worked installations - to premature wire fatigue.

3.3 Effect of lubrication on rope life in friction winder installations

The effective use of lubricants to reduce internal wear is restricted in Germany by the need to achieve maximum friction between the friction tread and the rope at temperatures of up to 35°C. When the D/d ratio (driving sheave diameter D to rope diameter d) is low, improvement of this ratio has a more positive effect on rope life than a larger increase in the amount of lubricant.

3.4 Differences in the tension of individual ropes in multi-rope winding installations

Multi-rope winding installations are the only convenient method of winding large payloads from great depths (Figure 12).

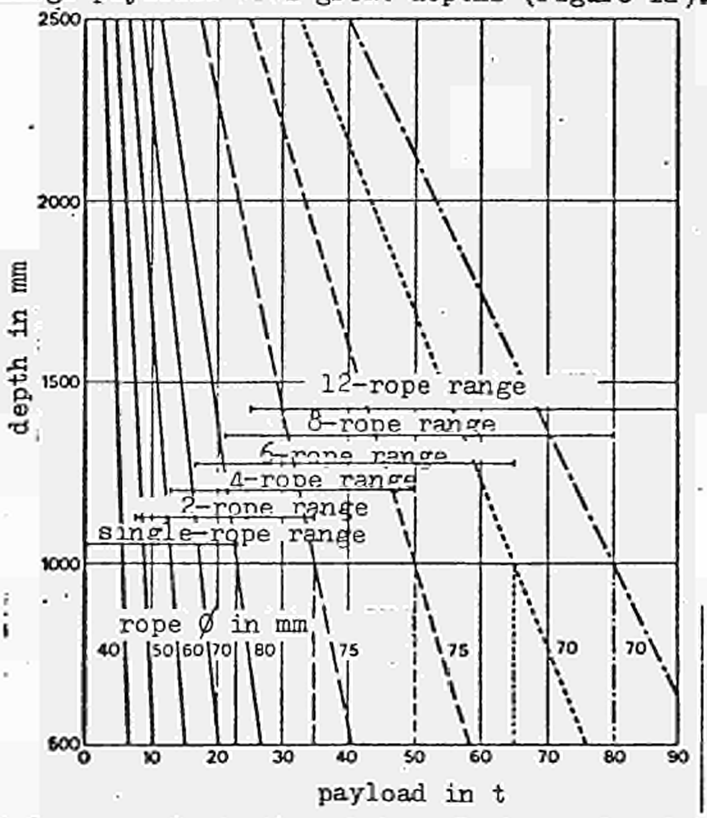


Figure 12

Attainable winding depth as a function of payload for single-rope and multi-rope installations applying the safety formula for mineral winding: safety factor (minerals) = 7.2 - 0.0005 x depth.*)

* Corresponds to the minimum factors of safety commonly applied in the FRG. With the factors of safety applied in other Community countries, the values would vary accordingly. However the trend is the same.

There is a danger of overloading individual ropes by failure to equalize the rope groove diameters at the proper time or by delays in balancing the surplus rope lengths, i.e. by neglecting to even out the rope tensions. It is a current requirement in the FRG for rope tensions to be equalized when the tension in a given rope deviates by more than 10% from the average of all ropes.

3.5 Defects in the wire material and on the wire surface

If the rope construction is free of defects the fatigue strength of the wires is reflected to a large extent in the endurance limit of the strands and rope. Figure 13 shows the fatigue and endurance values achieved, together with the target values.

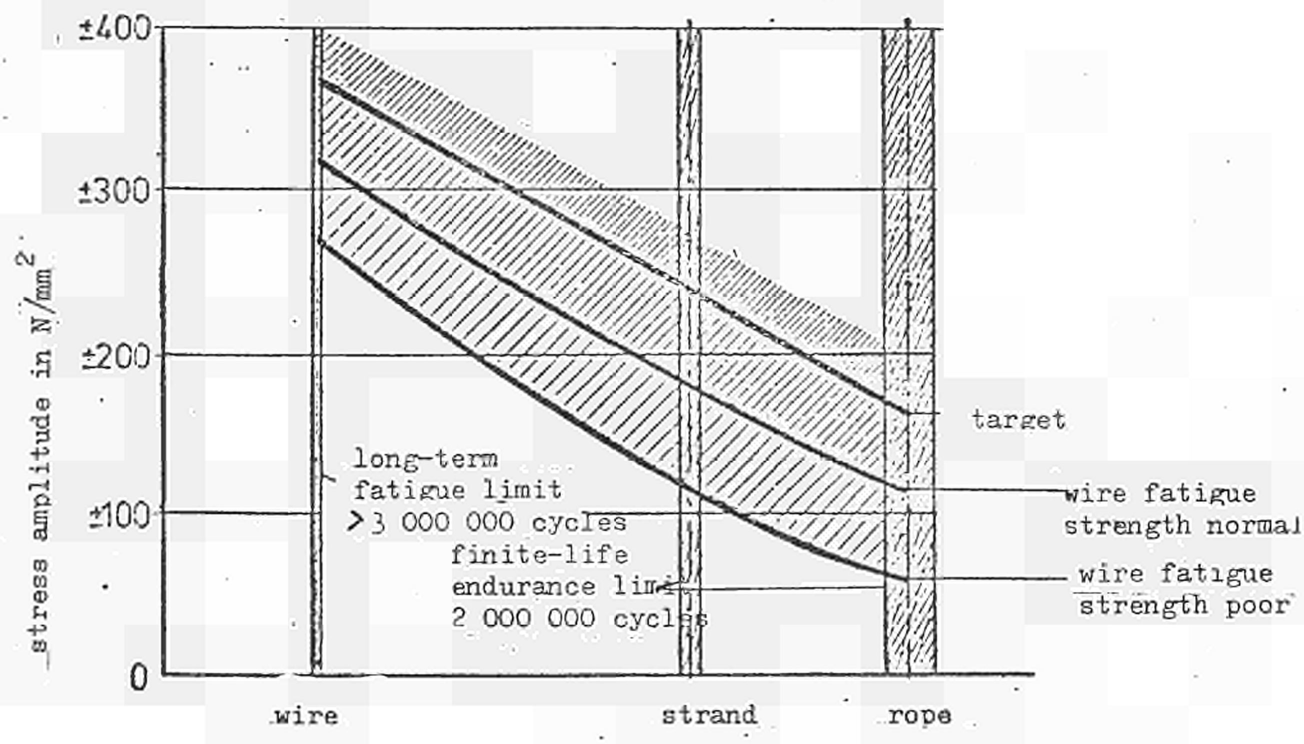


Figure 13 Fatigue strength specifications for highly-worked winding ropes; ropes of identical construction, variation only in the fatigue strength of the wires σ_m = 700 N/mm^2.

3.6 Corrosion hazard

The thinner the wires, the greater the notch effect and the reduction of the cross-sectional area of the wire (Figure 14).

Corrosion can be very dangerous owing to the irregularity of its occurrence on a winding rope. Often only very short lengths (50 to 200 cm) are severely corroded for various reasons, e.g. exposure of parts of the rope to corrosive air or water.

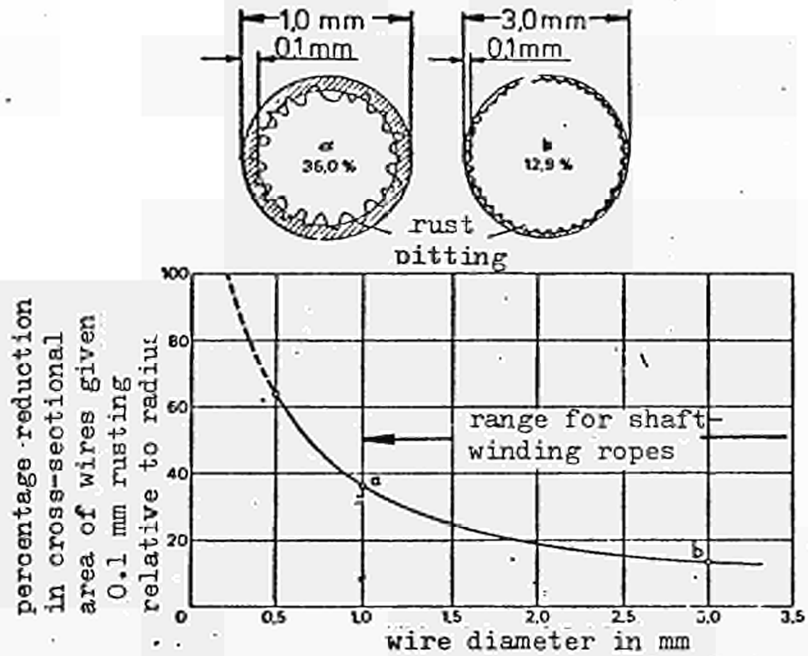


Figure 14 Reduction in cross-section of wires of different diameters in the event of rusting on the surface; corrosion pitting also causes a decisive drop in fatigue strength.

3.7 Erroneous assessment of rope life as a result of the method of calculating rope work

Rope work is normally calculated by means of a formula which makes no allowance for the working stresses inherent in the installation and the method of operation. If these factors, which greatly affect rope life, were taken into account in calculating the rope work the values obtained would be 1.1 to 1.6 times higher than those derived from the basic formula for approximately 60% of highly-worked friction winding installations in Germany (excluding exceptional cases).
A standard rope-work formula is to be devised separately.

4. Recommended measures to improve the assessment of discard limits for highly-worked winding ropes of stranded construction

The rope surveillance measures laid down in the mines inspectorate regulations for the FRG were insufficient in these cases to permit adequate observation of the rapid deterioration of these ropes and precise determination of the appropriate time of discard. For this reason, the following measures are recommended to improve standards of surveillance with respect to such ropes.

RECOMMENDED SURVEILLANCE MEASURES TO IMPROVE ROPE SAFETY

Nature of surveillance	Examination: competent person	Inspection: mine official	Testing: independent expert
I. Measurement of rope length once daily	X if exceptional elongation is observed	X if no adequate explanation is found	X
II. Examination of rotational characteristics a) sample -once			X
b) rope marking test -frequency as required		X with assistance of outside expert	X
III. Magnetic induction testing 1 month after installation: further tests depend on result of first			X
IV. Measurement of length of lay and rope diameter - frequency as required		X	X
V. Testing after damage After damage or incident the whole length of the rope must be checked.			X

Figure 15

4.1 Daily measurement of the lengths of winding ropes

Exceptional elongation, e.g. elongation exceeding 15-20 cm over a length of 1000 m, occurring within a short period of time (<1 day) may be a sign of internal damage. As such changes in length are smaller than the range of variation of the floating platform, they are not always detected as early they should be. Daily measurement of rope lengths is a simple method for early detection of rope damage.

Rope length measurements are carried out as follows:
Two cm scales H and F, reading in opposite directions, are fixed at the pit bank and at the bottom shaft landing;
Two markings are made on the two conveyances;
Set conveyance I with its marking against scale H, and conveyance II will then be beside scale F. Both conveyances must be empty;

Read off the figures on H and F, and record the difference (F-H).
The change in the difference (F-H) from one measurement to the next equals the rope elongation which has occurred in the interval.

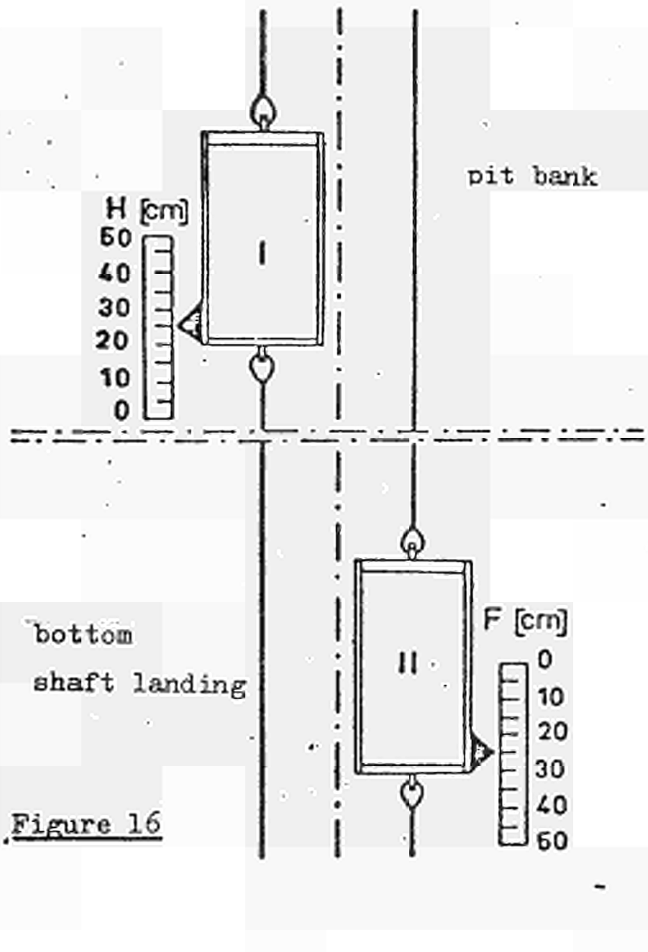
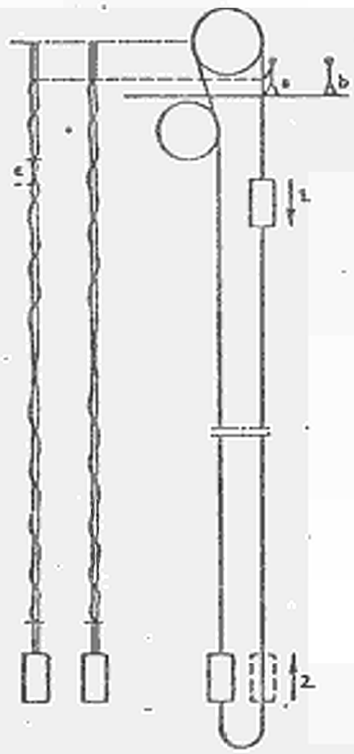


Figure 16

4.2 Testing of rope rotational characteristics on a test piece and in normal operation (Figure 15,II)

a) In order to assess the tendency of a rope to spin under operational conditions a sample at least 14 m long must be tested under progressive loading on a testing machine incorporating a torquemeter.

b) Variations in rope spin in operation are determined by the "rope marking test" (see Figure 17).



a. Mark the rope above a descending conveyance with chalk or paint over the whole rope-length until the conveyance reaches the bottom; rate of descent 1 to 2 m/s.

b. Count the rotations of the rope during the upward wind at 6 – 10 m/s

c. Discontinuity in the spin characteristics indicates internal damage. Follow-up tests: at the same location with the same load.

Figure 17: The rope-marking test.

Notes on the rope-marking test

If a friction winder installation makes use of winding ropes which are not completely non-rotating, the ropes spin during the wind. The greater the winding depth, the more pronounced is the spin, which can be detected by means of the rope-marking test. In the shaft, the mark on the rope adopts the form of a spiral. However, the winding rope rotates only in the compartment above a descending conveyance, and during the subsequent ascent the spiral thus created retains the same form.

Because the rotation of the winding rope reduces the rope torsion in the upper portion of the shaft, but increases it above the conveyance, the spiral reverses direction half way down the shaft. With an undamaged rope the slope of the spiral alters continuously over the entire length of the rope, and the reversal of direction is also continuous. Irregularities in the change of the slope of the spiral indicate abrupt changes in torque, and this in turn points to damage inside the rope.

The number of rotations of the spiral around the rope can therefore be counted during the ascent, and anomalies can be detected.

The greater the rope torque in, for example, a three-layer flattened-strand rope, the greater the danger that the outer layer of strands will cause constant corkscrewing and loosening of the second and third layers. The same applies to ropes with a wire core, and to a lesser extent to ropes with a hemp or plastic core. In addition to daily measurements of length, therefore, rope marking tests should be conducted each month initially, and then with increasing frequency to determine the number of clockwise and anticlockwise rotations of the rope during a winding cycle, and the results should be compared with the number of rotations counted previously under the same conditions.

4.3 Magnetic induction testing of highly-worked winding ropes of stranded construction (Figure 15,III)

Testing of this kind is specified for all highly-worked ropes; it is otherwise obligatory for multi-strand ropes only.

4.3.1 Hand-held testing instrument for mine officials

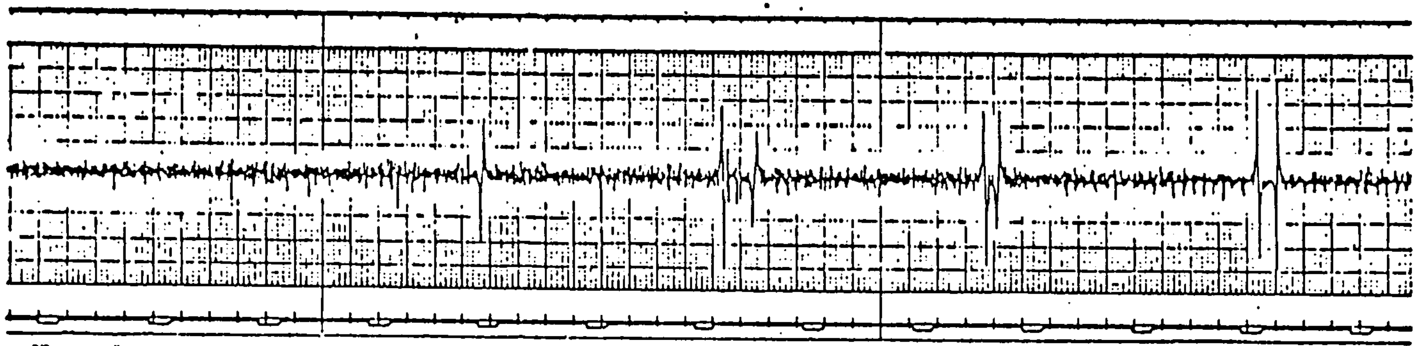
A battery-operated, intrinsically safe testing device of convenient size with auditory and visual defect indication was developed for the use of mine officials in rope testing. This hand-held instrument operates on the principle of magnetic induction and converts the signals to visual or acoustic output. The visual output comprises a chain of light emitting diodes in which one point lights up at a time corresponding to the amplitude of the signal. Short-term storage of the signals improves ease of recognition. A warning light can also be illuminated. The acoustic output takes the form of earphones, loudspeakers or claxons. For testing by experts, the device is fitted with a defect counter and a connection for a chart recorder.

4.3.2 Improved error detection

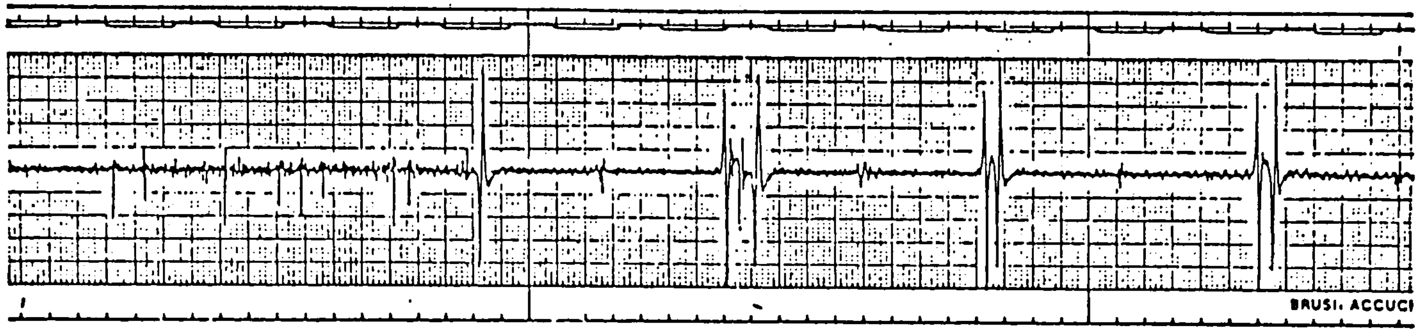
Powerful detectors fitted with permanent magnets permitting a considerable increase in the distance between search coil and rope make it possible to increase the error detection signals while reducing the level of interference (Figure 18).

4.3.3 Increasing the test range by means of permanent magnets

Detectors are so far in use for rope diameters of up to 80 mm.



Normal magnetization, search coil 1-2 mm from the rope



Strong magnetization, search coil 7-8 mm from the rope

Figure 18	Reduction of the interference level in electromagnetic testing by the use of strong magnets and the positioning of the search coils at a greater distance from the rope	Seilprüfstelle Institut für Fördertechnik und Werkstoffprüfung

4.4 Measurement of length of lay and rope diameter (Figure 15,IV)

When internal damage is detected by magnetic methods it is recommended that the length of lay and the rope diameter should be measured in the area affected. Fracture of the wire core or failure of the inner strand layers in multi-strand ropes can increase the length of lay by as much as 60 % according to the extent of the damage, and in exceptional cases the increase may be even greater. Wear of fibre or synthetic cores normally causes less marked increases in the length of lay and corkscrew deformation of the rope, which can easily lead to dangerous fractures at points of contact between strands.

4.5 Observation of the vibrational characteristics of the winding installation

Information on the amount of jolting of conveyances against shaft guides and on the vibration characteristics of the system of moving parts must be obtained with maximum speed and precision to permit assessment of the safety of the installation. Telemetric systems transmit the vibration data obtained from the conveyances to the surface. The angular acceleration of the driving and rope sheaves is then synchronously recorded along with the data obtained from the conveyances by a UV recorder (Figure 19).

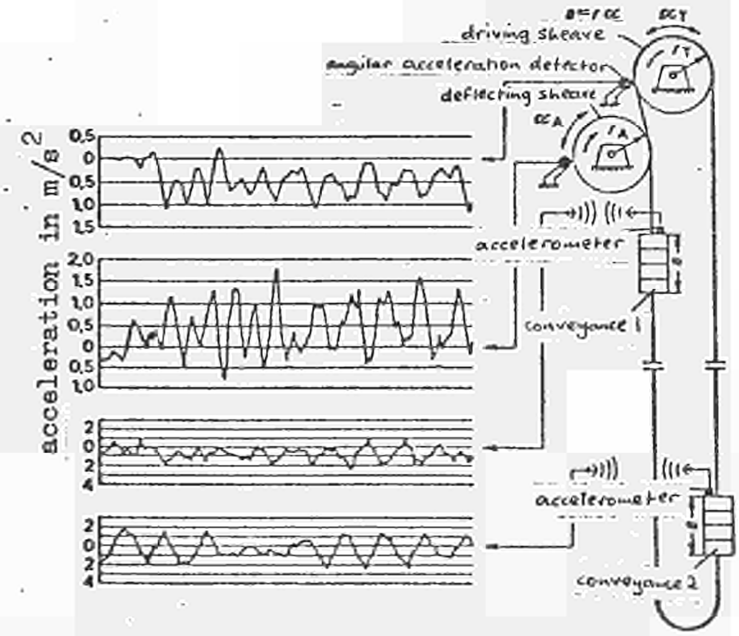


Figure 19 Measurements of vibrations in a shaft winding installation

Analysis of the charts is carried out by an automatic reading device which employs a laser beam and converts the chart values to digital form. These data are then further processed in a programmed classing device. The output from this system enables the expert to arrive at an opinion on the safety of the winding installation in respect of vibration.

4.6 Assessment of breakage and loosening of wires

In highly-worked ropes and especially ropes of larger diameter, internal wear leads to loosening of wires and hence overloading of those wires which are still fully tensioned and which are then usually subjected to stresses beyond the elastic limit. This causes premature fatigue of the wires and deterioration of the rope construction e.g. by kinking. The guidelines for the determination of discard limits for highly-worked ropes[1] drawn up by the Rope Testing Centre of the Westfälische Berggewerkschaftskasse, Bochum, state that the loss of strength of a rope as a result of wear and consequent loosening is to be taken as twice that caused by wire breakage. The concentration of wire fractures, including internal fractures detected by electromagnetic methods, within a length equal to 50 times the rope diameter must therefore not exceed one-third of the 15% loss of strength which is permitted. If fractures at points of contact between strands are observed, more severe discard standards are applied as such fractures are difficult to detect by visual inspection or magnetic induction.

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1) Ulrich, E. and Grupe, H.: Die Überwachung hochbeanspruchter Schachtförderseile, Glückauf, Issue III (1975), pages 870/874.

4.7 New method of determining wire fatigue

The scanning electron microscope is used to detect wire fatigue in highly-worked winding ropes which usually appear superficially to be in better condition than is in fact the case. Figure 20 compares the surface of a wire from the test piece with a wire taken from a rope due for discard. This technique is particularly suitable if the number of broken wires is small but fatigue is suspected.

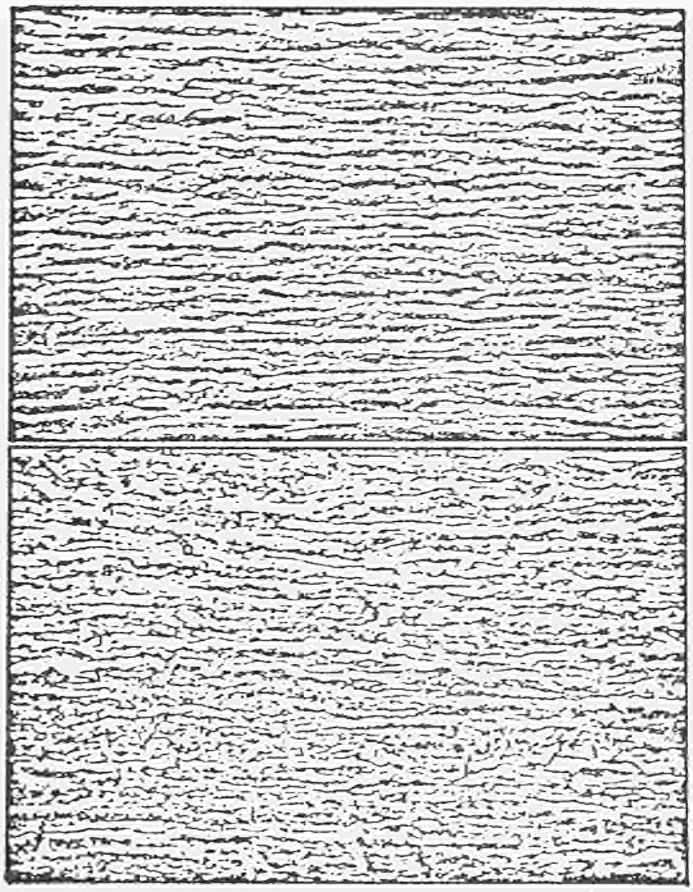

Figure 20: 200-fold magnification of wire surface, using scanning electron microscope: top - as-new condition; bottom - at discard limit.

ANNEX V

IMPLEMENTATION OF RECOMMENDATIONS

OF THE SAFETY AND HEALTH COMMISSION

AS AT 1.1.1978

The assessment of the implementation of the principles and reports prepared by the Safety and Health Commission since the beginning of its activities and distributed to the Governments and other interested bodies for further action or for information, is published every other year in its annual report.

The recommendations have been classified by subject and listed in their order of approval by the M.S.H.C.

The situation with regard to implementation of the above-mentioned recommendations and proposals is indicated, with explanatory notes, in the following tables.

The following symbols are used in the tables :

C :	national regulations which are already in accordance with the recommendations.
C'	recommendations which have not been embodied in regulations, but which have been implemented de facto.
NRC	recommendations for which new regulations implementing them have been issued.
NRP	recommendations for which new regulations implementing them are being drawn up.
E	the preparation of new regulations is being studied.
?	there is uncertainty regarding the steps to be taken.
A	the national authorities have decided not to bring their regulations into line with the recommendations.

***

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
I - Recommendation regarding the consulting of foreign experts in the case of rescue operations connected with major mining accidents						
In certain serious mining accidents advice requested by the leaders of the rescue operation from qualified foreign experts in mine-rescue matters.						
The heads of Mine Rescue Stations are provided for this purpose with a plan containing the most important addresses and information needed.	C' 1)	C' 1)	C' 1)	C' 1)	C'	C'
This plan should be constantly kept up-tp-date.	C' 1)	C' 1)	C' 1)	C'	C'	?

1) The main First-Aid Stations are in touch with the main Rescue Stations in the Community countries.

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
I - Recommendations regarding equipment for shafts in connection with the prevention of fires (First Report of the Safety Commission, p. 11 (German text)						
1. Steps to prevent any accumulation of grease and coaldust (First Report of the Mines Safety Commission, p. 15 (German text) and Report of the Conference, p. 54, No. 2, para. C.)						
- Skip-winding installations should as far as possible be sited only in upcast shafts;	C'	A 1)	A	A	C'	A
- Equipment in new shafts should be of aerodynamic form;	C'	C'	E	E	C	A
- all suitable steps should be taken to avoid in every case any accumulation of dust to ensure that any such accumulation is removed	C	C	C	C	C	E
2. Preferred siting of methane-drainage lines in upcast shafts (First Report of the Mines Safety Commission, p. 16 (German text) and Report of the Conference, p. 54, No. 3, Par. d)						
- This recommendation of the Conference applies particularly to pressure lines	C	C	C	E	- 2)	C
3. Siting electric cables, compressed-air mains and gas-drainage pipes (First Report of the Mines Safety Commission, p. 16 (German text) and Report of the Conference, p. 54, No. 3, par. e)						
- electric cables and leads, compressed-air drains and gas-drainage pipes should not be sited in the haulage compartment :	C	C	C	E	C'	- 3)
- electric cables should not all be sited in the same shaft	C	C	C	E	C'	C'
II - Guiding principles for fighting mine fires by sending down water (Second Report of the Mines Safety Commission, p. 26) supplemented 5.2.1973 (10th Report of the MSCH, annex VI)						
1. Installation						
a) At the top of every shaft reaching to the surface there must be a device which can send down at least 50 litres of water per minute and per square metre of shaft cross-section	C	C	C'	E	E	A 4)
b) This device must be installed in such a way that the supply of water can at no time be seriously affected by drawing-off or flowing-away of water at other points	C	C	C'	E	E	A 4)
c) The water pipes and the spray jets must be set in such a way that they are protected from frost	C	C	C'	E	E	A 4)
d) The damming device or devices must be set outside the shaft-top building in such a way that they can be operated at any time. They must be marked by means of an instruction plate.	C	C	C'	E	E	A 4)

1) All skip-winding equipment still in use is installed in downcast shafts;
2) No methane-drainage lines in service;
3) Recommendation does not apply; there is no multiple compartment shaft;
4) There are doubts as to the practicability of the recommendation; minimum water quantities are laid down

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
e) At each filling station of every main shaft a fire point should be provided such as spraying ramps, hoses, or equivalent apparatus	C	C	C	E	C	A
f) This apparatus should be operated either from the filling station or the shaft outlet	C	C	yes	E	E	A
g) A device should be installed at each level to restrict the air flow in the galleries coming from the air intake shaft, if it should be necessary, when the air flow is reversed accidentally or on purpose	A 1)	C	E	E	E	A
(This device should not necessarily be installed close to the shaft; the most important point is that it should be up-wind of the first bifurcation from the filling station. Nevertheless, since each mine is different, the effects of using this device should be evaluated beforehand by the use of a simulator or some equivalent method).						
2. Fires in down-cast shafts						
a) Immediate measures						
- it is essential to indicate in the fire-fighting plan the maximum amount of water which can be sent down each of the downcast shafts, without creating additional dangers for the workers by its effects on the ventilation.	A 2)	A 3)	A	E	E	A 2)
- the damming device which can be operated at this stage must not release more than this prescribed quantity of water.	A 4)	A 3)	A	E	E	A 2)
- until the leader of the rescue operations has issued his instructions and as long as there has been no reversal of ventilation, water may be sent down only by opening the damming device prescribed for this purpose.	A 4)	A 3)	A	E	E	A 2)
b) Measures to be taken on the instructions of the leader of rescue operations						
- the leader of the rescue operations must therefore decide - taking into account all the circumstances - either to send down an increased quantity of water - or must he give orders that reversal of the ventilation be brought about or encouraged.	A 3)	A 3)	A 3)	E	E	A 5)
- to facilitate the reversal of the ventilation in the burning downcast shaft, once this has been opened and the main fan stopped, water can be sent down the upcast shaft.	C	C'	C'	E	E	A 5)
- if reversal of the ventilation has already occurred - either as a result of the upward current produced by the heat of the fire or deliberately - downcast shafts should be treated as though they were upcast shafts.	C	C'	C'	E	E	A 5)

1) Fireproof doors to restrict the airflow are required in all mines in the intakes close to the shaft.*
2) There are doubts as to the practicability of the Recommendation; minimum water quantities are laid down.
3) Not suitable for inclusion in regulations.
4) There are doubts as to the practicability of the Recommendation.
5) Not suitable for inclusion in regulations; must be decided separately in each case.

** In principle, the regulations require fire doors at the pit-bottoms stations of these shafts.*

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
- if the calculated water quantiy appears to be too small to extinguish the fire immediately, or to hinder its spread, additional precautions must be worked out and laid down in the fire-fighting plan:						
- simultaneous supply of water down all downcast shafts,	A 1)	A 1)	A 1)	E	E	A 2)
- partial shutting-off of the burning shaft at surface level,	A 2)	A 2)	A 2)	E	E	A 2)
- shut underground fire-doors, etc..	A 2)	C	A 2)	E	E	A 2)
3. Fires in upcast shafts						
- in upcast shafts, water may be sent down only on the instructions of the leader of the rescue operation	C	C	E	E	E	A 2)
- as long as there are still any workers in the pit, only so much water may be sent down as will alow the fumes of the fire to continue to be extracted whilst the water is falling	C	C	E	E	E	A 2)
Note. A commentary and examples (with diagrams), regarding the calculation of the effect of falling water on the ventilation are given in the Second Report of the Mines Safety Commission pp. 29-50						
III - Recommendations for the sealing-off by dams of mine fires and underground combustion (Second Report of the Mines Safety Commission, p. 53)						
Introductory remark						
The following Recommendations are not binding. They are not intended to give Inspectorates "ready-made" regulations; on the contrary, it remains for the competent authorities to decide how these Recommendations are to be applied as regulations, circulars or service instructions.						
These Recommendations refer only to the actual fighting of the fire or combustion; they do not refer to the measures to be taken as a matter of priority to rescue men following the outbreak.						
A - When a mine fire has broken out or underground combustion developed, it is indispensable to take the necessary preparatory steps for any later sealing-off by dams which may be necessary while the direct firefighting operations are still going on	C	C	C'	C'	C'	C'
- In the event of sealing-off by dam becoming necessary, as a general rule the first stoppings to be erected must be advance dams.	C	C	C'	C'	C'	?
These advance dams are in fact the real subject of the present Recommendations.						
B - Structure and erection of the advance dams						
1. If there is no risk of exploaion 3) :						
a) to make the advance dams themselves as air-tight as possible and to create the closest possible seal between the dam and the surrounding walls;	C	C	C'	C'	C'	C'
b) there is nothing against shutting off first of all the intake air.	C	C	C'	C'	E	C'

1) Not suitable for inclusion in regulations.
2) There are doubts as to the practicability of the Recommendation.
3) For the assessment of the risk, see chapter A - II a), p. 52

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
2. If there is a risk of explosion:						
a) to have at all times the most precise information possible regarding the degree of explosion risks in the fire zone;	C	C	C'	C'	E	C'
it may be necessary to provide the men constructing the advance dams with fireproof clothing;	C	C	E	C'	C'	A 1)
b) to ensure that the advance dams are as air-tight as possible; to ensure that they are strong enough to resist an explosion:	C	C	C'	C'	C'	C'
c) to ensure that for the entire period during which the stopping is being erected, there is sufficient ventilation of the fire zone to counter as far as absolutely possible the formation of an explosive gas mixture;	C	C	C'	C'	C'	C'
d) to ensure that all suitable measures are taken to reduce as far as possible the effects of any explosion which may occur; (dust barriers, stone-dusting or water through barriers);	C	C	C'	C'	C'	C'
e) to the greatest possible extent, the dams on the intake and return sides should be sealed simultaneously;	C	C	C'	C'	C'	C'
only the number of workers and members of the staff strictly necessary for this work should stay behind;	C	C	C'	C'	C'	C'
as soon as the dams have been sealed, the danger area must be completely evacuated.	C	C	C'	C'	C'	C'
C - The final dams must be durable, built of brick or concrete under the protection offered by the advance dams.	C	C	C'	C'	C'	A
Note: Additional details to the foregoing Recommendations are given in a Commentary (Second Report of the Mines Safety Commission, pp. 53/58)						
IV - General guidelines for the opening-up of sealed-off fire areas (Doc 1304/3/64)						
1. GENERAL				2)		
Special reasons for opening-up a district sealed-off after a fire: - recovery of bodies - salvage of material - recovery of roadways and workings - reduction of the sealed-off area - inspection of the district, and, if necessary, - direct fire-fighting						

1) Not necessary.
2) The opening-up of fire areas is carried out on the responsibility of the manager, who prepares a reopening plan - taking into account the scale and type of fire and the ventilation situation in the fire area - in collaboration with the Main Rescue Station. The action plans of the Main Rescue Stations very largely embody the guidelines laid down in Doc. 1304/3/64.

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph.	Germany Saar	Belgium	France	Italy	United Kingdom
The following hazards can arise from reopening a sealed-off district: - release of CO, foul air and hot damp air, - explosion of firedamp or fire gas, where the fire is not yet extinguished, - recrudescence of the fire, which need not necessarily occur immediately, but even after some time has elapsed. Recrudescense of the fire can occur only when fresh air reaches the seat of the fire, so that with all operations involved in reopening a fire area it is of prime importance to inspect the individual air currents constantly.	C	C	C	C'	C'	C'
All places suspected of having been seats of fire or heatings must be ascertained with the utmost speed.	C'	C'	C'	C'	C'	C'
2. BASIC RULES 2.1 Sealed-off districts may be reopened only after the competent authorities have been notified or have given their permission.	C	C	C	C 1)	C 1)	C'
2.2 Before opening commences, gas samples must be taken from the fire area, at each stopping and from all sampling pipes.	C	C	C	C'	C	C'
2.3 The gas samples are analysed and the results assessed from the point of view of explosion risk in the sealed-off area and the state of the seat of the fire.	C	C	C	C'	C	C'
2.4 The cooling-off time of the seat of the fire must be taken into account.	C	C	C'	C'	C'	C'
2.5 If possible, the sealed-off district should be inspected before any air is circulated or any operations are started.	A	C'	C'	C'	C'	C'
2.6 Before opening commences, a plan should be drawn up jointly with the Main Rescue Centre.	C	C	C'	C'	C'	C'
2.7 This plan must cover the following points: - the method, - nature, scope and order of operations, - direction and supervision, - checking of the ventilation system and of the composition of the air, - communications, - preparation of material, - evacuation, prohibition of access to and remanning of endangered workings, - deployment of the Rescue Team, - connection and disconnection of electrical equipment and cutting-off the supply of electricity in both equipment and part of network concerned, - opening and closing of the compressed air, water and methan-drainage pipeline valves, - re-sealing of the fire area in emergency.	C	C	C'	C'	C'	C'
2.8 The method to be adopted for eopening sealed-off districts depends on the presence or otherwise of - non explosive gaseous mixtures which remain non-explosive on dilution with air, - non-explosive gaseous mixtures which may become explosive on dilution with air, or - explosive gaseous mixtures.						

1) Applies only to the opening-up of fire areas after particularly large fires.

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
Fire areas may be opened at one point or at several points. In the latter case, a continuous direct circulation of air is automatically established and the fire area is permeated with fresh air. An examination should be made of the effects of the opening of the area on the ventilation system of the pit as a whole and within the fire area.	C	C'+C	C'	C'	C'	C'
2.9 A sealed-off district may be reopned by - breaching one or more stoppings (with or without the use of an air-lock), or - cutting a new entry into the fire-area. Before opening a sealed.off area, provision should be made for immediate reclosure if necessary.	C	C	C	C'	C'	C'
2.10 Stoppings may be opened only on the instructions of the manager underground and under the constant supervision of personnel appointed by him.	C	C	C'	C	C	C'
2.11 Workings, into which the opening of a stopping may release toxic gases or foul air, or where there is a risk of explosion, must be evacuated and put out of bounds to personnel before opening.	C	C	C'	C	C'	C'
2.12 Since conditions in the district, the state of the seat of the fire and the risk of gas explosion may change during the opening operation the composition of the fire gases or fumes must be checked at regular intervals.	C	C	C	C	C'	C'
2.13 The kind and number of samples and the points at which they are to be taken should be fixed in advance.	C	C	C'	C'	C'	C'
2.14 In doing so, the possibility of gas accumulations forming should be allowed for. (In general, the formation of gas layers is fostered by low air velocities and differences in temperature).	C	C	C'	C'	C	C'
2.15 Where a stopping is opened in the knowledge that a fire is not yet extinguished, or where the fire is revived as a result, the area in question must be resealed at once, if the composition of the fire gases or fumes changes in such a way that an explosion hazard might arise.	C	C	C'	C'	C'	A' 1)
2.16 With non-explosive gas mixtures in the fire area, this is necessary only if extinguishing operations seem unlikely to succeed.	A 2)	C'	C'	C'	C'	A 1)
2.17 It is the responsibility of the Rescue Team to open and inspect fire areas, even after they have been ventilated.	C	C	C'	C'	C'	C'
2.18 On the intake side, breaching of stoppings need not be carried out by the Rescue Team provided that no gas hazard is to be reckoned with.	C	C'	C'	C'	C'	C'
2.19 When deploying the Rescue Team, allowance should be made for the adverse climatic conditions which are likely to obtain at any point where they may be employed.	C	C	C'	C'	C'	C'

1) Reopening of an area where a known fire exists is not normally considered.
2) Opening of sealed off areas is prohibited while there is known to be an explosive mixture behind.

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
V - OPENING-UP SEALED-OFF DISTRICTS CONTAINING NON-EXPLOSIVE GAS MIXTURES						
1. Opening-up one side only						
Asealed-off district containing non-explosive gas mixtures may be opened on one side even if the fire is not yet extinguished. It must first be extablishe whether the remaining stoppings and seals are sufficiently air-tight and that there is no risk of releasing fire gases, in particular carbon monoxide in other parts of the working, which may be connected with the fire area.	A 1)	C	C'	C'	C'	C'
If the stopping to be opened is on the return side, special attention should be paid to the release of CO or of other toxic or dangerous gases or foul air.	A 1)	C	C'	C	C'	C'
The decision as to whether to carry out operations in the fire area without ventilation air or with auxiliary ventilation depends on the purpose of the reopening of the area, the expected duration of the Rescue Team's operations and the possible hazards involved. Auxiliary ventilation is especially desirable for extended operations within the fire area. a) Working without ventilation air, especially behind an airlock, has the advantage of eliminating the risk of reviving the fire. When carrying out extinguishing operations without ventilation air and under unfavourable air conditions, it is advisable first to set up water sprinklers or nozzles and to put these into operation only after the Rescue Team has left the fire area.	A 1)	C	C'	C'	C'	?
b) If auxiliary ventilation is used, it should preferably be by suction.	A 1)	A 2)	C'	C'	3)	A 4)
It is advisable to isolate the fire area ventilated by an auxiliary fan from the non-ventilated section by means of an auxiliary stopping if the seat of the fire is situated in the non-ventilated section.	A 1)	C	C'	C'	C'	?
2. Opening on two sides to establish a circulation of air round the sealed-off area						
Asealed-off area containing non-explosive gas mixtures may be ventilated only if it is likely that the fire is extinct.	C	C	C'	C'	C'	C'
While ventilation is being extablished, a Rescue Team wearing breathing apparatus may enter the fire area to examine conditions within it and to extinguish any fires.	C	C	C'	C'	C'	C'

1) It is forbidden to start opening sealed off areas, either from one point or from two places, while there is known to be an explosive mixture behind the stoppings.
2) Experience hitherto has shown that blowing auxiliary ventilation is preferable, to ensure that no explosive gases are sucked in by the auxiliary fan.
3) The use of blowing auxiliary ventilation is preferred.
4) Not suitable for inclusion in regulations; the use of forcing or auxiliary fans would depend on individual circumstances.

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
VI - REOPENING OF SEALED-OFF DISTRICTS CONTAINING GAS MIXTURES WHICH MAY BECOME EXPLOSIVE ON DILUTION WITH AIR						
1. Opening on one side only						
1.1 A sealed-off area containing gas mixtures which may become explosive on dilution with air may be opened on one side only, even if the fire is not yet extinguished;	C	C	C'	C'	C'	A
1.2 It must first be checked whether the remaining stoppings and seals are sufficiently air-tight and that there is no risk of releasing fire gases, in particular carbon monoxide, into other parts of the workings which may be connected with the fire area.	C	C	C'	C'	C'	A
1.3 If the stopping to be opened is on the return side, particular attention must be paid to the possibility of releasing CO,CH_4 or foul air	C	C	C'	C	C'	A
1.4 All operations must be carried out without ventilation air.	C	C	C'	C	C'	A
1.5 There must be continuous sampling and evaluation of the results of analysis to check whether the gas mixture remains non-explosive.	C	C	C'	C	C'	A
1.6 For extinguishing operations, see section III.I. If the size of the sealed-off area is to be reduced, a new explosion-proof stopping must be erected. In order to be able to erect this stopping under tolerable climatic conditions and possibly without wearing breathing apparatus, auxiliary ventilation may have to be provided.	C	C	C'	C'	C'	A
1.7 For this purpose, an auxiliary stopping must first be erecred and sealed in an unventilated atmosphere. (Before constructing the main stopping, it should be considered whether to erect several successive auxiliary stoppings, according to the possible hazards).	C	C	C'	C'	C'	A
1.8 The section of roadway thus recovered must then be ventilated by an auxiliary fan so as to create suitable air conditions for the erection of the main stopping.	C	C	C'	C'	C'	A
1.9 When starting up the auxiliary ventilation, it must be remembered that the gas mixture becomes explosive on dilution with air. It is therefore essential to ensure that there is no source of ignition in the workings to be ventilated.	C	C'	C'	C'	C'	A
1.10 In addition, it is essential to make certain that the fan used cannot cause any risk of ignition.	C	C	C'	C'	C'	A
1.11 Before starting up the auxiliary ventilation, all workings likely to be exposed to the hazards of fire gases or explosions must first be evacuated and access thereto prohibited.	C	C	C'	C'	C'	A

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
1.12 Electrical equipment must be cut off from the power supply	C	C	C'	C'	C' 1)	A
1.13 In addition, the ventilation must, as far as possible, be regulated so that no explosive gas mixtures can be released over long distances.	C	C	C'	C'	C'	A
1.14 For this purpose, the quantity of air circulated should, if necessary, be increased.	C	C'	C'	C'	C'	A
2. <u>Opening on two sides to extablish a circulation of air through the fire area</u>.						
2.1 This method of opening automatically results in the formation of a through air-current in the open district, but not necessarily in other parts of the district. The method can be used only if there are no remaining signs of fire in the district.	C	C	C'	C'	C'	C'
2.2 In addition, a period long enough for the seat of the fire to cool off must have elapsed since the estimated time of extinction.	C	C	C'	C'	C'	C'
2.3 If possible, the Rescue Team should carry out an inspection in an unventilated atmosphere.	A	C	C'	C'	C'	C'
2.4 Failing this, the results of the snuffle pipe tests should be used to determine the condition of the seat of the fire.	C	C	C'	C'	C'	C'
2.5 Furthermore, it should be considered in such cases whether the method described in section IV.1 might not be preferable.	NRP	C'	C'	C'	C'	C'
2.6 In each case, it is essential to check the likelihood of a recrudescence of the fire during ventilation, by means of fire gas samples.	C	C	C'	C'	C'	C'
2.7 This applied particularly in the case of a much-branched district.	C	C'	C'	C'	C'	C'
2.8 Before ventilating the fire area, all working exposed to the hazards of fire gases or explosions of fire gases or fire-damp when the stopping is opened must be evacuated.	C	C	C'	C'	C'	C'
2.9 All electrical installations in these workings must be cut off from the power supply.	C	C	C	C'	C'	C'
2.10 On safety grounds, it is advisable to open the return stopping first.	NRP	C	C'	C'	C'	C'
2.11 After the Rescue Team has withdrawn to less dangerous zones, the intake stopping should be opened.	NRP	C	C'	C'	C'	C'
2.12 When ventilating the fire area, the quantity of air and the content of inflammable gases in the air-current circulation through the fire areas, and in the current into which it subsequently flows, should be checked.	C	C	C'	C'	C'	C'

1) Special attention is drawn to the fact that the fan must be switched off.

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
2.13 The two air-currents should be mutually adjusted in such a manner as to ensure that no explosive mixture of gases is present over long distances after their junction.	C	C	C'	C'	C'	C'
2.14 Access to the fire area is prohibited until it has been ventilated.	C	C	C'	C'	C'	C'
VII- OPENING OF FIRE AREAS CONTAINING EXPLOSIVE GAS MIXTURES						
Sealed-off districts may not be reopended, either on one side or on two sides, if the presence of explosive gas mixtures behind the stoppings is established.	C	C	C'	C'	C'	C'
VIII- OPENING OF FLOODED FIRE AREAS						
The composition of the air in fire areas flooded to extinguish the fire must be checked after draining.	C	C'	C'	C'	C'	C'
In workings with solid coal, allowance must be made for the increased hazard of spontaneous ignition after drainage. Where fire areas have been isolated by local flooding instead of by stoppings, the rules mentioned in section I to V should be observed, insofar as applicable, when opening a district.	C	C'	C'	C'	C'	C'
IX- REMANNING OF FIRE AREAS						
After ventilating a fire area, workings may not be manned until a Rescue Team has established that all workings are free of noxious gases.	C	C	C'	C'	C'	C
If the fire area is merely being reduced in size, workings free of noxious gases may be manned only when the remainder of the fire area has heen sealed-off by permanent stoppings.	C	C	C'	C'	C'	C
X- GUIDELINES FOR THE CONSTRUCTION OF ADVANCE FIRE STOPPINGS FROM PLASTER (doc. 4928/63/2).						
In all cases where it is possible and advantageous, the erection of plaster stoppings to seal off fires and heatings is recommended.						
Is this process applied in practice as laid down in the guidelines contained in the report?	NRP 1)	C	yes	yes 2)	E	C'
Is the application of this process prescribed by regulations?	NRP	C	no	no	no	no
Is this process applied in practice in a manner differing from the principles laid down?	NRP	yes	no	no	no	no
Is the application of this modified process prescrived by regulations?	NRP	yes	no	no	no	no

1) The construction of advance stoppings against will be the subject of new regulations when the fire-fighting directives are revised.
2) The choice of means is, however, left to the mine-manager.

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
XI- USE FOR FOAMED URETHANE						
Opinion on the use underground of foamed urethane in coal mines (7th Report of the Mines Safety and Health Commission, annex VI)						
The Mines Safety and Health Commission considers it desirable that the producers of the foamed urethane plastic should further develop the compound at present available in such a way that, while retaining unchanged the positive properties which it now has, it satisfies the requirement set out in the Commission's opinion.						
Are there any regulations governing the use underground of foamed urethane?	yes 1)	C'	no	no	no	no
XII- PLASTER STOPPINGS						
Opinion on the construction of plaster stoppings using the hydromechanical process (doc.3481/3/69); instructions for construction (8th Report of the Mines Safety and Health Commission, annex V)						
Is this recently developed process in use?	yes	C	yes	yes	E	yes
Is its use governed by any regulation?	yes 2)	C	no	no	no	no
XIII- FOURTH REPORT ON SPECIFICATIONS AND TESTING CONDITIONS RELATING TO FIRE-RESISTANT FLUIDS USED FOR POWER TRANSMISSION						
Part II - Specifications and test conditions (pp. 19 onwards)						
1. Fire-resistant fluids for hydraulic power transmission and hydraulic control, before being used in mine workings must be given a certificate of approval.	C	C	C'	C'	E	C
This certificate must indicate that the product has been subjected to the following tests:						
a) Laboratory tests (articles 3 -7)						
aa) to determine criteria of flammability (article 3, p.22)	C	C	C'	C'	E	C
bb) to determine health criteria (article 4, p.23)	C	C	C'	C'	E	C
cc) to determine technical criteria (article 5, p.23	C	C	C'	C'	E	C
b) Long-term tests during normal operations (article 8, p.27)	C	C'	C'	C'	E	C'
2. These tests are carried out under an authorised body.	C	C	C'	C'	E	C'
3. Authorisation for use underground should be dependent on presentation of the certificate mentioned in 1. above.	C	C	C'	C'	E	C'

1) The use underground of liquid plastic products requires the approval of the Obergamt. Approval has so far only been granted for its use in rock consolidation. Its use for coating surfaces is not permitted.
2) Directives for the construction of stoppings of 21.4.71 - 18.13.1 II - 1.

A. RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
XIV- <u>FIRST REPORT ON TESTS AND CRITERIA OF FLAMMABILITY FOR TEXTILE CARCASS CONVEYOR BELTS USED IN COAL MINES (12th Report of the Mines Saftey and Health Commission, annex VI)</u>						
Is account taken of the tests and criteria of flammability for textile carcass conveyor belts defined in this report, i.e.						
- drum friction test?		C	C	E	no [1]	yes
- flame test?	yes	C	C	E	no	yes
<u>Article 9 - Withdrawal of approval</u> At the request of the authorised body, the permitting authority may withdraw the approval for the fluid to be used in mine workings.	C	C	C'	C'	E	C
XV - FIRST REPORT ON FILTER SELF-RESCUERS FOR USE IN COALMINES - Part I : Minimum requirements and testing procedures. (13th Report MSHC, Annex X)						
In those countries where filter self-rescuers are used :						
- does the manufacturer take into account the requirements set out in Section 2 of the report ? yes/no	yes	C	yes		N[2]	C
- are they tested in accordance with the procedures laid down in Section 3 ? yes/no	Yes	C	Yes		N[2]	C+NRF
- do they undergo a quality control test ? yes/no	yes	C	No		N[2]	C+NRF

(1) currently no coal mine in operation
(2) filter type self rescuers are not used in French coal mines

C. ELECTRIFICATION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
I- RECOMMENDATIONS REGARDING ELIMINATION OF OIL FROM UNDERGROUND ELECTRICAL EQUIPMENT (1st REPORT OF MINES SAFETY COMMISSION, p.7 - German text)						
1. a) Resistances installed underground should not contain any combustible oil. (Exceptions are allowed for the starting-up resistances of large motors driving water pumps).	C	C	C	C	C'	C'
b) Condensers and transformers installed underground must not contain either combustible oil or didectric substances which can give off noxious gases.	C	C	C	C	C'	C' 1)
- Otherwise effective measures should be taken against the dangers to workers caused by the use of these devices.	C	C	C	C	C'	C'
c) Switches and relays, used underground and operation on voltages below 1,100 v, must not contain any flammable oils.	C	C	C	C	C	C
2. Recommendation to begin detailed investigation into the degree of increased safety which can be achieved, when prescribing an explosion-proof housing for normally spark-producing components only, and a design of the "increased safety" type for all other equipment.	A 2)	- 3)	C	E 4)	C	- 5)
3. Is the policy followed of reducing the use of oil in cut-off devices by reason of the potential dangers of explosion and fire?	yes	C	yes	yes	yes	C'
4. Are new purchases restricted to apparatus using no oil or, if this is not possible, only small quantities of oil?	yes	C	E	yes	no+ yes	C'
II- RECOMMENDATIONS FOR SHOTFIRING LEADS (2nd Report of Mines Safety Commission, p.10)						
1. Recommendations for all shotfiring leads						
- Every conductor must be provided with at least one good-quality insulation.	C	C	C	C	C'	C
- All connections must be properly insulated.	C	C	C	C	C'	C
- Every shotfiring lead must have the appropriate degree of flexibility	C	C	C	C'	C'	C
- The conductors must be of such cross-sectional area that thy do not occasion an excessive voltage drop.	C	C	C	C'	C'	C
- The shotfiring leads must be made up and laid so that the risk of any fault current, resulting from contact with metal objects, is reduced.	C'	C	C	C	C	C
- Before any shotfiring operation in particular workings and before the simultaneous firing of a fairly large number of shots, the ohmic resistance of the circuit must be measured.	C	C	C	C	C	C

1) In hazardous zones only.
2) Cannot be laid down in inspectorate regulations.
3) Not applicable.
4) Approval regulations have been issued for equipment in the "increased safety" category, but the type of protection is left to the individual firms.
5) A British Standard for "increased safety" apparatus has been published.

ELECTRIFICATION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
a) Temporary shotfiring leads						
- Careful inspection before each firing.	C	C	C	C	C'	C
- Regular and thorough testing by an expert either at the surface or in an underground workshop.	C'	C	C	C	C'	A 1)
A thorough checking must consist of at least:						
- a careful inspection of the lead over its whole length.	C'	C	C	C	C	C
- measurement of the insulation between the two conductors, if the lead consists of a cable or rubber-covered lead.	C 2)	C	C	C	C	A 1)
- measurement of the ohmic resistance of the lead.	C'	C	C	C	C	A 1)
b) Permanent shotfiring leads						
- Regular and thorough checks by an expert.	C	C	C	C	- 2)	C
- Written record of every thorough check, with the date.	A 3)	C	C	C	C'	C
2. Further recommendations for permanent and temporary shotfiring leads used in gassy mines						
The shotfiring leads must fulfil conditions which ensure sufficient safety with regard to:						
a) mechanical strength and in particular tensile, bending and abrasion strength.	C	C	C	C'	NRP	C
b) electrical insulation.	C	C	C	C'	NRP	C
c) impermeability (to moisture) of the insulation and the sheathing.	C	C	C	C'	NRP	C
Recommendation that checking standards which correspond to the conditions be laid down.	C	C	C	2)	NRP	C
3. Supplementary recommendations for permanent shotfiring leads used in gassy pits						
- Permanent leads shojld be so arranged that, as far as possible, damage during firing of the shots or from other causes is avoided.	C'	C	C	C'	C'	C
- If the shotfiring lead consists of two separate conductors, these should be arranged sufficiently far apart and in such a way that inspection is possible.	C'	C	C	C'	C'	C
- In shafts and dipping roads, the leads must have an adequate mechanical strength.	C'	C	C	C	C	C

1) Safety is ensured py proper insulation; leads must not be used if there is any visual evidence of damage to the insulation.
2) Not applicable.
3) Seems unnecessary and would increase administrative work.

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph	Germany Saar	Belgium	France	Italy	United Kingdom
III- RECOMMENDATIONS REGARDING THE PROTECTION OF UNDERGROUND DISTRIBUTION NETWORKS AGAINST THE DANGER OF CAUSING ELECTRIC SHOCKS (2nd Report of the Mines Safety Commission, p.13)						
I. The following recommendations refer only to the MT networks defined below; Medium Tension (MT) : the normal voltage range for working equipment used underground with three-phase A.C. (between 380 and 1.100 V). These networks should fulfil all the recommendations set out below.						
These recommendations refer neither to the HT networks, nor to voltages which are lower than the medium-tension range and are used for particular purposes (lighting, drilling apparatus, telephone installations, etc...) for which some easing of the restrictions may be allowed. Overhead wire networks with bare trolley wires are also excluded.						
II. Protection against the risk of electric shocks						
A - First order precautions (Protection against direct contact with a live phase)						
1. Every chance contact with a live phase should be avoided as far as possible by laying the conductor out of the workmen's reach, by interposing effective barriers, by sheathing the phase or by insulating it.	C	C	C	C	C	C
2. The cables and leads used in medium-tension underground networks should be mechanically protected either by means of a metal armouring connected to the pilot lead, or by a flexible envelope of the best possible design.	C	C	C	C	C	C
- Leads without metal armouring must be electrically protected by separate or common protective screens, which trip safety devices in the event of a fault.	C	C	C	C	C	C
3. Only trained men should be allowed to open the housings of accessible live parts (medium-tension voltage range) and this only under conditions which have been clearly laid down in advance.	C	C	C	C	C	C
4. The repair and maintenance of the electrical equipment should be entrusted only to trained personnel.	C	C	C	C	C	C
B - Second order precautions (Equipotential connection between conductive parts of the installation)						
1. All underground networks must be provided with an equipotential connection between the conductive (not live in normal operation) components of the installation and the other metal elements connected thereto, such that its conductance is sufficient to prevent the occurrence, between any two points accessible to a workman simultaneously, ofa voltage higher than the weak voltage.	C	C	C	C	C	C
2. This equipotential connection (protective lead) must ensure electric connection between the conductive elements of the installation over the whole length of the network. It must be						

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Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph.	Germany Saar	Belgium	France	Italy	United Kingdom
maintained in satisfactory condition and must be inspected as often as is necessary to ensure this.	C	C	C	C	C	C
3. The above-mentioned equipotential connection (protective lead) must be earthed to at least one point of the network via an earth connection of the lowest possible resistance.	C	C	C	C	C	C
4. This earth connection must be combined with the star-point earth connection, if a star-point is employed.	C	C	C	C	C'	C
C - Third order precautions (Reduction of fault duration) 1. Any fault current must be considered dangerous in underground medium-tension networks if, when the fault current flows through the protective lead and connected conductive component of the installation of earth, there is produced between any two points accessible to a workman simultaneously a voltage exceeding the level of a weak voltage, regardless of whether it occurs between parts of the installation or between such parts and earth.	C	C	C	C	C'	C
2. If the star-point of a network is earthed via a weak impedance or without any impedance, so that the presumed fault current is not restricted to a low value, then the network must be provided with safety devices which can at any time automatically isolate the damaged section of the networkfrom the current source (or render it completely dead) before the fault flowing through the protective components of the installation or earth reach a dangerous value	- 1)	- 1)	- 1)	C	E	C
- Since the complete or partial cutting-off of a line voltage can have serious effects on the current supply to important equipment, appropriate preventive measures should be taken. - Only when the line has been repaired or the fault eliminated, or at the direction of a specialist who has taken all necessary precautions, may that section of the network be brought under voltage again.	C	C	C	C	E	C
3. <u>If the star-point of a network is insulated or earthed via some impedance, which restricts fault currents to a low value</u>, the network must be fitted with supervising devices which are always in a state of readiness and which are capable: a)- either of <u>checking the insulation</u> of the various parts of the network and of indicating <u>any damage they may have suffered</u> or	C	C	C	C	E	C
- <u>of automatically cutting off the damaged section of the network from</u> its source of current (<u>or rendering the entire network dead)</u>.	C 2)	C	C	C	E	C
- If no automatic cut-off device is installed, the responsibility for cutting-off should be entrusted to an expert who can intervene as soon as the warning signal of the supervisory system is tripped or if the fault assumes major dimensions.	C	C	C	C	C'	- 1)

1) Not applicable, as only isolated ciruits are used.
2) Was carried out in workings where there is a risk of firedamp.

ELECTRIFICATION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
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- If cutting-off has been necessitated by one of the two cases cited above, the restoration of current may be accepted only after repair of the line or elimination of the fault, or only at the direction of an expert official, who has tken all necessary precautions.	C	C	C	C	C'	C'
- If no automatic cut-off device is installed, the rubber-covered leads of mobile machines should be fitted with an automatic device which renders them dead as soon as there occurs a fault current which is caused by damage to the insulation of an individual phase.	C	C	C	C	C	1)
b) - or of automatically cutting off the the damaged section of the network from its source of current (or rendering the entire network dead) as soon as a double fault occurs leading to a dangerous fault current in the protective lead and connected parts of the installation. - In this instance, the current may be switched on again only after the line has been repaired or the fault eliminated.	- 2)	2)	C	C	C'	- 1)
N.B. The comments on this Recommendation are given in the Second Report of the Mines Safety Commission, pp. 15/22. IV - RECOMMENDATIONS REGARDING THE PROTECTION OF UNDERGROUND ELECTRICAL NETWORKS AGAINST FIRE AND FIREDAMP-EXPLOSION RISKS (Doc. 1156/61/4) 1. Recommendations regarding the protection of underground electrical networks against fire risk A - First order precautions - avoidance of fire risk 1) Avoidance of excessive heating of cables in normal use by providing adequate conductivity. Avoidance of unforeseen local heatings by the use of suitable designs and by proper supervision.	C	C	C	C	C	C
2) Reduce the possibility of faults and short-circuits occurring between conductors, or between conductors and earth, by adequate insulation or proper spacing of the conductors.	C	C	C	C	C'	C
B - Second-order precautions - protection against the effects of a heating or a fault 1) Use of heat- stable insulations.	C	C	C	C	C'	C'
2) Use of protective sheathing for equipment and for cables, made of flame-resistent and non-propagating material.	C	C	C	C	C'	C'
- Use of oil as a non-conductor only if no fire risk for the workers is involved.	C	C	C	C	C'	C'
3) Accumulations of flammable or combustible materials and pipelines for combustible gases should be sited well away from electrical equipment.	C	C	C	C	C'	C'

1) Not applicable
2) Not suitable for inclusion in regulations.

ELECTRIFICATION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph.	Germany Saar	Belgium	France	Italy	United Kingdom
C - Third-order precautions - measures regarding the network						
1) Automatic protection of networks against abnormal overloads.	C	C	C	C	C	C
2) Automatic protection of networks against short-circuit; these protective devices must be capable of handling the maximum short-circuit current at their point of installation.	C	C	C	C	C	C
Selecting and regulating of these devices in relation to the minimum short-circuit current which can occur at the end of the section they protect	C	C	C	C	C'	C
3) Steps to give effective protection against low-current faults, which might get past the above-named protective devices and cause dangerous heating.	C 1)	C	C	C	C'	C'
2. Recommendations for the protection of underground electrical networks against firedamp-explosion risks						
A. First-order precautions - prevention of accumulations of firedamp						
1) The firedamp content at the site of the electrical apparatus must be kept whithin the limits prescribed by the Inspectorate.	C	C	C	C	C	C
2) The ventilation situation must be checked before any new installation or extension of electrical equipment.	C	C	C	C	C'	C
3) There must be a thorough investigation of the possible consequences of any alterations in working method, of ventilation or gas omission, which might cause problems in the vicinity of electrical equipment.	C	C	C	C	C'	C'
B. Second-order precautions - protection against ignition						
1) In gassy workings: use of electrical equipment which is permitted by the Inspectorate only under its own specified conditions.	C	C	C	C	C	C 2)
2) The electrical equipment must be installed, used, supervised and maintained in such a way as to keep it flameproof.	C	C	C	C	C	C
All cables must be of adequate mechanical strength.	C	C	C	C	C	C
All cables must be installed and maintained without damage.	C	C	C	C	C	C
C. Third-order precautions - cutting off the circuit						
1) Networks must be designed and installed in such a way that any fault current which may arise between phase and earth is reduced to a low value or quickly cut off.	C	C	C	C	C	C

1) Was carried out in workings where there is a risk of firedamp.
2) In such mines where CH_4 is a hazard, all apparatus must be designed to prevent open sparking and must be so certified.

ELECTRIFICATION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
2) A protective relay, preferable automatic, must be provided against between-phase faults and earth faults.	C	C	C	C	C	C
3) Precautions must be taken to avoid accidents when faults are being sought or dealt with.	C	C	C	C	C	C
4) Protection must be given to leads without metallic sheathing, and to those which supply movable machines, by means of individual or collective screens which bring a protective device into operation if a fault occurs.	C	C	C	C	C	C'
5) If the firedamp content rises above the prescribed limit, all the sections of the network involved must be cut off.	C	C	C	C	C	C
Issuing instructions to maintain in operation certain machines which provide ventilation.	C	C	C	C	C	C
Restarting only when the firedamp content has fallen below the permissible value, and only on the orders of a trained person.	C	C	C	C	C	C
Supplementary precautions for pits liable to sudden outbursts of gas						
1. Risk of damage by particles projected by an outburst of gas						
- The threatened zones in which projection can occur should not be electrified.	A	C	C	C 1)	C 2)	C'
- The electrical equipment and cables should be protected against heavy blows.	A	C	C	C	C 2)	C
- The electrical equipment should be designed to give adequate robustness.	A	C	C	C	C 2)	C
2. The risk of firedamp concentrations						
- Increased ventilation	C'	C'	C'	C	C 2)	C'
- Use of remote-indicating methano-meters or ventilation-fault detectors which can cut off the threatened section of the network.	C'	C'	C	C	C 2)	E 3)

1) The use of electricity is forbidden in pits liable to sudden outbursts of gas, excepting for lighting and shot-firing. Exceptions can, however, be approved by the senior mining engineers: when using armoured cables, telephone installations and methanometers in intake airways-provided that no damage is likely to occur as a result of a gas outburst - and also in main return airways.

2) No pits liable to sudden outbursts of gas. However, in pits or parts of mines which are considered to be liable to sudden outbursts of gas, the use of electricity, excepting for lighting purposes and portable lamps, must be authorized by a senior mining engineer, subject to the observance of all other measures, precautions or restrictions which might be included in the authorization such as for example the above-mentioned recommendations.

3) Introduced recently in some individual mines which are not necessarily subject to outbursts, but have high quantities of firedamp.

ELECTRIFICATION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph.	Germany Saar	Belgium	France	Italy	United Kingdom
- Relaxation shot-firing only after all equipment has been switched off.	C'	C'	C	C	C 1)	C
3. - Supplementary electrical precautions a) Preferable use of a starpoint earthed via a strong impedance, e.g. by means of an insulation detector.	C	C	C	C'	C 1)	C'
b) Quickest possible automatic protection of the network against all insulation faults, even if formed by resistances between phase and earth.	C	C	C	C	C 1)	C'
V - <u>CONCLUSIONS AND RECOMMENDATION CONCERNING THE USE OF EXPLOSION-PROOF ELECTRICAL APPARATUS FOR NOMINAL VOLTAGE ABOVE 1100 VOLTS (10th Report MSHC, annex VIII, June 1973)</u> In respect of the circuit-breakers, it will be observed that the conclusions contained in the Report of 1964 (see third report of The Mines Safety and Health Commission, annex VIII, pages 391-404) are now out-of-date, since considerable efforts have been made in all the Member States to eliminate or reduce the quantities of oil used. Different types of oil-less apparatus can be found (using sulphur hexafluoride, air or water) and all have given satisfaction and their utilization has made considerable advances. During the reporting period, the design of circuit breakers of the "increased safety" category with additional protection of the contacts has been accepted in different Member States, and the new purchases of circuit-breakers containing a large quantity of oil have been either restricted or forbidden. In the <u>contactors</u> without oil, considerable progress has been achieved, particularly as a result of the introduction of vacuum-break contactors. In these circumstances, the Mines Safety and Health Commission considers it necessary to recommend to the Member States to continue their policy of reducing the use of oil in cut-off devices by reason of the potential dangers of explosion and fire resulting from the presence of an appreciable quantity of oil in such devices. Consequently, the Mines Safety and Health Commission recommends that new purchases be restricted to apparatus using no oil or, if this is not possible, only small quantities of oil. 1) Is the policy followed of reducing the use of oil in cut-off devices by reason of the potential dangers of explosion and fire?	yes	C	yes	yes	yes	C'
2) Are new purchases restricted to apparatus using no oil or, if this is not possible, only small quantities of oil?	yes	C	E	yes	no+ yes	C'

1) No pits liable to sudden outbursts of gas. However, in pits or parts of mines which are considered to be liable to sudden outbursts of gas, the use of electricity, excepting for lighting purposes and portable lamps, must be authorized by a senior mining engineer, subject to the observance of all other measures, precautions or restrictions which might be included in the authorization such as for example the above-mentioned recommendations.

ELECTRIFICATION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
VI - CABLES SUPPLYING MOBILE MACHINES AND THEIR ELECTRICAL PROTECTION Recommendations arising out of the "Report adopted by the Mines Safety and Health Commission on 20th June 1969 on the characteristics and electrical protection of cables supplying mobile machines (coal cutters, loading machines, etc.) used underground in coal mines in the various Community countries" 1) (8th Report of the Mines Safety and Health Commission, Annex IX) The Mines Safety and Health Commission recommends that electrical equipment supplying current to mobile machines should meet the following minimum requirements: A. Power should automatically be cut off from cables supplying mobile machines in the following cases:						
a) phase to phase faults	C	C'	C	C	C'	C
b) faults between phase and earth	C	C'	C	C	C'	C
c) faults between phase and polarised screen	C'	C'	C	C	C'	2)
d) faults between conductor or polarised screen and earth	C	C	C	C	C'	2)
e) breaking of the monitoring circuit	C	C	C	C	C'	C'
B. The electrical installations defined above should be designed in such a way that any fault arising in the cable cannot result in unintentional starting of machines connected to the supply.	C'	C'	C	C	C'	C'
C. CI or CB insulation monitors and BS safety blocks not automatically monitored should incorporate a device which monitors their operation and integrity. They should also have a fault-indicating device.	C'	C'	C	C	E	C'+E
D. The BS safety block should be arranged so that the supply cable cannot become live again after power has been cut off due to a fault.	C'	C'	C	C	E	C' 3)
E. The monitoring circuit should not give rise to any risk of igniting firedamp.	C'	C'	C	C	C	C'
F. The earth conductors should be symmetrically arranged.	C	C	A 4)	A 4)	E	?
G. Finally, the Mines Safety and Health Commission recommends that: 1. The power to a cable supplying a mobile machine should be cut off when the first fault between phase and screen (polarised screen or earth conductor) appears and,	C	C	C	C'+ NRP	C'	C

1) See 7th Report of the Mines Safety and Health Commission, Annex V.
2) There is no polarised screen.
3) There are precautions additional to BS.
4) Yes, but on condition that this measure is extended to the whole network which is practically impossible.

ELECTRIFICATION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
2. In view of the present state of the art it suggests the use of cables provided with screens (polarised screens or earth conductors) of one of the types described in annex V, page 13 of the 7th Report of the Mines Safety and Health Commission except types A^2, B^2, D^2.	C	C	C	C	E	C'
3. These cables should be used in conjunction with the following devices:						
- protection by means of current intensity appropriate to the length and cross-section of the cables,	C	C	C	C	E	?
- a permanent insulation monitor (CI or CB),	C	C	C	C	E	C'
- a safety block incorporated in the gate-end box.	C	C	C	C	E	C
VII – THE USE OF LIGHT ALLOYS FOR THE CONSTRUCTION OF ELECTRICAL APPARATUS FOR USE IN GASSY MINES. (13th Report of the MSHC, Annex IX) At its meeting on 11 July 1975, the MSHC decided to reply as follows to the question posed by CENELEC (European Committee for Electrotechnical Standardization) concerning the light alloy enclosures for Group I (gassy mines) covered by draft standard EN 50 014 - General Requirements concerning electrical apparatus for potentially explosive atmospheres (&7.1.) : The alloys used in the construction of enclosures of electrical apparatus for use in gassy mines should contain, by weight :						
a) no more than 15 o/o in total of aluminium, titanium and magnesium and	C'		C'	E		C'
b) no more than 6 o/o in total of magnesium and titanium	C'		C'	C		C'

D - WINDING ROPES AND SHAFT GUIDES, WINDING ENGINES AND WINCHES

Proposals from the Safety and Health Commission for the improvement of safety and health conditions in coal mines	Federal Republic of Germany		Belgium	France	Italy	United Kingdom
	North Rhine Westph.	Saar				
I - REPORT ON THE ELECTRO MAGNETIC EXAMINATION OF WINDING ROPE (doc. 8470/64/2) Steps taken to develop electro-magnetic testing methods and results obtained.	C(1)	C'	C(2)	C(2)	C' (3)	C' (2)
II - REPORT ON THE USE OF ACCELEROMETERS TO TEST WINDING INSTALLATIONS. doc. 3725/1/61 Tests with accelerometers should be continued on a large scale.	C	C'	-	-	E	C'
Use of accelerometers should be extended.	C(4)	E	-	-	E	C'
III - MINIMUM SAFETY REQUIREMENTS FOR WINDING AND BALANCE ROPE SUSPENSION GEAR, FOR SHAFT WINDING AND SINKING INSTALLATIONS. (13th report MSHC - Annex VII)						
1. Field of application						
1.1. These requirements apply to winding and balance rope suspension gear in :.						
1.1.1. Shaft winding installations designed for manriding	NRC	C'				C'
1.1.2. Shaft winding installations not designed for manriding (mineral winding) in compartments adjacent to man winding installations	NRC	C'				C'
1.1.3. Mineral winding installations not accommodated in the same shaft as the man winding installations.	partly	C'				C'
1.2. The provisions of items 3.1. to 3.8. and 3.15 and 3.16 shall apply to winding and balance rope suspension gear in other installations not included in item 1.1.	NRC	C'				C'
1.3. The following shall not be considered as winding rope suspension gear (1) or balance rope suspension gear (2) :						
1.3.1. The ends of the winding or balance rope attached to the suspension gear..	NRC	C'				C'
1.3.2. The main load-bearing elements of the conveyance (3), the attachment points on the conveyance for the bridle						

(1) Electro-magnetic examination is required for multi- strand ropes of flattened strand construction and other highly-worked ropes.
(2) Tests are being carried out with a view to improving the electro-magnetic method of examination
(3) Electromagnetic examination of ropes is not obligatory.
(4) Annual examination of rigid guides in installations where the winding speed exceeds 4 m/s and more than 300 winds are carried out per working day by geometric measurement and acceleration or force measurements (& 2Q Abs. 2, Nr 4. BVOS).

Proposals from the Safety and Health Commission for the improvement of safety and health conditions in coal mines	Federal Republic of Germany		Belgium	France	Italy	United Kingdom
	North Rhine Wesphaly	Saar				
chains and winding rope suspension gear and the suspension beams and attachment points for the balance rope suspension gear	NRC	C'				C'
(1) See item 2.4. (2) See item 2.5. (3) See item 2.4.						
2. Definitions						
2.1. Examination (German : "Ueberprüfung" - French "contrôle")						
Examiniations are to be carried out by a competent person nominated by the Manager of the Mine. They are made to determine externally visible damage or defects.	NRC	C'	C			C'
2.2. Inspection is to be carried out by a competent person who has received appropriate engineering training (e.g. overman mechanic). Inspections are made to determine damage or defects requiring detailed examination, if necessary after the cleaning of individual components.	NRC	C'	C			C'
2.3. Testing (German : "Untersuchung" - French "examen")						
Testing shall be carried out by an independant expert authorized by the Mining Authorities to perform such duties.	NRC	C'	C			C'
Testing comprises :						
2.3.1. detailed examination of components, after they have been dismantled and cleaned, to determine damage or defects,	NRC	C	C			C'
2.3.2. where necessary, application of special testing or measuring methods permitting detection of damage to the load-hearing components e.g. incipient cracks..	NRC	C	C			C'
2.4. Suspension gear						
Suspension gear (see fig. 1-9) is taken to mean the connecting elements between winding rope and winding cage, skip or counter-weight (herein after referred to as "conveyance")	NRC	C'	C			C'
2.5. Balance rope suspension gear						
Balance rope suspension gear (see fig. 10-13) is taken to mean the connecting elements between the balance rope and conveyance.	NRC	C'	NRP			C'

Proposals from the Safety and Health Commission for the improvement of safety and health conditions in coal mines	Federal Republic of Germany: North Rhine Westph.	Federal Republic of Germany: Saar	Belgium	France	Italy	United Kingdom
3. Standard safety regulations for winding and balance rope suspension gear.						
3.1. Mathematical safety factor for suspension gear - at least 10 x.	NRC	C'	NRP			C'
3.2. Test loading of suspension gear - 25 x	NRC(5)	C'				
3.3. Mathematical safety factor for the king post in the area of the borehole - at least 10 x	NRC	C'	NRP			C'
in the shaft of the king post - at least 15 x.	NRC	C'	NRP			C'
3.4. Edges of the clamps rounded off. . . . . . . yes	NRC	C'	NRP			C'
3.5. Marking of the load-bearing components of the suspension gear (see item 4.6.) . . . . yes	NRC(6)	C'	NRP			C'
3.6. Weld seams only on non load-bearing components other than chains (compression and shear loads permissible). yes	NRC	C'	NRP			C'
3.7. Wedge-type capels and wedge clamps for conveyance with arresting devices - with the exception of straight friction wedge-type rope capping (type reliance) - not acceptable.	NRC	C'	NRP			C'
3.8. Items 3.1., 3.4., 3.5. and 3.6. apply to balance rope suspension gear . . . . yes	NRC(7)	C'	NRP			C'
3.9. In situ examination of suspension gear (for derogation see item 4.7.) - every working day.	NRC	C'	NRP			C'
3.10. In situ examination of balance rope suspension gear - at least weekly	NRC	C'	NRP			C'
3.11. Dismantling and inspection of suspension gear (for derogation see item 4.8.) - 6 months.	-	every 12 months	NRP			C'
3.12. Dismantling and inspection of balance rope suspension gear (for derogation see item 4.8.) - 6 months.	-	-	NRP			C'
3.13. Testing of suspension in the dismantled condition (for derogation see item 4.9.) . . . . . . 12 months	-	every 2 years C'	NRP			C'
3.14. Testing of balance rope suspension gear in the dismantled condition (for derogation see item 4.9.) . . 12 months	(8)	i d	NRP			C'
3.15. Service life of winding and balance rope suspension gear (for derogation see item 4.10). . . . . . 10 years	(9)	C'	NRP			C'
3.16. Overall life of winding and balance rope suspension gear in calendar years (for derogation see item 4.10) 20 years	(10)	C'	NRP			C'

(5) In North Rhine-Westfalia 3 x nominal load or absence of cracks established by non destructive testing.
(6) Only in man-winding installations *(7) Except. 3.5.* *(8) 24 months*
(9) After 10 years, special examination for further serviccability, after 15 years the item is discarded and sent for scrap
(10) After 20 years, special examination as in (9), after 30 years the item is sent for scrap.

	Proposals from the Safety and Health Commission for the improvement of safety and health conditions in coal mines	Federal Republic of Germany		Belgium	France	Italy	United Kingdom
		North Rhine-Westph.	Saar				
4.	General Supplementary provisions applicable to the standard safety requirements for winding and balance rope suspension gear.						
4.1.	Winding and balance rope suspension gear must be manufactured from non-aging materials (i.e., materials resistant to strain age embrittlement) or from materials which are specifically permitted under national regulations.	NRC NRC	C' C'	NRP NRP			C C'
	Tests must be conducted to determine the mechanical properties of the materials of which suspension gear is made - apart from capel wedges or thimbles and clamps.	NRC	C'	NRP			C'
	The tests must be carried out on surplus lengths having the same cross-section and having undergone the same heat treatment as the individual ropes in question or on test places from the same batch, the shape and dimensions to be agreed with the user. These test places must have undergone the same heat treatment as the individual components.	NRC	C'	NRP			C'
4.2.	The requisite mathematical safety factor for winding rope suspension gear (item 3.1.) and balance rope suspension gear (item 3.8) is based on the ex-works condition and on subsequent replacement of bushes. It shall be determined by simple static load calculations based solely on the load the strength of the material and dimensions, taking into account the limits of permitted wear (code of practice). (The safety factors have been selected so that there is an adequate safety margin even if complicated theoretical strength calculations are used). The lowest tensile strength guaranteed for the material selected shall be used for the calculation.	(11) NRC	C'	C			C'
4.3.	In the calculation of safety factors for all suspension gear components the load shall be taken as the net weight of the conveyance, the weights of the mine cars, the payload and the balance rope suspension gear as well as that of the balance rope from the topmost operting condition of the conveyance down to the loop of the balance rope and shall cover at least the proportionale weights of the winding rope suspension gear. The payload to be included in the calculation is that most frequently encountered in material winding under normal conditions. The man-winding weight should be used if this is greater than the material winding weight.	NRC	C'	C'			C'
4.4.	In calculating the safety factors for the balance rope suspension gear, the load shall be taken as the weight of the balance rope suspension gear and of the balance rope	(12)					

(11) The calculation are based on nominal load of the item ; this shall be at least equal to the loads given at 4.3. and 4.4., respectively.

(12) 3 x the nominal load.

Proposals from the Safety and Health Commission for the improvement of safety and health conditions in coal mines	Federal Republic of Germany		Belgium	France	Italy	United Kingdom
	North Rhine-Westph.	Saar				
from the topmost operating position of the conveyance down to the loop of the balance rope.	*NRC*	*C'*	C'	-	-	C'
4.5. Test loading of the suspension gear shall be carried out at 2.5 times the design load. Test loading of ordinary thimbles and clamps is not necessary.	(12) NRC	C'	NRC	-	-	C'
4.6. The load-bearing suspension gear components must be marked - e.g. by stainless steel plaques attached with adhesive - so that the surface of the material is not damaged, unless national standards permit this at certain points on the components..	(13) NRC	C'	NRP	-	-	C'
4.7. Examination of suspension gear (item 3.9.) need only be carried out weekly if manriding and material winding take place only occasionally and involve not more than thirty winding operations per working day.	NRC	C'	NRP	-	-	A
4.8. Dismantling of the winding rope suspension gear components (item 3.11) and of the balance rope suspension gear components (item 3.12) need only be carried out at intervals of 12 months (maximum) if winding and balance rope suspension gear is inspected in situ at intervals of not more than two months.	NRC	C'*	NRP	-	-	A
4.9. Except in the case of winding installations subjected to heavy usage, e.g. over 500 winding operations per working day, testing (items 3.13 and 3.14) need only be carried out at intervals of up to two years if winding and balance rope suspension gear components subjected to tensile and bending stresses are tested for incipient cracks by means of suitable non-destructive methods.	(14) NRC'	C'	NRP	-	-	A
4.10. The service life of winding and balance rope suspension gear (see item 3.15) may be set at a maximum of 15 years and the overall life (see item 3.16) at a maximum of 30 years provided the Mining Authorities grant exceptional authorization.	(15) NRC	C'	NRP	-	-	C'
4.11. In the case of material winding installations not contained in the same shaft as manriding systems, other time intervals may be laid down by national authorities for the examination and inspection of winding and balance rope suspension gear covered by items 3.9., 3.10, 3.11 and 3.12..	NRC	C'	NRP	-	-	A

(13) Except balance rope suspension gear.
(14) Highly worked installations are not excluded
(15) No exemption required.

E. VENTILATION, FIREDAMP AND OTHER MINE-GASES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
I - PRACTICAL CONCLUSIONS ON THE APPLICATION OF THE THEORY OF STABILISATION OF VENTILATION (sixth report of the Mines Safety and Health Commission - Annex III)						
1. Supervision of ventilation The supervision of ventilation in a mining system requires an overall view, and should therefore be entrusted to a single man specially appointed, having at his disposal all the necessary means for carrying out his task.	C'+ NRP	C	C'	C 1)	C	A 2)
2. Fundamental factors in ventilation Apart from a regular inspection and anlysis of ventilation conditions in mines, ventilation officials require to have data on:						
- the actual characteristics of the main and auxiliary ventilation fans,	C	C	C'	C' 3)	C'	C'
- the order of magnitude of the aerodynamic effect of natural ventilation in summer and winter,	C+ NRP	C	C'	C'	C'	C'
- the potentials of the intersections (at least the main ones).	C	C	C'	C' 4)	C'	C'
3. Additional representations of ventilation systems In order to obtain a precise picture of the overall structure of ventilation systems and to reveal possible instabilities, it would be advisable when necessary to have, in addition to the regulation diagrams, representations of other types, such as, for example:						
a) a representation of the whole of the mine workings in perspective (isometric or any other equivalent system).	C	C	E	C' 5)	C'	C
b) a diagram without any topographical information.	C'	C' 6)	C'	C' 4)	C'	C
4. Characteristics of ventilation The representations mentioned in conclusion No. 3 should make available all the data necessary for the understanding of analysis of ventilation, particularly:						
a) at the measuring points						
- the air quantities	C	C	C'	C	C	C
- the direction of the airflow	C	C	C'	C	C	C
- the methane content	C	C	C'	C	C	C
- the temperatures	C	C	C'	7)	C	A 7)
- the pressures (at least at the principal intersections)	C	C	E	C'	E	A 7)

1) In every colliery with over 500 workers the engineer responsible is also assisted by a supervisor who ensures application of the ventilation measures. In each coalfield an engineer has been specially entrusted with studying the application of the ventilation stabilisation theory adopted by the Mines Safety and Health Commission.
2) It is a statutory duty of the undermanager or, in some cases, the manager of a mine to verigy the sufficiency of the ventilation.
3) Applies to recent ventilators, but not to old ones.
4) These are being carried out.
5) Applicable to some coalfields, but not all.
6) Carried out by means of network plans in ventilation calculations made by electronic computers.
7) Not systematically recorded.

E. VENTILATION, FIREDAMP AND OTHER MINE-GASES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
b) in addition - the lengths and average cross-sections of the roadway	C+C'	C	E	C'	C	C'
- the calculated resistances	C'	C	E	C'	E	C'
- the angles of inclination, particularly at the ends of the inclined and vertical section	C	C	E	C'	C'	C'
- the positions of the air doors and control doors, and of the barriers	C	C	E	C	C	C'
5. Inspection of ventilation conditions In each mine, there should be a systematic analysis of the ventilation system, at least once a year and after any major modification of the system, in order to detect any probable cases of instability under the normal operating conditions	C	C	C'	C'	C'	C
In addition, cases of instability which may be caused by the introduction of additional aeromotive sources, or the changing or elimination of the existing aeromotive sources, should also be examined	C	C'	C'	C'	E	C
6. Informing the personnel Taking into account the importance of ventilation for the whole of the underground workings, each responsible person should be informed of ventilation conditions within his own field.	C	C	C'	C	C'	A
Furthermore it is essential that separate meetings should be held once a year at least, as well as after any major modification in the ventilation system, at which the colliery ventilation engineer will explain the ventilation conditions obtaining at the pit, together with any modifications which have recently been made, in the presence of: a) the management officials, the technical departments, the chief of the rescue team and the officials responsible for ventilation;	C'	C	C'	C'	C'	C'
b) the local officials, each in respect of his own speciality.	C'	C 3)	C'	C	C'	C'
On these occasions, attention should be drawn to districts where instabilities are already likely in normal conditions and, in particular cases of instability which make the occurrence of a fire likely.	C'	C'	C'	C'	E	C'
7. Exercises on plans Once a year at least, the management or the competent mining authority should organise an exercise on plans covering measures to be taken in the event of an underground fire. This should be attended by the mine owner or his representative, the ventilation engineer and the competent officials responsible for the organisation of fire fighting and rescue operations.	C' 4)	E	E	5)	E	A

2) Headlines for the evaluation of pressure measurements are now being drafted.
3) This instruction is not usually given at separate meetings.
4) Will be regulated by the fire-fighting plan.
5) These will be organised after implementation of the Budryk plan, but the ventilation officials and the rescue centres already contact each other from time to time.

E. VENTILATION, FIREDAMP AND OTHER MINE-GASES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
8. <u>Position of regulation doors</u> When doors are necessary for regulating ventilation they should be placed as near as possible to roadway junctions, taking into account other requirements, in order to facilitate access in smoky conditions.	A 1)	A 2)	E	3)	C'	A 1)
9. <u>Measures and equipment for slowing-down ventilation</u> In all collieries, devices for rapidly slowing-down ventilation in order to stabilise it shall be installed in all intake airways, subject to exceptions to be previously determined, after each roadway junction or branch, and as near as possible to it.	A 4)	C	E	5)	C'	A
10. <u>Instructions to officials in the event of underground fire</u> Apart from the usual provisions regarding the obligation to attack any seat of a fire in order to extinguish it as soon as possible, and to inform the officials and managementwithout delay, there should be instructions to officials laying down the other measures to be taken in the event of a mine fire in order to slow down ventilation so as to avoid an increase in the air supply to the seat of the fire.	A 6)	A 7)	E	8)	C'	A 6)
11. <u>Instructions to management officials in the event of underground fire</u> No decision to modify the ventilation is to be taken by the management staff without a study being made of the consequences, by means of application of the theory of the stabilisation of ventilation, and without the help of plans and ventilation schemes which have previously been prepared in respect of all the possible causes result from the fire or from the structure of the mine (ventilation by multiple fans etc..).	C'	A 7)	E	C' 9)	C	C'

1) Owing to the different local conditions a uniform regulation would be unsuitable.
2) The decision is to be taken by the head of the fire-fighting unit.
3) As soon as possible, but not automatically.
4) Experience has shown that it is more convenient to have a central store of materials for constructing regulation doors.
5) Now being studied by the users.
6) The ventilation must not be modified except on the express order of the officials in charge.
7) The decision is to be taken by the leader of the fire-fighting unit.
8) Not supervisors level but thechiefs of rescue teams and the rescue centres.
9) To be specified after implementation of the Budryk plan.

E. VENTILATION, FIREDAMP AND OTHER MINE-GASES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
II - <u>CONDITIONS UNDER WHICH EXEMPTION MIGHT BE GRANTED TO RAISE MAXIMUM PERMITTED CH_4 LIMITS</u> (12th Report of the Mines Safety and Health Commission, Annex V) 1. <u>Prerequisites for granting exemptions to maximum permitted CH_4 limits</u> 2.1. A reasoned application from the producer 2.2. Documents to be enclosed: a) a forecast on the emission of firedamp (2.2.1) b) a ventilation forecast (2.2.2) c) firedamp capture (2.2.3) d) other methods of reducing firedamp emission (2.2.4)	NRC	C	C	C	A 2)	A
2. <u>General conditions for raising maximum permissible CH_4 levels</u> The conditions under which an exemption is granted are to be specified by the Mines Inspectorate. The regulations laid down by the Inspectorate, as they apply in normal cases, remain in force unless otherwise expressly stated in the exemption. In particular, it should be pointed out that CH_4 monitoring with hand-held instruments prescribed by national regulations is not to be discontinued where automatic CH_4 monitoring is used and will have to be carried out in accordance with the provisions in force. 2.1. . Automatic monitoring of CH_4 content in tbe airflow, alarms. 2.1.1. Monitoring of CH_4 content in the airflow is obligatory if an exemption is to be granted. Monitoring must be carried out: - automatically and - continuously and with sufficient frequency by means of reliable and accurate equipment.	NRC	C	C	C	2)	1) 1)
2.1.2. . Depending on local requirements, readings should be monitored either centrally or locally. It should be specified whether all readings or only some are to be recorded, e.g. whether recording is required in the case of readings from a measuring head or installation located at a point where the full amount of firedamp emitted from the working area is mixed with the air current (in principle at the end of the return airway).	NRC	C	C	C	2)	1)
2.1.3. . The way in which firedamp content is to be monitored (mean content in the airflow or local content) must be clearly specified.	NRC	C	C	C	2)	1)
The following points should also be specified: 2,1,4. The location of the points at which CH_4 content is to be monitored, as these points may vary according to the type of working areas and to the wording of the exemption.	NRC	C	C	C	2)	1)
A CH_4 recorder may, in particular, be required at the return end of the face, at right angles to the electricity supply devices in the return airway if such devices exist and at the far end of the return airway as indicated in p.p 3.1.2.	NRC	C	C	C	2)	1)

1) not applicable
2) the regulations do not envisage exemptions.

E. VENTILATION, FIREDAMP AND OTHER MINE-GASES

	Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph.	Germany Saar	Belgium	France	Italy	United Kingdom
2.1.5	. The frequency of the checks and calibration of the measuring heads of the automatic monitoring equipment.	NRC	C	C	C	2)	1)
2.1.6	. In the case of failure of the automatic monitoring equipment the exemption should be lapsed. However, if such failure affects only one measuring head and lasts less than 24 hours, the exemption may be maintained under special conditions, including in particular intensified monitoring and measurements taken with hand-held instruments.	NRC	C	C	C	2)	1)
2.1.7.	. A visual and/or a acoustic alarm must be triggered off at a continuously manned location, if the permissible CH_4 limits are exceeded.	NRC	C	C	C	2)	1)
2.2.	Additional monitoring of CH_4 content using hand-held instruments. Additional monitoring (supplementing the routine monitoring prescribed in the regulations) using hand-held instruments may be required in places where an increase in CH_4 is feared likely.	NRC	C	C	C	2)	1)
2.3.	Switching on and off of electrical equipment.						
2.3.1.	When the maximum permitted CH_4 levels are exceeded, the electrical installations in the area in question should, if not intrinsically safe, cut out immediately and preferably automatically. Multi-powered (by electricity or compressed air) auxiliary fans might be recommended.	NRC	C	C	C	2)	1)
2.3.2.	Resumption of power should be by manual operation only, by a specially appointed person or another person answerable to him and carrying out his instructions.	NRC	C	C	C	2)	C
2.4.	. Ventilation measures.						
2.4.1.	. Care must be taken to ensure that the quantity of air and the minimum air speed are such that the mixture of firedamp with air prevents the formation of CH_4 roof layers.	NRC	C	C	C	2)	C'
2.4.2.	. Where there is a risk of CH_4 roof layers, the air speed must be subject to continuous automatic monitoring accompanied by warning lights and/or acoustic signals at a continuously manned control point.	NRC	C	C	C'	2)	A
2.5.	. Shotfiring operations. Shotfiring operations will remain subject to the regulations in force in the various countries.	NRC	C	C	C	yes	C
2.6.	. Use of light alloys. No light alloys may be used where the use of such components would present an ignition hazard	NRC	C	C	C		C'
2.7.	. Use of diesel engines. In areas for which exemption is granted in respect of admissible CH_4 content, diesel engines may be used only if suitable precautions are taken to ensure that such use does not create additional hazards or increase existing ones.	NRC	C	C	E	2)	1)
2.8.	Evacuation of workings. Should the maximum CH_4 content in the general body of the air or localized areas be exceeded by a specific amount the working areas must be						

1) (See previous page)
2) (" " ")

E. VENTILATION, FIREDAMP AND OTHER MINE-GASES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
evacuated. An evacuation procedure must be drawn up in advance, and the procedure for alerting personnel laid down. The importance of a suitable, intrinsically safe communications network, or of other warning devices should be stressed.	NRC	c	c	c'	2)	c
2.9. Informing and instructing personnel. A procedure should be laid down whereby personnel and possibly their representatives working in areas subject to an increase in CH_4 limits are informed. Specific instructions should be given to supervisory officials and officials authorized to take action where maximum permissible limits are exceeded or where evacuation is required.	NRC	c	c	c'	2)	c'
2.10. Control by the Inspectorate. The various information documents concerning working operations in areas for which an increase in maximum CH_4 levels has been authorized must at all times be available to the officials of the local Inspectorate.	NRC	c	c	c	2)	1)
3. Measures relating to the granting of exemptions to increase maximum permissible CH_4 levels in special cases. In special cases, measures must be laid down in addition to those mentioned in Chapter 3.	NRC	c	c	c'	2)	1)
III - FIRST REPORT ON IGNITIONS OF FIREDAMP BY POWER LOADERS AND HEADING MACHINES (14th Report MSHC - Annex X)						
1. Development and use of mobile automatic CH_4 monitoring instruments which contain equipment designed to cut off the power supply or to raise an alarm.						
1.1. The MSHC believes that the development and use of such instruments should be encouraged. Has any progress been made in this field ? . . . yes/no	yes	C'	yes	yes		yes
2. Further research work to clarify the mechanism of ignition caused by cutter picks seems to be appropriate . . . . Special attention should be paid to the long-term recommendation of the National Coal Board (see end of Annex I) :						
2.1. There should be further examination of a hydraulically-operated ventilator or other means of ventilating the space between the face and the body of the machine. Has any progress been made ? . . . . . . yes/no	yes	C'	no	no		yes
2.2. Work should continue on the development of suitable equipment for automatically monitoring the efficiency of auxiliary ventilation devices. Has any progress been made ? . . . . . . yes/no	yes	C	no	no		yes

E. VENTILATION, FIREDAMP AND OTHER MINE-GASES

Proposals from the Safety and Health Commission for the improvement of safety and health conditions in coal mines	Federal Republic of Germany		Belgium	France	Italy	United Kingdom
	North-Rhine Westph.	Saar				
2.3. More attention should be given to making available better facilities for horizon control.						
Has progress been made ? . . . . yes/no	yes	no	no	no		yes

(1) See previous page
(2) id.

F. MECHANIZATION

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
I - RECOMMENDATIONS REGARDING LOCOMOTIVE EQUIPMENT (First Report of the Safety Commission, p.20 - German Text - April 1959)						
1. New locomotives must be equipped with fixed, rigid cabins which at all times give the driver a clear view along the roadway, ahead and behind, without any need for him to put his head out of the cabin. (Fixed cabins are understood to cover those forming a part of the structure or which can be removed only laboriously with special tools).	C 1)	C 1)		C 3)		
	A 2)	A 2)	C	E 4)	C	NRP
2. The locomotives in service must be modified to meet this requirement,	C 1)	C	A	E	C	A
- locomotives which cannot be modified should gradually be withdrawn from service, within a period to be fixed by the responsible inspectorate, or	C	C	A	E	C	A
- only be used in roadways which are wide and high enough to eliminate accident risk	C	C	C'	E	A	C
3. For particular types of locomotive, or in certain circumstances, the responsible Inspectorate can grant exceptions from the above regulations, provided that safety regulations of equal stringency are laid down.	C	C	NRC	E	A	5)
II - RECOMMENDATIONS REGARDING THE NEUTRALISATION OF DIESEL-ENGINE EXHAUST FUMES (First Report of the Safety Commission, p. 23 - German text - April 1959)						
- General use of better starters	C'	E	?	?	?	A 7)
- Intensified research into improving combustion by the use of catalysts	E	A 6)	?	?	6)	A 7)
- Draw attention to the existence of this process	- 5)	- 5)	- 5)	- 5)	-	- 5)
- Continuation of the research into an automatic transmission system, which would make it possible to give Diesel engines a constant rpm. . Subsequent resumption of trials with the Houdry carbon monoxide purification process.	?	A 6)	?	?	6)	A 7)

1) In the case of main-road locomotives, with the exception of "a clear view behind", which is difficult technically.
2) No application made to gateroad locomotives, because the risk of accident is increased.
3) For trolley locomotives.
4) For other than trolley locomotives.
5) Not applicable.
6) The problem of the low CO content of Diesel engine exhaust fumes is solved by blocking the injection pump at a pumping capacity at which the CO content shows a marked rise.
7) Not suitable for inclusion in regulations.

G. HEALTH IN COAL MINES

G - HEALTH IN COAL MINES AND MEDICAL

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
I - DUST CONTROL						
RECOMMENDATION EMBODYING DIRECTIVES OF SUPPRESSING DUST CONCENTRATIONS IN UNDERGROUND WORKINGS (8th Report of the Mines Safety and Health Commission, Annex VI)						
With due regard to the basic principles set out and, in particular, to the need for the different dust control processes to be combined to suit locally prevailing conditions, the dust control methods should be applied in accordance with the directives of the recommendation, namely:						
A. FACES						
1) Coal winning						
1.1. - Seam injection	C	C	C'	C	E	C
- Is any attention paid to the degree of efficiency of the different processes suggested?	C	C'	C'	C'	C'	NRP
1.2. - Spraying	C	C	C'	C	C	C
2) Stowing						
a) In general:						
2.1. Prior sprinkling of the soil	C'	C	?	C	C	C
2.2. Prior sprinkling of the site to be stowed	C'	C	?	C	C'	C
b) When hydraulic stowing is employed:						
2.3. Specific consumption of ventilated air maintained at the lowest possible level	C'	C	C'	C'	C'	?
2.4. Use of soil of fine mechanical composition and sufficiently humid to prevent subsequent fissuring during transport and forced ventilation	C'	C	C'	C'	C'	?
2.5. Prevention of air stagnation in the stowage zone when tipping the goaf	C'	C'	C'	C'	C'	?
3) Caving						
3.1. Seam injection	C	C	C'	C	E	C
3.2. Spraying	C	C	?	C	C'	C
B. SHAFTS AND ROADWAYS						
4) Drilling of mine chambers (shot holes)						
4.1. Wet drilling, dry dust extraction	C	C	C'	C	C'+C	C
5) Shotfiring						
5.1. Use of wet tamps or gelatine pastes, supplemented by previous sprinkling of the floor and sides of the roadways and the dirt resulting from previous shots.	C 1)	C	C'	C	C	C
5.2. Use of water screen where wet tamps cannot be used	C 1)	C	E	C	E	C
6) Loading of excavated material						
6.1. Abundant and systematic sprinkling of excavated material	C'	C	C'	C	C	C

1) Only wet tamps are used.

G. HEALTH IN COAL MINES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
7) Machine drivers						
7.1. Suitable distribution of the dust extraction and ventilation flow rates so as to keep the dust against the drivage front at the maximum distance away from the machine operators	C'	C'	E	C'	C'	C
7.2. Purification of the dusty air before it is diluted in the general ventilation system	C'	C'	E	-	C'	C
8) Various rock working operations						
8.1. Use of wet mechanical picks	C'	A	C'	-	C'	C
9) Various material handling operations						
9.1. Arrangements for withdrawal, transfer, tipping and loading (e.g. determining the minimum height of fall, ensuring that meterials are completely tipped out at loading and unloading points)	C'	C	E	C	C	C
9.2. Use of additional products ensuring or maintaining surface wetting	C'	C'	E	-	C	C
II - ORGANISATION OF SERVICES						
RECOMMENDATION ON THE ORGANISATION OF SPECIAL SERVICES RESPONSIBLE FOR THE INSPECTION OF DUST CONDITIONS IN UNDERGROUND WORKINGS (8th Report of the Mines Safety and Health Commission, Annex VII)						
The Commission recommends the following methods of operating:						
1. The managementof each pit shall appoint from among its staff a person who shall be responsible for dust control and is not directly concerned with production and output.	C	C	C'	C'	C'	C
2. The said person, and any assistants, shall be responsible for dust control operations, any improvements required, and dust sampling.	C	C	C'	C'	C'	C
3. Dust is to be sampled in all working places. The frequency and location of sampling or measurements are to be recorded in accordance with the standards laid down in the various countries and made available to the appropriate administrations and the mine's medical department.	C	C	C	C'	C	C
4. A department belonging to the company or coalfield shall assemble the results of measurements, be responsible for training persons in charge of dust control operations in each mine, and work out and co-ordinate instructions for use by the latter.	C	C	C'	C'	C'	C
5. The special services belonging to the company or coalfield shall keep in touch with the relevant technical and medical departments so as to take any precautions needed for reducing inadmissible dust concentrations or moving staff following the results obtained during the periodical medical examinations.	C	C	C'	C'	C'	C

G. HEALTH IN COAL MINES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
III - RECOMMENDATIONS ON THE FIXING OF CLIMATIC LIMITS (The unabridged text is reproduced in doc. 3034/4/62)						
1.1. The basis is the American effective temperature (° eff basic scale).	C	C	C'	E 1)	NRP	C
Air velocities above 3 metres/sec should be considered as only 3 metres/sec in determining the American effective temperature.	C 2)	C	C'	-	NRP	C
1.2. The temperature data must be given so as to make possible a comparison on the basis indicated under 1.1.	C	C	C'	-	NRP	C
1.3. The climatic limits determined shall be maximum values.	C	C	-	-	NRP	C
More favourable climatic values for the workers shall remain unchanged.	C	C	-	-	NRP	C
1.4. There will be further investigation into the effectiveness and accuracy of the various climatic indices.	-	-	-	-	NRP	C
2. Determination of a maximum climatic value						
2.2. Work on location is forbidden in working places where the temperature exceeds 32° eff A (basic scale), excepting the cases named in 2.3. and 2.4.	C	C	-	E 3)	NRP	C
2.3. An exception can be made to the ban on working on location in temperatures above 32° eff A (basic scale) if the competent authority has given permission and the workers in question have been medically examined. In this case the following conditions must also be fulfilled:	C 4)	C	-	A	NRP	C
2.3.1. The responsible authority can only issue permission for a fixed period and for given working operations.	C	C	-	-	NRP	C
2.3.2. The work must be carried out under medical supervision.	C	C 5)	-	-	NRP	C
Guidelines must be worked out, in collaboration with medical experts, covering the medical examination envisaged under 2.3.	C	-	-	-	NRP	C
2.3.3. Work must not continue uninterrupted for more than one hour. A suitable break must then be arranged in a better 'climate'.	C	C	-	-	NRP	E

1) Climatic values only have to be determined in certain very exceptional cases.
2) 3,5 metres/sec.
3) Working points where the temperature reaches 28°C are considered as particularly hot (without this being an absolute maximum value).
4) For mine rescue personnel.
5) Medical supervision obligatory.

G. HEALTH IN COAL MINES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph.	Saar				
The duration of uninterrupted working time, as well as the duration and frequency of the breaks and the climatic range in which this break is spent, as also all other necessary provisions are to be laid down in writing by the competent authority together with the responsible doctor before the work begins.	C 1)	C	-	-	NRP	E
2.3.4. Acclimatised persons must be chosen. Persons over 40 years of age should not be put to this work.	C	C 2)	-	-	NRP	E
Persons under 21 and over 45 years of age must not be put to this work.	C	C 3)	-	-	NRP	E
2.4. An exception can also be made to the ban on working on location in temperatures above 32° eff A (basic scale) if danger threatens or in special circumstances calling for immediate action.	C	C	C'	C 4)	NRP	E
In such case, however: 2.4.1. The competent authority and the responsible doctor must be immediately informed.	C	C	C'	-	NRP	E
2.4.2. This work must be performed as soon as possible under the conditions listed in 2.3.1. to 2.3.4.	C	C	C'	C'	NRP	E
3. Climatic range between 32° eff A and 28° eff A (basic scale) 3.1.1. Only persons shown by medical examination to be suitable can be employed in this climatic range.	C	C'	-	C	NRP	E
The medical examination must pay particular attention to the heart and to blood circulation.	C	C'	-	C	NRP	E
Persons continually employed in this climatic range must be examined medically at least once a year.	C	A	-	C	NRP	E
In addition, the following provisions apply: 3.1.2. As soon as a working-point reaches a temperature above 28° eff A (basic scale) the competent authority must be informed in writing.	C'	C 5)	-	-	NRP	E
3.1.3. The length of stay in the climatic range between 30° and 32° eff A (basic scale) is restricted to 5 hours, and in the range between 28° and 30° eff A (basic scale) to 6 hours.	C	C 6)	C'	-	NRP	E
3.1.4. For work in a climatic range between 28° and 32° eff A (basic scale) a method of payment corresponding to these conditions must be applied to eliminate any overloading.	C	A 7)	-	C	NRP	A 7)
3.1.5. The provisions quoted in 3.1.3 and 2.1.4 apply to all persons who, during one shift, have to work more than half the time of that shift in one of the climatic ranges mentioned above.	A	C	-	-	NRP	E

1) Laid down generally in the mine rescue plans.
2) Only required for rescue work.
3) No provision made for excluding persons below 21 years of age from exceptional hot work.
4) ... ban on work on location in excessively high temperatures ...
5) If 30° eff A (basic scale) is reached or exceeded, the Mines Inspectorate must be informed.
6) Six hours.
7) Must be arranged by tariff, outside the intervention of the Mines Inspectorate.

G. HEALTH IN COAL MINES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
IV - RECOMMENDATIONS REGARDING MEDICAL EXAMINATION (Second Report of the Mines Safety Commission, p. 79)						
1. Pre-Entry Medical Examinations						
- All applicants for employment at collieries should undergo a pre-entry medical examination.	C	C	C	C	C	C 1)
- This must establish that the applicant shows no symptoms rendering him unfit for such employment.	C	C	C	C	C	C
The pre-entry medical examination must include:						
- a general examination						
- such special examination as may be deemed necessary for the purpose.	C	C	C	C	C	C
- The examinations effected must include, as regards the chest, a radiograph or radiophotograph of format not smaller than 70 x 70 mm.	C	C	C	C	C	C'
- The latter to be supplemented if need be by a standard-format (1 : 1) radiophotograph.	C	C	C	C	C'	C'
- The nature of these examinations and	C	C	C	C	C'	C'
- the practical details, together with	C	C	C	C	C'	C'
- the criteria on which the doctor should base his findings,	C	C	C	C	C'	C'
- should be defined by medical experts.	C	C	C	C	C'	C'
- In the case of recruitment for work, whether below or above ground, where the worker will be exposed to a dust hazard, the examination must show a normal pulmonary image.	C	C	C	C'	C'	C'
- The concept of normal pulmonary image must be defined by medical experts.	C	C	C	C'	C'	C'
- These are to be regarded as minimum medical recommendations.						
- The points concerning the number and type of examinations to be carried out,						
- the effecting of radiological examinations						
- the definition of the normal pulmonary image						
- are subject to review in each country						
- whenever this is felt to be appropriate in the light of progress in medical and radiological knowledge						
- working conditions, and						
- preventive measures.						
2. Special Examinations						
a) The object of special medical examinations should be to establish - taking into account, according to circumstances, the opinions of:						
- the training						
- vocational-guidance and applied psychology	C	C	NRP	C'	E	C'
- and other services concerned a worker's fitness for certain specific occupations	C	C	NRP	C	C	C'

1) Statutory regulations require all persons under 18 years of age to undergo such an examination. In practice extensive medical facilities are available to all miners free of charge and at any time.

G. HEALTH IN COAL MINES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
b) Such examinations are essential in the case of jobs:						
- Which, either in themselves or owing to the conditions under which they are performed, involve a special hazard to the worker himself or to others as regards health and/or safety.	C	C	C	C	C	C'
- which involve special health or safety requirements,						
- or which demand particular physical aptitutes or characterological qualities.	C	C	C	C	C	C'
c) No attempt has been made here to list in full the cases in which special examinations are necessary this being left to the competent authorities in each country. Examples include:						
- winding enginemen,	C	C				
- staple pit enginemen,	C	E				
- motormen (drivers of locomotives, mobile haulers and surface vehicles),	NRP	E				
- workers assigned to hot workings,	C'	C				
- all those employed on cage handling.	NRP					
3. Routine examinations during employment						
a) Periodic health checks						
- The object here is to establish whether the subject is still fit for duty,	C	C	C	C	C	C
- to detect any symptoms of occupational disease at the earliest possible stage,	C	C	C	C	C'	C
- where appropriate to help supervise the subject's health generally.	C	C	C	C	C'	C
- All personnel should undergo such check-ups at intervals.	C	C	C	C	C	A 4)
- The interval is fixed at two years.	C	C	C	C 1)	C 2)	C 4)
- The interval is reduced for workers under 21.	C	- (5)	C	C 3)	C	- 4)

1) The interval is one year;
2) Article 648 of Inspectorate Regulations provides for an interval of one year.
3) For workers under 18 years.
4) Compulsory for persons under 18 years of age at annual intervals; other miners can consult their local doctors or an industrial medical officer.
5) Not applicable

G. HEALTH IN COAL MINES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
- The interval should be considered as a maximum figure.	C	- 1)	C	C	C	- 2)
This interval can also be reduced:						
- if the state of health of a worker indicates that such a reduction is desirable;	C	C	C	C	E	C'
- in relations to the type of work performed;	C	C	C	C	E	C'
- because of the nature of the place at which the work is being done.	C	C	C	C	E	C'
b) Medical examinations on specific occasions						
1. In the case of reassignment						
- Workers whom it is proposed to assign to jobs involving hazards not previously taken into account for the man concerned should be re-examined.	C	C	C	C	E	C'
2. Medical examination following absence from work						
- Where a man's return to work after an illness or accident involves risk to the safety of himself or others, he may be subjected to a special examination,	C	C'	C	C	E	C'
- the type and extent of which should be fixed in each case according to the circumstances.	C	C'	C	C'	E	C'
V - GUIDELINES CONCERNING THE DESIGN AND USE OF COAL-GETTING AND HEADING MACHINES RELATING TO THE REDUCTION OF AIRBORNE DUST (11th Report of the Mines Safety and Health Commission, annex XI)						
Coal-getting machines (8)						
- General observations on the quality of air entering working areas, water infusion where possible; maintenance of cutting horizons.	C	C	C'	C'	E	C
Directives for coal producers on the use of drum power-loaders (9)						
- water spraying on power loaders (9.1)	C'	C	C'	C'	E	C
- location of sprays (9.2)						
a) internal	C'	C	C'	C'	E	C
b) external		C	-	C'	E	C
- avoidance of jet blockage by adequate pressure and outflow of water (9.3)	C'		C'	C'	E	C
- minimizing coal fragmentation by adequate travel speed of power loaders, by suitable drum speed and by maintaining picks in good condition (9.4)	C'	C'	C'	C'	E	C'
Directives for constructors on the construction of drum power loaders (10)						
To ensure minimal breakage of coal:						

1) Not applicable.
2) Compulsory for persons under 18 years of age at annual intervals; other miners can consult their local doctors or an industrial medical officer.

G. HEALTH IN COAL MINES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
1. picks should be as few as possible; their shape and distribution on the drum should be such that the coal is not broken unnecessarily;	yes	A 1)	C'	C'	E	C'
2. the body of the drum should be designed to transfer the cut coal continuously to the conveyor to avoid build-up, the need for clearing up and consequent secondary breakage of the product, as well as projection into the air stream;	yes	A 1)	C'	C'	E	C'
3. the drum should be capable of removing more coal than it cuts;	yes	A 1)	C'	C'	E	C'
4. the speed of travel of the power loader should be variable while in motion;	yes	A 1)	E	C'	E	C'
5. the drum speed should be variable; a maximum pick speed of 4 m/sec is suggested;	yes	A 1)	E	C'	E	C'
6. provision should be made for adjusting the height if the drum to avoid cutting in the roof and floor; it is an advantage to provide facilities for automatic control by suitable sensing devices wherever these can be used.	yes	A 1)	E	C'	E	C'
To ensure effective spraying, machines should be provided with (11): 1. a water filtering arrangement;	C'	A 1)	C'	C'	E	C'
2. piping to take the water to the inside of the drum; the junction between the body of the machine and the drum should be made by a gland designed for pressure well above the working pressure;	C'	A 1)	C'	C'	E	C'
3. distribution channels in the drum to take the water to the picks;	C'	A 1)	C'	C'	E	C'
4. pipes with a sufficiently large internal diameter to allow an adequate supply of water without excessive loss of pressure; account must be taken of the fact that already or in the near future production methods may call for water supplies of, for example, 200 l/min at a pressure of 15 atm;	C'	A 1)	C'	C'	E	C'
5. one or more systems to feed the external sprays; the position of the jets (for example on the body of the machine and/or on the cowl), the direction of projection, the diameter and operating angle of the jets should all be adaptable to operating conditions.	C'	A 1)		C'	E	C'
To complete the dust suppression arrangements, particularly in view of the use of more and more powerful machines, it is advisable (12): a) to provide an automatic water control system to ensure that water is flowing before the drum can rotate; an "override" system should be provided for use by fitting staff only;	C'	A 1)		C'	E	E
b) to design the machine to permit the fitting of a cowl.	C'	A 1)		C'	E	E
The possibility of fitting a dust extractor to the machine should be allowed for in case the systems already described prove inadequate.	C'	A 1)		C'	E	E
Coal ploughs (13) a) it is essential that seams be infused correctly on ploughed faces	C	A 1)	C'	C'	E	?
b) where infusion is impossible or insufficient, plough runs should be sprayed either continuously or during the passage of the plough only; alternatively, sprays should be fitted on the plough itself.	C	A 1)	-	C'	E	C'

1) The mines inspectorate cannot (legally) prescribe conditions to the constructors of machiniery. However, the mine owners can only use machiniery which complies with the above requirements.

G. HEALTH IN COAL MINES

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
c) the methods outlined for external spraying on the drum power loaders apply equally to ploughs.	C	A 1)	-	C'	E	E
d) in addition, spraying must be adequate on the plough runs and at the discharge points between faces and transport roads.	C	A 1)	C'	C'	E	E
- Directives on road heading machines General observations on working conditions a) in the seam (14); b) the importance of dust: the need for de-dusters (15); c) the need for cooperation between coal producers and the makers of machines and of de-dusting equipment (16).	C'	A 1)	C'	C'	E	C'
- Technical measures relating to ventilation and the filtration of dust a) in general, the forcing of ventilation through ducts (17a);	NRP	A 1)	C'	C'	E	C'
b) the particular case of auxiliary extraction ventilation (17b);	NRP	A 1)	C'	C'	E	C'
c) air filtration (18).	C	A 1)	C'	C'	E	C'
Recommendations on the construction of heading machines 19. The number of cutting picks on a heading machine should be reduced to the minimum; they should be of such shape and so arranged on their mountings as to reduce fragmentation as far as possible.	C'	A 1)	C'	C'		C'
20. A water supply should be provided on the machine to give sufficient output and pressure for each cutting tool; the arrangements are similar to those for power loaders.	C	A 1)	C'	C'		C'

1) (See previous page)

H. HUMAN FACTORS

H - PSYCHOLOGICAL AND SOCIALOGICAL FACTORS AFFECTING SAFETY

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
I - RECOMMENDATIONS ON THE PSYCHOLOGICAL AND SOCIOLOGICAL FACTORS AFFECTING SAFETY (3rd report of the Mines and Safety Commission, p. 425)						
1. Measures which will make it possible for workmen to recognise dangers and to carry out their work in such a way that these dangers are avoided.						
1.1. Recognising dangers						
1.1.1. Before starting work in a district, a section of a working or a workingpoint and before any planned major change in the manpower deployment or in working conditions it is important to check all the safety precautions tomeet any dangers to be encountered.	C	C	C'	C	C'	C
1.1.2. During the work, regular reports on the following points must be prepared on the basis of the safety conditions which have to be observed under continuous supervision: a) changes in operating conditions	C'				C' 2)	
b) accidents or incidents			C		C'	
c) dangerous situation encountered during work	C+C'	C+C'	3)	C'	C'	C
The data brought together in these reports should be systematically assessed with a view to improving or adapting the safety precautions in force.	C+C'	C'	C'	C'	C'	C
1.1.3. After the work has been finished, the data assembled on the basis of daily experience should be used to prepare a report of experience which should at least include information	C'	C'	4)	C'	5)	C
regarding the winning methods used,	C'	C'	4)	C'	C'	C
the dangers which have arisen and the precautions taken to deal with them,	C'	C	4)	C'	C'	C
together with any accidents, incidents and dangerous situations which have occurred during the working operations	C'	C	4)	C'	C'	C
1.2. Making known the dangers to all concerned						
1.2.1. Before starting work in a district, a section of a working or a workingpoint or in the event of a major change in the operating conditions, it is advisable to arrange a discussion between representatives of the management, supervisory staff and members of the safety sevices as well as the workers concerned or their representatives, in order: - to inform each individual with regard to the work envisaged - to study in detail the work to be carried out.						

1) No report is drawn up, verbal or written instructions given to the personnel concerned.
2) As regards the pattern of work and not actual operations as mentioned in the text.
3) Such situations are discussed at management or supervisor level, no report is drawn up.
4) No report is drawn up although account is taken of experience gained.
5) Not only when work is finished but in any case either weekly, monthly or annually.

H. HUMAN FACTORS

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph	Germany Saar	Belgium	France	Italy	United Kingdom
- to settle upon the method of work	C'	C'	1)	C' 2)	C'	C'
1.2.2. The workers concerned should be informed by the most appropriate means of the method of work chosen.	C	C	C'	C	C'	C'
1.2.3. During the execution of the work, the management and the supervisory staff should refer to the regulations and instructions to be observed as often as necessary to counteract the effects of habit.	C	C	C'	C	C'	C'
1.2.4. If it is considered necessary to issue new safety instructions, these should be brought regularly to the notice of every worker concerned.	C	C	C'	C	C' 3)	C'
1.2.5. Reports made by each of the workmen regarding dangerous situations which arise during the work should be brought to the notice of the management staff.	C'	C	C'+C	C'	C'+C	C
1.3. Instruction in the manner in which the work is to be carried out without danger						
1.3.1. Every worker assigned to underground work must be able to show that he has:						
- a general training as an underground worker;	C	C	C' 4)	C'	5)	C
- a special training for the work to which he is to be assigned;	C	C	C'	C'	5)	C
- the necessary additional training to cover the special working conditions at the point where he will work.	C	C	C'	C'	5)	C
1.3.2. Should there be a change in the work or in the working conditions, the necessary additional training must be provided.	C' 6)	C	C'	C'	C'	C
1.3.3. Instruction in safety precautions is to be considered as an integral part of vocational training	C	C	C'	C'	C'	C
1.4. Supervision to check that safety regulations are observed during work						
1.4.1. During the work, the safety conditions must be subject to continual supervision.	C	C	C	C	C'	C
1.4.2. The duty to see that safety regulations are observed, and the responsibilities resulting from this duty, fall upon the management and supervisory staff.	C	C	C	C	C	C
1.4.3. The supervision, which must be exercised with authority, should in its ever-day action seek to improve the training and education of the workmen on the basis of daily experience, and should give rise to fines or penalties only in very serious or repeated cases of infringement.	C'	C'	C' 7)	C'	C'	C

1) This takes place at engineer or supervisor level, or even at Safety Committee level, but not at meetings where all the people mentioned are present.
2) Workers' safety representatives may give their opinion and submit their observations in the form provided for in the labour legislation.
3) By means of service instructions issued by the management of the mine, or of service notes issued by departmental heads and supervisors.
4) Convention of the Joint National Mines Commission.
5) Systematic training courses are provided up to 1963. After 1963, no new staff were engaged and therefore apprenticeship and training are only provided where new machinery and equipment is introduced.
6) Laid down by the responsible authorities for particular cases, otherwise generally included in the enterprises manual.
7) Concerns the last part of the sentence: '... and should give rise ...'.

H. HUMAN FACTORS

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph	Germany Saar	Belgium	France	Italy	United Kingdom
2. Training the management and supervisory staff in the matter of safety						
2.1. General						
2.1.1. Steps must be taken to ensure that the supervisory staff does not change posts frequently	C'	C'	C'	C'	C'	C'
2.1.2. The vocational training should be adapted to the particular features of the staff member's task and his responsibilities, and in particular to the requirements of his place in the hierarchy of management or supervisory staff.	C'	C	C+C' 1)	C'	C+C'	C'
2.1.3. The transition from one grade to another should be possible for a given person ly after he has actually proved to have the required knowledge and skill.	C'	C	C'	C'	C' 2)	C'
2.2. Guidelines for the vocational training of the management or supervisory staff						
2.2.1. The management and supervisory staff must have an adequate knowledge of:						
- the safety regulations;	C	C	C'	C	C'	C
- the safety precautions to be taken;	C	C	C'	C	C'	C
- the available safety equipment and its use;	C	C	C'	C	C'	C
- the instructions in force for the different vocational groups whose work they are called upon to supervise, and the instructions for the exercise of activities at the working points for which they are responsible.	C	C	C'	C	C'	C
2.2.2. The management and supervisory staff must be able:						
- to point out in a suitable way to the workers under their orders the dangers associated with their work;	C'	C	C'	C	C'	C
- to instruct these workers as to how best to carry out the work in order to avoid these dangers.	C'	C	C'	C'	C'	C
2.2.3. The management and supervisory staff should be trained in how to issue instructions.	C'	C'	C' 3)	C'	C' 4)	C'
2.2.4. Special attention must be apid to the continual further training of all management and supervisory staff.	C'	C'	C'	C'	C'	C'
2.2.5. The management and supervisory staff must both:						
- account for and report on the execution of their work, and	C'	C'	C'	C'	C'	C'
- account for and report on all accidents and other notable incidents which have occurred during the working period at the points for which they are responsible.	C	C'	C'	C'	C	C'
2.2.6. The management and supervisory staff must be able:						
- to draw up accident reports correctly;	C	C'	C' 5)	C'	C'	C'
- to assess and use the data in these report;	C'	C'	C' 5)	C'	C'	C'
- to study and establish the causes of accidents;	C'	C'	C' 5)	C'	C'	C'

1) For the shotfirer.
2) By limited competition in the E.N.E.L. (Ente Nazionale per l'Energia Elettrica).
3) For the management staff. No systematic training in management for other grades.
4) This is not considered as a subject for training. Preference is given to constant supervision of the staff.
5) For the management staff. For supervision staff in certain cases only.

H. HUMAN FACTORS

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph	Germany Saar	Belgium	France	Italy	United Kingdom
- to work out means to aboid accidents;	C'	C'	C' 1)	C'	C'	C'
- to receive the training necessary to this end.	C	C'	C' 1)	C'	C'	C'
2.3. Staff responsible for training						
2.3.1. The staff responsible for the training activities set out in paragraphs 1.3 and 2 must be numerous enough and must have available the necessary means and time to carry out their task properly.	C	C	C'	C'	2)	C
2.4. Drawing up of an accident report; training of staff responsible for filling in such reports						
2.4.1. The accident report must, taking into account all the appropriate human and technical factors, give all necessary information and in particular:						A 5)
- the circumstances, the consequences of the accident, the causes,	C	C	C	C'	C'	C'
- the precautions proposed to avoid similar accidents.	C	C	C	C'	C'	C'
2.4.2. Each of these items of information referred to in point 2.4.1 must be capable of formulation as an answer to a clear and precise question.	C	C	C	C'	C'	C'
2.4.3. The breakdown and layout of the form used for accident reports must clearly show which questions have to be answered by each of the members of the staff contributing to the preparation of the reports.	C'	C' 3)	C	C'	C'	A
2.4.4. There must be suffcient room on the form for supplementary remarks or sketches which may be provided by the person or persons concerned.	C'	C' 3)	C'	C'	C'	C'
2.4.5. Each of the persons contributing to the preparation of the report must be informed with regard to:						
- the importance of each question,	C	C'	C'	C'	C'	A
- the way to provide correct answers to the questions.	C	C'	C'	C'	C'	A
2.4.6. Practical instruction should be provided to draw the attention of the employees concerned to the consequences of omissions, neglectful or unclear answers to the questions.	C'	C'	4)	C'	2)	A
2.4.7. Systematic attention should be paid to ensure that the answers are complete, aacurate and precise.	C	C'	C	C'	C'	C'
2.4.8. The accidents reports referred to in this cahpter are to be drawn up for the sole purpose of accident prevention.	C'	C'	C'	C'	C'	C'
2.5. Appointment and promotion of management or supervisory staff						
2.5.1. Care should be taken to ensure that there is available an adequate number of management or supervisory staff possessed of the requisite skills both in the technical and safety fields.	C	C	C+C'	C'	C+C'	C

1) For the management staff. For supervision staff in certain cases only.
2) Systematic training courses were given up to 1963. After 1963, no new staff were engaged and therefore apprenticeship and training are only provided where new machinery and equipment is introduced.
3) The form used by the professional mining organisation does not complyentirely with this provision
4) Does not exist.
5) It is not considered necessary to provide such training.

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Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
2.5.2. The election of this staff is the responsibility of the employer, who must at least inform the competent authority of the persons entrusted with supervision of working operations, together with the necessary data justifying the selection.	C	C	C	C 1)	C+C' A 2)	C
2.5.3. To ensure a selection which promises success, there should be laid down the minimum requirements for appointment to a post in one of these categories, either by direct appointment or by promotion, together with the certificates and other documents which are the necessary requisite for such an appointment.	C'	C	3)	C'	C 4)	C
2.5.4. The competent authority should be in a position to check the knowledge and skills of the management or supervisory staff - both from the human and technical points of view - should this authority consider it necessary, at least in the case of a major failure or of repeated failures in the performance of duties.	C	C	C 5)	A	A	C
3. Usefulness of psycho-technical examinations						
3.1. On assignment						
3.1.1. It is recommended that the application of a relatively simple psycho-technical examination upon assignment should be developed as far as possible, in order to:						
- determine the general intellectual level of the candidate;	C'	C	C' 6)	C'	C+C' 7)	A
- to exclude those candidates whose intellectual level lies below a pre-determined minimum.	C'	C	C' 6)	C'	C' 7)	A
3.2. Before the exercises of specific duties						
3.2.1. In every instance, the workmen who are to be amde responsible for the execution of particular working operations - with which there is associated a particular responsibility in respect of collective safety or - which call for particular intellectual or personality characteristics should be subjected to a special psycho-technical examination to determine whether they have the capacities required for this activity.	C 5)	C+E 8)	C' 9)	C'	E	A
3.2.2. The competent authority must, in co-operation with the representatives of the employers and employees, keep up to date the list of work for which those special examinations are to be prescribed and, to this end, should list the duties which have been shown by experience to call for such tests and for which such tests can inpractice be carried out.	C 5)	E 3)	3)	A	E	A

1) The managing director of the mine informs his chief engineer of the name of the departmental head in charge of technical matters.
2) As regards the reasons for the choice.
3) Does not exist in practice.
4) The law lays down a provision concerning the academic qualifications of directors and departmental heads.
5) Psycho-technical examinations are required for certain duties only (winding-enginemen, locomotive drivers).
6) This ceased when recruitment was discontinued.
7) Cf. 2) on previous page.
8) For winding-enginemen and locomotive drivers.
9) Ceased when recruitment was discontinued.

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Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
3.3. <u>Before any promotion of a worker to a supervisory post</u>						
3.3.1. Before the promotion of any workman to a supervisory post, a suitable psycho-technical examination must be carried out.	A 1)	A 1)	C 2)	C'	E	A
3.4. <u>Principles underlying the various psycho-technical examinations</u>						
3.4.1. The psycho-technical examinations listed under 3.2 and 3.3 should, as far as possible, aid the vocational specialisation of the worker in question.	C	C	C'	C'	C'	A
3.4.2. The management must lay down the criteria which have to be met by the candidate on assignment, or later, when directed to special tasks,	C' 3)	C+E	C'	C'	C'	A
and must seek the advice of psychologists when so doing.	C' 3)	C+E	C'	C'	C'	A
3.4.3. The psychologist's assessment will be valid only for a restricted period and must be compared with the assessments of the vocational behaviour of the person in question.	C' 3)	C+E	C' 2)	C'	E	A

1) Eligibility for promotion within the supervisor grade is determined during the vocational training laid-down by the responsible authorities.
2) Where there was in fact a psychological department.
3) Psycho-technical examinations are required for certain duties only (winding-enginemen, locomotive drivera). Other enterprises have these types of examination for other duties.

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Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany N.R./Wph	Germany Saar	Belgium	France	Italy	United Kingdom
II - RECOMMENDATIONS AS TO PRINCIPLES TO BE OBSERVED IN VIEW OF THE POSSIBLE INFLUENCE OF PAYMENT AT PIECE RATES ON SAFETY IN COALMINES (4th report of the Mines Safety and Health Commission, Annex IV).						- 1)
1. Piecework arrangements	2)					
1.1. Minimum age; medical examinations						
1.1.1. To be assigned to piecework, a miner must						
- be not less than 18 years of age	C	C	C	C	C 3)	-
- have underground a medical examination to establish his fitness for such work.	C	C	C	C	C 3)	-
1.1.2. Similar examinations must follow at regular intervals.	C'	C 4)	C	C	C 3)	-
1.2. Make-up of piece rates						
1.2.1. Written particulars of the operations to be performed must be given to the men concerned, including such information as is needed to calculate the amount payable therefor.	C' 5)	C'	C'	C	C'	-
1.2.2. In the interests of safety, the piecework arrangement employed must either						
- provide that operations of importance to safety shall be paid on a separate basis, or	-	-	C'	-	C'	-
- contain equivalent financial safeguards for the proper execution of such operations.	C' 5)	C'	C'	C'	C'	-
1.3. Fixing of norms and of rates payable therefor						
1.3.1. The men must have the right to discuss the fixing of piecework norms and rates with the employer.	C' 5)	C'	C'	C	C	-
1.3.2. If agreement is not reached, the men or their representatives must have the right to start conciliation proceedings under 4 below.	C' 5)	C'	C'	C	7)	-
1.4. Form of piecework						
1.4.1. One-man piecework should preferably be permitted only where the operations concerned are not of a nutre to allow any other form of piecework.	A 6)	C'	?	C'	C'	-
1.5. Determination of the norm						
1.5.1. The norm must be determined in accordance with:						
- the amount of time actually available during a normal shift;	C' 5)	C'	C'	C	C'	-

1) Recommendations not applicable; miners are not paid on piece rates.
2) Questions relating to pay cannot be dealt with by the responsible authorities. Such questions are settled by means of collective agreements.
3) Pursuant to the Mining Regulation and to the provisions relating to young workers.
4) Periodic X-ray examinations (every 15 months at most). Periodic clinical examination only where signs of pneumoconiosis are detected or on medical advice.
5) Settled by collective agreement.
6) For certain operations, one-man piecework is considered by both sides to the agreement as the most appropriate type of remuneration.
7) The collective agreement does not provide for conciliation procedures, although such procedure exists and the Ministry of Labour and Social Security acts as an arbitrator (whose decisions are not binding).

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Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
the amount of work the men can fairly be expected to perform during this time, having regard to the working conditions;	C' 1)	C'	C'	C	E	-
the amount of time required to perform the operations properly.	C' 1)	C'	C'	C	C'	-
1.6. Calculation of the end wage						
1.6.1. The basis and mode of calculation must be sufficiently simple for any worker to be able to work out for himself the sum due to him for a given period.	C' 1)	C'	C'	C	C'	-
1.7. Performance in piecework						
1.7.1. Regulations should be laid down requiring that periodic checks be carried out on the amounts of workperformed for the purpose of determining the wages payable therefor.	C' 1)	C'	C'	C	C'	-
and that the findings be duly notified to the men concerned	C' 1)	C'	C'	C	C'	-
1.7.2. Particulars must be supplied to the men of all additions and deductions affecting the amount of the end wage, together with details as to how these were calculated.	C' 1)	C'	C'	C	C'	-
2. Changes in conditions at the workplace						
2.1. A piecework arrangement my be terminated or amended if the employer and the men are agreed that genuine difficulties warranting this course have been objectively found to exist.	C' 1)	C'	C'	C	C'	-
Failing such agreement, the men must have the right to ask nevertheless that the arrangement be terminated or amended forthwith.	C' 1)	C'	C'	C	C'	-
2.1.1. If the men cannot be paid at piece rates for so long as the difficulties persist, they must be paid a proper wage appropriate to their grade.	C' 1)	C'	C'	C	C 2)	-
3. Managerial and supervisory staff						
3.1. In the interests of safety, extra supervision must be provided in workings where men are employed on piecework.	C'	C'	?	C'	C'	-
3.1.1. Since failure to carry out safety operations in good time can result in particular hazards, the supervisory personnel must give the men strict and relevant instructions to this effect, and check regularly to see that these are carried out	C'	C'	C	C	C'	-
3.2. Payment of managerial and supervisory staff						
3.2.1. Since managerial and supervisory staff are responsible not only for the organisation and smooth running of operations, but also for the safety of the men engaged in them, they should as a rule be paid out						

1) Settled by collective agreement.
2) The collective agreement guarantees minimum pay and ancillary allowances.
3) Cannot be subject of Mines Authority prescriptions. Settled according to area.

H. HUMAN FACTORS

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
on a basis independent of the ups and down of production.	A 1)	C'	C	C	C	-
They may be granted production or output bonuses provided they have at the same time a sufficient financial incentive to devote the necessary attention to safety.	A 1)	C'	C'	C	C	-
4. Settlement of disputes						
4.1. There should be a conciliation system for dealing with any disputes arising between management's and men's representatives with regard to piecework arrangements or their implementation.	C' 2)	C'	C'	C	2)	-
4.1.1. The conciliation system should operate by means of a board on which employers and workers are equally represented, and which should approach disputes in the light of the present recommendations.	C' 2)	C'	C'	C	2)	-
4.1.2. The fact that proceedings of this kind are pending must not affect the terms of employment of the men concerned,	C' 2)	C'	C'	C	C'	-
who must continue to be entitled to a fair wage appropriate to their grade.	C' 2)	C'	C'	C	C	-

1) Cannot be subject of Mines Authority prescriptions. Settled according to area.
2) Settled by collective agreement.

I - INFLAMMABLE DUST

Proposals from the Mines Safety Commission for the improvement of safety and health conditions in coalmines	Germany		Belgium	France	Italy	United Kingdom
	N.R./Wph	Saar				
1. Memorandum on information necessary for the examination of coal-dust explosions on ignitions of firedamp in mines (adopted by the Mines Safety and Health Commission, 6.2.73, 10th Report, Annex VII) In this memorandum used by the mines inspectors when investigating accidents?	yes	C	yes	yes	C	C'
2. - Information on the procedure for binding dust by means of hygroscopic salts, another effective technique for neutralizing inflammable dust (11th report of the Mines Safety and Health Commission, annex VI) Is any further information available?	C	C	E	NRP	no 1)	no
3. - Information report on water barriers for containing dust explosions underground (11th report ofthe Mines Safety and Health Commission, annex VII) Is any further information available?	C	C	E	NRP	no 1)	no
4. _ Triggered barriers and recommendation for their use underground (11th report of the Mines Safety and Health Commission, annex VIII) At the present stage of research the Mines Safety and Health Commission feels that triggered barriers may be more effective than conventional methods of suppressing explosions at certain points in the mine such as headings, gallery and face junctions, gateroads, the boundaries of ventilation districts and at particular danger points. The Mines Safety and Health Commission has recommended that barriers already available should be installed so that their behaviour under working conditions may be tested. Has this recommendation been implemented?	2)	C	E	E	no 1)	yes
5. **APPLICATION OF DUST BINDING BY HYGROSCOPIC SALTS AS A MEANS OF COMBATING COAL DUST EXPLOSIONS.** 14th Report MSHC - Annex V The MSHC recommends the proper application of hygroscopic salts as a protection against dust explosions, particularly in places where coal dust makes are likely to be high. Is this recommendation being complied with alone ? yes/no	yes(3)	C	no	yes		no
In conjunction with the following alternatives : 1) the MSHC considers that stone dusting, whether applied over the whole periphery of roadways or in combination with dust binding on the floor, is a suitable alternative, provided it is regularly applied.	yes(4)	C	no	yes		C
2) The recommendation does not apply to those workings or sections of roadway which are kept constantly wet either naturally or as a result of winning operations. . .	yes	C	no	yes		C'
3) It does not, however, preclude water spraying at certain points in the mine as a means of protection against dust explosions	yes(5)	C	no	yes		C'

(1) Currently, no coal mine in operation.
(2) Tests are envisaged during 1976

3) Regulation prescribe this for drivages, etc.. (4) in other roads
5) except in staple pits.

GENERAL REMARKS ON STEPS TAKEN IN ITALY

The Italian coal mines, of course, comprise only the Sulcis coalfield in Sardinia and are currently not being worked.

The Italian Government only recently decided to consider reopening this coalfield and is carrying out an extensive survey to determine its potential.

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ANNEX VI

THE CHECK TESTING OF CONVEYOR BELTS WITH TEXTILE CARCAS FOR USE UNDERGROUND IN COAL MINES

Resistance to flame

Adopted by the Safety and Health Commission
on 6th April 1978
and sent to Governments
as an information report in accordance with Art. 3 of the its Terms of Reference

1478/8/77 E with annexes available at the Secretariat in E–F–D–I–N–DK

THE CHECK TESTING OF CONVEYOR BELTS

WITH TEXTILE CARCAS

FOR USE UNDERGROUND IN COAL MINES

Resistance to flame

The check testing of conveyor belts with textile carcas for use underground

1. General

1.1. On 15th. november 1974, the Mines Safety and Health Commission adopted the First Report on Tests and criteria for flammability of conveyor belts with textile carcass used in mines of coal in the European Community countries. The report was published as Annex VI to the 12th Report of the MSHC. It prescribes two testing procedures which constitute the minimum requirements which conveyor belts with textile carcass must satisfy prior to approval for use in underground coal-mines.

The two tests are :

- the drum friction test and
- the propane burner test.

1.2. Since 1974, new types of belt in Belgium, the Federal Republic of Germany and the United Kingdom have been approved for use in coal mines only if they can satisfy the requirements described in the above-mentioned report. In some countries additional tests are prescribed.

1.3. The Working Party on Rescue Arrangements, Mines Fires and Underground Combustions has given the Committee of Experts on Fire Resistant Conveyor Belts, the task of finding a routine quality control test for conveyor belt delivered for use in coal mines to determine whether the fire resistant properties of these belts are substantially the same as the values established at the time of the type approval tests.

These quality control tests are intended to allow belt users and manufacturers to monitor product quality.

1.4. The type approval tests involve the use of expensive equipment which is generally not available to manufacturers and users. It is therefore necessary to seek a rapid, simple and cheap method for check testing of conveyor belts. However, in Belgium the type approval tests had been used for this purpose.

1.5. A series of comparative tests has been carried out at the following research institutes :

- CERCHAR	Verneuil-en-Halatte
- INIEX	Pâturages
- NCB	Bretby/Harrow
- Versuchsgruben-gesellschaft	Dortmund.

The findings indicate that both the Barthel burner test and determination of the limiting oxygen index could be suitable for check testing of belt material on delivery.

It is possible to define the two tests in terms of the apparatus used and procedure adopted with a sufficient degree of precision to ensure reproducibility of results. A final assessment of their suitability will not be possible until results are available for a sufficiently large number of test pieces.

1.6. The Committee of Experts also notes that :

1.6.1. The National Coal Board in the United Kingdom has used the Barthel Burner test as part of its type approval testing scheme for 20 years. It also requires that the manufacturers carry out one complete "test" on at least every 400 metres of conveyor belt prior to despatch.

In addition the NCB itself tests at least one sample for every 800 metres of belt received. The NCB however, use predominantly belt with textile carcas and PVC covering. The U.K. experience indicates that the Barthel Burner Test can be successfully used for quality control purposes for this type of belt.

1.6.2. Recently, the limiting oxygen index for conveyor belts has been determined in Belgium, France, the Federal Republic of Germany, and the United Kingdom. These tests, which are still in progress would seem to indicate that this procedure may also be suitable as a quality control test for conveyor belts with textile carcass.

2. Proposals.

The member states are invited to see that either the Barthel Burner or the Limiting Oxygen Index test or preferably both, be introduced on an experimental basis for quality control purposes. This shall supplement and not replace any arrangements which already exist. Experience of the two methods of quality control is to be evaluated in the three years following the approval of this document.

2.1. **Tests instructions.**

The tests should be carried out in accordance with the attached instructions, Annexe I and Annex II of this document.

2.2. **Reference values.**

When the sample of a new type of conveyor belt is submitted to a testing station for type approval testing, the conveyor belt should also be submitted to the Barthel Burner Test and/or the Limiting Oxygen Index Test. The results may be taken as the reference value for the check testing purposes for this type of conveyor belt.

2.3. **Check testing procedures.**

2.3.1. Prior to the use of a belt underground, users should ensure that as far as possible a check test (in accordance with Annexe I and/or II) should be completed on at least one sample per delivery or production batch.

2.3.2. The results of the quality control tests should be recorded by the parties conducting the test and should be forwarded to the testing stations responsible for type testing. The latter will submit summaries of the data to the Committee of Experts at regular intervals.

2.4. Assessment.

The fire resistant properties of a conveyor belt ready for shipment to the mine may be considered similar to those of the specimens submitted for the type approval test when the results of the quality control tests are not generally different from the reference value. What variations from the reference value are acceptable can only be determined after a statistical evaluation of the results of these tests.

Until then, it is left to the discretion of the testing institutes to determine the siye of the permissable variances from the reference values in the light of the spread of individual results.

3. Objectives.

If the results of the trials are positive, a decision will be taken on the methods and values to be proposed for check testing the fire resistance of conveyor belts.

4. This report was adopted by the Working Party on "Rescue Arrangements Mine Fires, and Underground Combustions" on 31st January 1978 after consulting with representatives of the manufacturers of conveyor belts in the various member states.

5. The Working Party sends this report to the Mines Safety and Health Commission suggesting that it accepts the proposals set out in Item 2 above.

Note : *Texts of check testing can be obtained at the Secretariat under doc. 1479/8/77 efdindk.*

ANNEX VII

PROPOSAL TO GOVERNMENTS

concerning

THE HARMONISATION AND APPLICATION OF SAFETY SIGNS AT WORK IN COAL MINES

(Adopted by
the SAFETY AND HEALTH COMMISSION FOR THE MINING AND EXTRACTIVE INDUSTRIES
on the 1st of december 1978
in accordance with Article 1 of its terms of reference
and follow up in accordance with art. 4 of those terms).

Doc. 3040/3/78

PROPOSAL TO GOVERNMENTS

concerning

THE HARMONISATION AND APPLICATION OF SAFETY SIGNS AT WORK IN COAL MINES

(Adopted by
the SAFETY AND HEALTH COMMISSION FOR THE MINING AND EXTRACTIVE INDUSTRIES
on the 1st of december 1978
in accordance with Article 1 of its terms of reference
and follow up in accordance with art. 4 of those terms).

1. INTRODUCTION

1.1. The Commission proposed to the Council of Ministers of the European Community and it adopted a Directive on the approximation of the laws regulations and administrative provisions of member states relating to Safety Signs at places of work.

1.2. Following requests from various organisations and certain delegations of the coal industries, the Consultative Committee of the European Coal and Steel Commission asked that the advice of the Safety and Health Commission for the Mining and Extractive Industries be sought concerning the question of the draft directive.

1.3. In response to these requests, and believing that this directive could not be applied in total to the mines and other extractive industries coming within its terms of reference, the Safety and Health Commission for the Mining and Extractive Industries asked the Commission of the European Communities to exclude the coal mines and other extractive industries within its competance from the provisions of the directive ; at the same time, it promised to try to propose to governments, in accordance with Articles 1 and 4 of its Terms of reference, an appropriate harmonised document for signs in these industries as soon as possible and not more than 18 months later.

1.4. On 25th July 1977, the Council of Ministers of the European Communities adopted the Directive and excluded coal mines from its application.
(See paragraph 2 c of Art. 1 of 77/576/EEC).

1.5. In accordance with its promise, the Safety and Health Commission for the Mining and Extractive Industries asked a group of experts to prepare a proposal based as far as possible on the Council Directive, and respecting those principles which are indicated in paragraph 3 of that text.

1.6. Resulting from technical progress and future developments, the list of harmonised signs will require up-dating by the addition of new signs from time to time. Provisions for dealing with this aspect are contained in paragraph 4.

2. APPLICATION

2.1. The proposals in this document shall apply to **all coal mines.**

2.2. These proposals shall come into force for the buying of new signs, two years after the adoption of the document by the Safety and Health Commission for the Mining and Extractive Industries, and it will be fully implemented within six years of its adoption.

3. SYSTEM OF SAFETY SIGNS

3.1. DEFINITIONS

(a) **A system of safety signs,**
means a system of signs referring to a specific object or situation and providing information by means of a safety colour or sign.

(b) **A safety colour,**
means a colour to which a specific meaning relative to safety has been assigned.

(c) **A contrasting colour,**
means a colour contrasting with the safety colour of the sign, which provides additional information.

(d) **A safety sign,**
means a sign combining geometrical shape, colour and symbol to provide specific safety information.

(e) **A prohibition sign,**
means a sign prohibiting behaviour likely to cause danger.

(f) **A warning sign,**
means a safety sign giving warning of a hazard.

(g) **A mandatory sign,**
means a safety sign prescribing a specific obligation.

(h) **An emergency sign,**
means a safety sign indicating, in the event of danger an emergency exit, the way to an emergency installation or the location of a rescue appliance.

(i) **An information sign,**
means a safety sign providing safety information other than that referred to in the points (e) to (h).

(j) **An additional sign,**
means a safety sign used only in conjunction with one of the safety signs referred to in points (e) to (h) and providing additional information.

(k) **A symbol,**
means a pictoral representation, describing a specific situation, used on one of the safety signs referred to in points (e) to (h).

3.2. THE MEANING AND USE OF SAFETY SIGNS

The meaning and use of safety signs and contrast colours and the shape and design, and the meaning of the safety signs shall be as defined in Annex I.

3.3. PRINCIPLES

The competant authorities in Member States shall take all necessary measures to ensure that :

- Safety signs at all coal mines conform to the principles laid down in Annex I;
- To provide the information specified in Annex II only those safety signs defined in that Annex shall be used to indicate dangerous situations, listed therein.
- Road traffic signs in force are used to regulate internal works traffic.

4. AMENDMENTS

On the request of a delegation of a Member State or in the case of a modification to the Directive of the Council of Ministers dated 25th July 1977 (on the approximation of the laws regulations and administrative provisions of the Member States relating to the provision of safety signs at places of work (77/576/EEC), or to take account of technical progress, the Mines Safety and Health Commission will examine modifications proposed and will determine the procedure to be followed.

5. ADOPTION

Adopted by the Safety and Health Commission for the Mining and Extractive Industries in accordance with Article 1 of its terms of reference as a proposal to be sent to Governments for the improvement of safety and health in coal mines, on 1st december 1978.

ANNEX I

Basic principles of the system of safety signs

1. GENERAL

1.1. The objective of the system of safety signs is to draw attention rapidly and unambiguously to objects and situations capable of causing specific hazards.

1.2. Under no circumstances is the system of safety signs a substitute for the requisite protective measures.

1.3. The system of safety signs may be used only to give information related to safety.

1.4. The effectiveness of the system of safety signs is dependent in particular on the provision of full and constantly repeated information to all persons likely to benefit therefrom.

2. SAFETY COLOURS AND CONTRASTING COLOURS

2.1. **Meaning of safety colours**

Table 1

Safety colour	Meaning or purpose	Examples of use
Red	Stop Prohibition	Stop signs Emergency shutdown devices Prohibition signs
	This colour is also used to identify fire-fighting equipment.	
Yellow	Caution! Possible danger	Identification of dangers (fire, explosion, radiation, chemical hazards, etc.) Identification of steps, dangerous passages, obstacles
Green	No danger First aid	Identification of emergency routes and emergency exits Safety showers First aid stations and rescue points
Blue [1]	Mandatory signs Information	Obligation to wear individual safety equipment Location of telephone

[1] Counts as a safety colour only when used in conjunction with a symbol or words on a mandatory sign or information sign bearing instructions relating to technical prevention.

2.2. **Contrasting colours and symbol colours**

Table 2

Safety colour	Contrasting colour	Symbol colour
Red	White	Black
Yellow	Black	Black
Green	White	White
Blue	White	White

3. GEOMETRICAL FORM AND MEANING OF SAFETY SIGNS

Table 3

Geometrical form	Meaning
	Mandatory and prohibition signs
	Warning signs
	Emergency, information and additional signs

4. COMBINATIONS OF SHAPES AND COLOURS AND THEIR MEANINGS FOR SIGNS

Table 4

Shape / Colour			
Red	Prohibition		Fire-fighting equipment
Yellow		Caution, possible danger	
Green			No danger Rescue equipment
Blue	Mandatory		Information or instruction

5. DESIGN OF SAFETY SIGNS

5.1. **Prohibition signs**

Background: white; symbol or wording: black.

The safety colour red must appear around the edge and in a transverse bar and must cover at least 35 % of the surface of the sign.

5.2. **Warning, mandatory, emergency and information signs**

Background: safety colour; symbol or wording: contrasting colour.

A yellow triangle must have a black edge. The safety colour must cover at least 50 % of the surface of the sign.

5.3. **Additional signs**

Background: white; wording: black;

or

background: safety colour; wording: contrasting colour.

5.4. **Symbols**

The design must be as simple as possible and details not essential to comprehension must be left out.

6. YELLOW/BLACK DANGER IDENTIFICATION

(Proportion of safety colour at least 50 %)

Identification of permanent risk locations such as:

— locations where there is a risk of collision, falling, stumbling or of falling loads,

— steps, holes in floors, etc.

7. SPECIAL SIGNS

7.1. In the United Kingdom the principles set out in Tables 1 and 2 of Annex I are respected ; however there are two exceptions as follows :

7.1.1. Safety Signs which are used to indicate the situation o firefighting equipment are coloured green with symbol or contrast coulour, white.

7.1.2. A mandatory sign is a specific obligation on persons to take a positive action ; the colour red is used. (Thus the signs listed in Annex II, point 3, are white on a red background).

7.2. The exceptions have been sought by the U.K. in order to simplify the system of safety signs in use in that country and the desire to use the colour RED for all signs which impose an obligation on persons to do or not to do a particular action precribed in a sign.

A total of seven harmonised types of signs are affected. In all other projects the signs conform to the shapes and designs illustrated.

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BILAG II — ANLAGE II — ANNEX II — ANNEXE II — ALLEGATO II — BIJLAGE II

SÆRLIG SIKKERHEDSSKILTNING — BESONDERE SICHERHEITSKENNZEICHNUNG — SPECIAL SYSTEM OF SAFETY SIGNS — SIGNALISATION PARTICULIÈRE DE SÉCURITÉ — SEGNALETICA PARTICOLARE DI SICUREZZA — BIJZONDERE VEILIGHEIDSSIGNALERING

1. Forbudstavler — Verbotszeichen — Prohibition signs — Signaux d'interdiction — Segnali di divieto — Verbodssignalen

a)

Rygning forbudt
Rauchen verboten
No smoking
Défense de fumer
Vietato fumare
Verboden te roken

b)

Rygning og åben ild forbudt
Feuer, offenes Licht und Rauchen verboten
Smoking and naked flames forbidden
Flamme nue interdite et défense de fumer
Vietato fumare o usare fiamme libere
Vuur, open vlam en roken verboden

c)

Ingen adgang for fodgængere
Für Fußgänger verboten
Pedestrians forbidden
Interdit aux piétons
Vietato ai pedoni
Verboden voor voetgangers

d)

Sluk ikke med vand
Verbot, mit Wasser zu löschen
Do not extinguish with water
Défense d'éteindre avec de l'eau
Divieto di spegnere con acqua
Verboden met water te blussen

e)

Ikke drikkevand
Kein Trinkwasser
Not drinkable
Eau non potable
Acqua non potabile
Geen drinkwater

Mitnahme von Rauchwaren, Feurzeuge und Streichhölzer verboten

No smoking materials, lighters or matches

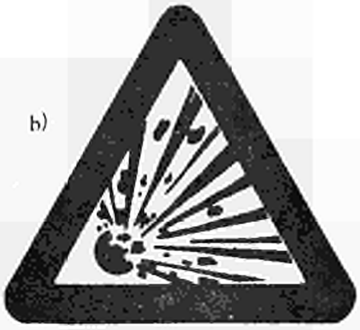
Interdit d'avoir sur soi tous produits pour fumer

2. Advarselstavler — Warnzeichen — Warning signs — Signaux d'avertissement — Segnali di avvertimento — Waarschuwingssignalen

a)

Brandfarlige stoffer
Warnung vor feuergefährlichen Stoffen
Flammable matter
Matières inflammables
Materiale infiammabile
Ontvlambare stoffen

b)



Eksplosionsfarlige stoffer
Warnung vor explosionsgefährlichen Stoffen
Explosive matter
Matières explosives
Materiale esplosivo
Explosieve stoffen

c)

Giftige stoffer
Warnung vor giftigen Stoffen
Toxic matter
Matières toxiques
Sostanze velenose
Giftige stoffen

d)

Ætsende stoffer
Warnung vor ätzenden Stoffen
Corrosive matter
Matières corrosives
Sostanze corrosive
Bijtende stoffen

e)

Ioniserende stråling
Radioaktivitet/Røntgenstråling
Warnung vor radioaktiven Stoffen oder ionsisierenden Strahlen
Radioactive matter
Matières radioactives
Radiazioni pericolose
Radioactieve stoffen

f)

Kran i arbejde
Warnung vor schwebender Last
Beware, overhead load
Charges suspendues
Attenzione ai carichi sospesi
Hangende lasten

g)

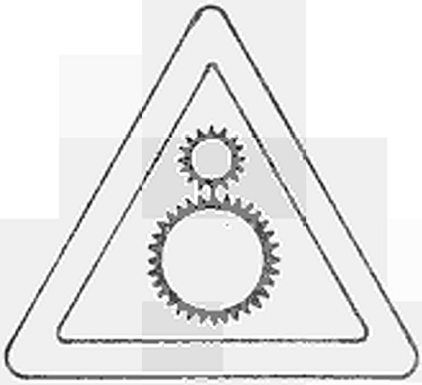
Pas på kørende transport
Warnung vor Flurförderzeugen
Beware, industrial trucks
Chariots de manutention
Carrelli di movimentazione
Transportvoertuigen

h)

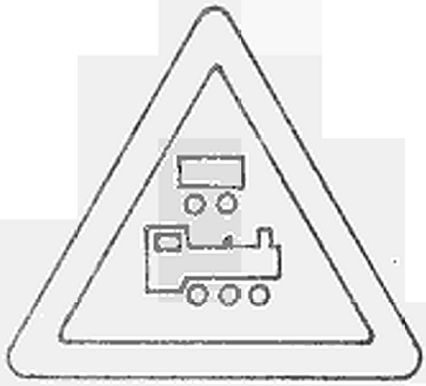
Farlig elektrisk spænding
Warnung vor gefährlicher elektrischer Spannung
Danger: electricity
Danger électrique
Tensione elettrica pericolosa
Gevaar voor elektrische spanning

i)

Giv agt
Warnung vor einer Gefahrenstelle
General danger
Danger général
Pericolo generico
Gevaar



j) Mouving machiniery
Mécanisme en mouvement



k) Locomotives moving wagons
Locomotive, locomotracteur, wagons
en mouvement

l) Warning Laser
Attention Laser
Vorsicht Laserstrahl

3. Påbudstavler — Gebotszeichen — **Mandatory** signs — **Signaux d'obligation — Segnali** di prescrizione — **Gebods-signalen**

a) 

Øjenværn påbudt
Augenschutz tragen
Eye protection must be worn
Protection obligatoire de la vue
Protezione degli occhi
Oogbescherming verplicht

b) 

Hovedværn påbudt
Schutzhelm tragen
Safety helmet must be worn
Protection obligatoire de la tête
Casco di protezione
Veiligheidshelm verplicht

c) 

Høreværn påbudt
Gehörschutz tragen
Ear protection must be worn
Protection obligatoire de l'ouïe
Protezione dell'udito
Gehoorbescherming verplicht

d) 

Åndedrætsværn påbudt
Atemschutz tragen
Respiratory equipment must be used
Protection obligatoire des voies respiratoires
Protezione vie respiratorie
Adembescherming verplicht

e) 

Fodværn påbudt
Schutzschuhe tragen
Safety boots must be worn
Protection obligatoire des pieds
Calzature di sicurezza
Veiligheidsschoenen verplicht

f) 

Beskyttelseshandsker påbudt
Schutzhandschuhe tragen
Safety gloves must be worn
Protection obligatoire des mains
Guanti di protezione
Veiligheidshandschoenen verplicht

g) hupen
sound your hooter
avertissez

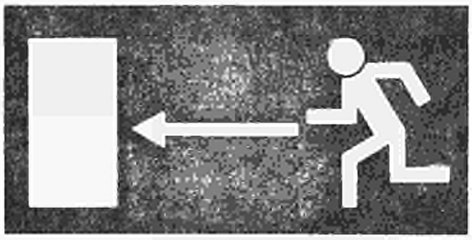
4. Redningstavler — Rettungszeichen — Emergency signs — Signaux de sauvetage — Segnali di salvataggio — Reddingssignalen

a)

Førstehjælp
Hinweis auf „Erste Hilfe"
First aid post
Poste premiers secours
Pronto soccorso
Eerste hulp-post

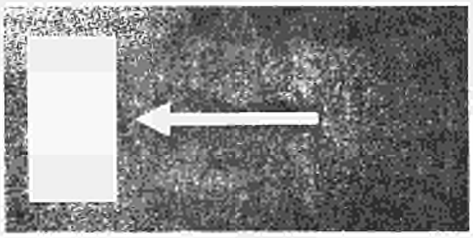
b)

c)



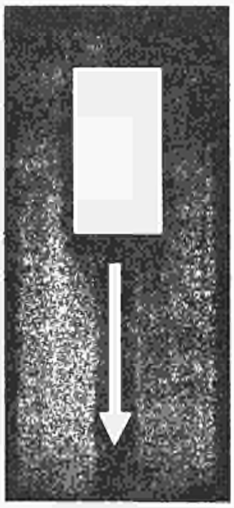
eller/oder/or/ou/o/of

d)



Retningsangivelse til nødudgang
Fluchtweg (Richtungsangabe für Fluchtweg)
Emergency exit to the left
Issue de secours vers la gauche
Uscita d'emergenza a sinistra
Nooduitgang naar links

e)



Nødudgang
(anbringes over udgangen)
Fluchtweg
(über dem Fluchtausgang anzubringen)
Emergency exit
(to be placed above the exit)
Sortie de secours
(à placer au-dessus de la sortie)
Uscita d'emergenza
(da collocare sopra l'uscita)
Nooduitgang
(te plaatsen boven de uitgang)

ANNEX VIII

CONSTRUCTION OF GATESIDE PACKS
FOR LONGWALL FACES

Report established by an editorial Committee
discussed and approved by the Working Party
on Strata Control on 21.11.78
and adopted by the M.S.H.C. on 27th March 1979,
as an information report to be sent to Inspectorates, Management
and other interested parties in accordance with Art. 3 and 6 of the Terms of Reference of the M.S.H.C.

CONSTRUCTION OF GATESIDE PACKS OF LONGWALL FACES

INTRODUCTION

1. GENERALITIES

1.1. Studies of the frequency of accidents occuring in European Coal Mines by location, show that the zones in which gate roads are formed and the junction between the face and the gate are areas of high risk.

1.2. This apart, the largest category of accident in European Coal Mines is now haulage and transport. Many of these accidents are known to occur in gate roads outbye of the face. To reduce the frequency of accidents occuring here, it is desirable to create the best possible travelling and working conditions in these roadways by reducing roadway deformation to the minimum to allow free movement of men, material and coal. Fringe benefits arise from improved ventilation and lower fire risks in clear and tidy roadways.

1.3. From both the economic and safety standpoints it is desirable to avoid the need to repair gate roads for these constitute a large proportion of the total length of roadway in use in many mines.

1.4. Apart from the natural strength of the rocks adjacent to the seam there are a large number of other factors which affect the actual strength of the strata in which the gate road and the face gate junction are constructed ; some of these factors also affect the pressure on the roadway outbye of the face. Examples are given below.

1.4.1. The placement of roadways, particularly with relation to stressed or desstressed zones caused by over and underlying workings may affect roadway conditions.

1.4.2. The position of the formation of the roadway relative to the face: normally roadways formed behind the face are subject to less convergence than those created in advance of the face.

1.4.3. The method of formation of the roadway: In general the cutting out of the roadway profile by machine causes less destruction of the natural strength of the strata than shotfiring and gives a better profile to which supports can be set, thus reducing the point loading on arches, bars or lagging.

1.5. Some of the general aspects referred to above and methods of strengthening stata by bolting etc. have been studied by the Working Party on Strata Control and Stability of Ground. The following papers are available from the Secretariat of the Mines Safety and Health Commission.

<u>2751/74</u> Experiences with roadhead systems on advancing faces in the South Midlands Area of the National Coal Board.

<u>761/77</u> Support in Narrow Workings in the S. Midlands and S.Notts. Areas of the National Coal Board

<u>1612/3/75</u> Strata Reinforcement by Bolting, Dowelling and Injection Techniques

<u>1462/5/77</u> The view of the Mines Safety and Health Commission on the question of Strata Reinforcement by Bolting, Dowelling and Injection.

These factors are outside the scope of the present paper which deals with methods of packing. In due course a paper will follow on planning aspects to be taken into account when considering the location of roadways and the method of forming roadways to be used in practice.

1.6. Having optimised the natural strength of this strata by taking account of the above factors and any local conditions appertaining, attention to the method of building the gateside pack remains, probably one of the best ways of reducing accident in the roadhead/face/gate junction area, and reducing roadway deformation behind faces.

1.7. The following report summarises the advantages and disavantages of the various methods of building packs, and from this it should be possible to draw up certain recommendations for the improvement of both general conditions in mines, and specifically improvements in the roadhead area of longwall faces.

2. General Remarks on Packing Systems

2.1. With most methods of constructing gateside packs persons have to approach or enter the pack-hole and in this position they may be behind the general breaking off line of the waste. It is important that proper consideration should be given to methods of increasing the stability of support in this area, either by the construction of the pack in front of the general breaking off line, or by the use of special supports designed to prevent falls occurring in the pack hole.

2.2. In general the method of building a gateside pack should be such as to reduce the risk of persons being injured either by falls of roof in the pack-hole or adjacent thereto and to risks from the use of materials or tools.

2.3. For any given situation the method of building the pack should take into account the desirable length of the pack, its strength, the distance of the completed pack from the face, and its rapid placement.

2.4. The strength of the pack should, wherever possible be adjustable to give minimum roadway deformation behind the face.

3. The Classification of packing systems

3.1. The gateside packing systems in use in European Coal Mines can conveniently be divided by the origin of the material from which the pack is built, and by the method of placing the material.

3.1.1. by the origin of the packing material

3.1.1.1. Indigenous material (stone or coal coming from the face or the creation of the roadway)

3.1.1.2. Inported material (natural or synthetic)

3.1.2. by the method of placement of the packing material

3.1.2.1. placed by hand

3.1.2.2. placed by mechanical means

3.1.2.3. placed hydraulically or pneumatically

following this classification there are six methods of packing normally available. The advantages and disavantages of each of these methods is considered in the next three parts of the report, which are based on information derived from the main coal mining countries of the European Community.

4. Hand Packing methods

4.1. The proportion of the total number of gate roads in which packs are constructed by hand varies throughout the various member states. A fairly detailed breakdown for the United Kingdom suggests that about 80% of the roads where packing is practised (nearly 1 000 out of 1,250) are hand packed. Of these some three quarters use indigenous material and the balance use imported matèrial (either concrete blocks or wood). It is believed that in Germany, a rather lower proportion of the gates are packed by hand. In France and in Belgium, hand methods still predominate, though mostly using imported material.

4.2. Since men must enter the pack-hole to construct the pack and so expose themselves to the danger of falls in this area, it is extremely important with this technique that wherever possible the pack is built in advance of the general breaking off line of the waste, and that the pack-hole is well supported. In the latter case, the use of powered supports either with powered rear facing cantilevers, or of telescopic length, is one way of ensuring a greater degree of stability in this area. In one country, the use of a tandem or buttress chock is sometimes advocated to prevent the risk of the general caving of the waste extending into the pack-hole where men may be working.

4.3. A disadvantage of the method as compared with mechanised means of placing the pack is that it is impossible, de facto, to remove the men from this area. On the other hand, they are not exposed to any of the risks associated with the use of dirt moving equipment.

4.4. Hand Packing using indigenous material

4.4.1. This method is still widely used in the United Kingdom; it is less common in other member states of the Community. The material has to be broken into an acceptable size by shotfiring or mechanical means. Sometimes, especially, in thick seams, there are insufficient stones for the building of the pack walls, and for this, fine material has to be bagged in paper, hessian or wire-mesh sacks.

4.4.2. By comparison with mechanised means of pack construction, the method is slow and the resultant pack has a very variable performance, largely dependent on the quality of workmanship and the stone available. These factors may be difficult to control. However, the lower strength can be valuable with certain roof conditions where it is necessary to allow the roof or floor beds to move to destress the gate.

4.4.3. The work involved in the construction of the pack is difficult and arduous especially in thin seams. The resultant cost per metre^3 of packed space, is probably higher than for a similar pack of imported material. Equally this system is slow and arduous in thick seams.

4.4.4. Also this system of packing has the disavantage of producing a gateside pack which is previous to air which, if there is either roof coal or an appreciable coal content in the pack itself, may give rise to spontaneous combustion either in the gateside pack itself or in the neighbouring strata. The difficulty can be overcome by plaster injection into or onto the pack, but at additional cost.

4.4.5. With very rapidly moving faces, it is difficult to keep up with the face advance.

4.4.6. On the other hand, there are no capital costs for equipment, and the ripping dirt is kept within the mine. There is a lower risk of transport accidents arising as compared with where imported material is used.

4.4.7. In summary, modern technology seems to offer better alternatives in the majority of circumstances.

4.5. Hand Packing with imported materials

4.5.1. The imported materials for packing are generally either hard or soft wood or concrete blocks. With soft wood a longer pack is frequently built and the cribs formed may be filled with stone. They possess a measure of yield which may be valuable under a pliable roof or with a soft floor. Hardwood chocks give a higher resistance for any given area but the chocks are normally smaller and consequently are better suited to the more resistant strata.

4.5.2. The use of imported wood enables hand packing to be speedily completed to a fairly well assured standard. However it has a serious dissadvantage in that it permits air to pass through the waste and this may give rise to spontaneous heating particularly near to faults or air crossings etc. and it should never be used without special precautions in seams liable to spontaneous combustion. Under such circumstances it is necessary to seal the gateside pack either with plaster or foam of a fire resistant type. Both processes are costly.

4.5.3. The alternative system of using concrete blocks has certain advantages. In particular it allows a pack of known resistance to be constructed quickly and economically. Such packs are not liable to cause spontaneous combustion, either in or close to the pack, or in the waste. When crossing faults, it is relatively easy to seal the pack completely, against air leakage by facing with gypsum plasters or by injection.

4.5.4. Tests with concrete blocks have generally shown that aerated concrete is both cheaper and better than solid concrete. The resistance of a solid concrete block is frequently lost as soon as it breaks; it is heavy and costly to transport and place; packs of this material tend to break either the roof or floor beds. The aerated block can be manufactured to give the desired strength and amount of yield; they are virtually impervious to air once faced with gypsum plaster.

4.5.5. Both hand packing with imported wood and with imported concrete pose a serious disadvantage from the safety standpoint: they create a transport requirement which does not occur with indigenous material and hence an additional risk of accident. However the improved roadway conditions which frequently result from the use of a more homogeneous and reliable material in the pack, may more than offset this additional risk. Already transport occurs in these roadways for men, materials and sometimes coal, but the packing material does increase the load on these facilities.

5. Mechanical methods of placing packing material

5.1. The mechanical methods of placing packing materials in the packs of gates of longwall faces, almost invariably use indigenous material. They account for some 20% of the gateside pack installations in one country (the U.K.). Of 261 installations in March 1978,

115 were slushers
19 were Webster packers
26 were Cam packers
10 were Dowty ripping tables

French and Belgian experience of application of these techniques again shows the preponderence of the established technique of slushing. It is convenient to deal with these systems in three main groups, Slushers, Blade Packers and Ram Packers. Previous systems using high speed belts for the discharge of material into the waste have now largely been superceded.

5.2. Slushers

5.2.1. For slushing to be successful, the ripping dirt must be well fragmented by either the shotfiring or the mechanical ripper. Large stones present serious problems and result in many stoppages.

5.2.2. The second requirement for successful slushing is the careful preparation of the pack-hole, which must be straight and well supported. It can be argued that the return wheel should be securely anchored to a rear extension of a powered support or remotely controlled hydraulic chock.

5.2.3. The method has the advantage that it can deal with virtually all the dirt produced from quite sizeable rippings in thin seams very quickly. (15 to 20 tons per hour in packs up to 35 m. long).

5.2.4. It has the disavantages of the pack being (a) further from the face than with certain alternative systems and hence allowing greater convergence of the roof beds before placement of the pack (b) erratic pack quality which is dependant on the two factors listed in 5.2.1. and 5.2.2. and (c) exposing personnel to risks associated with the movement of the bucket and ropes in confined spaces and haulage drums. Notwithstanding this, it finds considerable application in thin seams where the coal from the face must not be contaminated with free mine dirt. It is thought to be less effective than other methods in the thicker seams (more than 1½ metres).

5.2.5. Never-the-less properly applied, packing can be economically and safely completed with less physical effort than by hand means, and less risk.

5.3. Blade Packers (The Webster system)

5.3.1. This system consists of a blade drawn along the waste side of the powered supports by a continuous chain driven by a hydraulic piston motor attached to the gobside of the support at the waste end of the pack (a photograph is attached).

5.3.2. Like the slusher packer, the dirt must be carefully graded, and the pack-hole maintained straight. This is best done behind modified powered supports with rearward facing cantilever roof beams (see photograph).

5.3.3. The system has certain advantages over the simpler slushing system
a) it has a higher capacity at up to 50 tons per hour.
b) it can cope with a rather wider range of seam thicknesses from 1 metre to 2,5 metres high.
c) the dangers associated with ropes, drums and return wheels are largely eliminated.

5.3.4. It has the disadvantage that it can as yet only deal with packing on one side of the gate and has only rarely been applied to main gates. (In the U.K. some 25% of gates still have packs on two sides for one reason or another).

5.3.5. In general, this seems a more refined alternative to slushing and its development appears to merit encouragement.

5.4. Ram Packers (a) Cam Packers

5.4.1. This system can only be used in conjunction with powered supports which extend along the face right up to the gate side. It consists basically of a series of cams fitted to the rear legs of the powered supports and operated through a turning angle of 90° by integral hydraulic rams. The bore of the ram is 114 mm giving a maximum tip force of 6.9. tonnes when operated at a pressure of 15.2 MPa. The cams are arranged in odd and even units, which are separately controlled by two valves, and operate sequentially to move the dirt along the face, the cams can be either floor or roof mounted on the supports.

5.4.2. The system has the advantage that it can work on both sides of the gate with either shotfired or machine cut dirt. There must be a good dirt feed to the first cam, but once this has been achieved, packing dirt movement and placement is good.

5.4.3. Its greatest application is in the thinner seams (below 2 metres) but like some systems described previously it tends to increase the distance between the pack and the face.

b) Dowty Packing Table

5.4.4. Another system of mechanical packing particularly well suited to the thicker seams is that described in the following note.
Broadly the same consideration apply to this as to the Cam packers.

5.4.5. Dowty Packing Table

The Dowty Packing Table is a ripping platform with drawers which move debris on the table onto either side and then ram it into the pack-hole up to a distance of 4.5. m. The platform consists of a trough section containing the top and bottom drawers and a hinged table section which can be elevated through 90° feeding the debris on it forward into the drawers. The bottom drawer is usually double telescopic giving an overall stroke of 2.2 m and a thrust of 12,700 kg at 13.8 MPa. On each side of the trough are mounted a pair of hydraulic legs and a roof beam which stake the unit against the lateral forces generated in packing and also assist in the control of roadway sides at the packhole entrance. A 4.5 m pack can be placed in 25 minutes at a rate of 35 tonnes per hour. The table is best operated in conjunction with roadhead powered supports capable of supporting the ripping lip in cantilever. Access to the face is inevitably limited because of the size of the table. The table is best operated in sections greater than 1.75 m and has been seen to give good pack consolidation.

5.6. Overall, mechanical packing offers one solution to the problem of speedily constructing a pack, whose resistance can be assured in advance, without resort to costly and arduous hand work. With the exception of slushing the system can be remotely operated from a position of safety on the face under powered supports.

By the proper choice of system to suit the seam thickness (e.g. slushing for thin seams, cam packers for medium seams and ram packers and packing tables for the thicker seams) virtually all the ripping dirt can be absorbed allowing a cleaner coal to be sent from the face.

No water is used other than for dust suppression; this is frequently an important factor when working on a soft fireclay floor which will soften markedly and subsequently lift to cause dinting to be necessary outbye of the face if free water is left on the floor.

All systems require careful dirt preparation, and straight pack-holes. The use of slushing generally results in the completed pack being further from the face than other systems.

The entry onto and exit from the face are encumbered by rather large equipment, and there is a capital cost to be found and equipment to be serviced.

5.7. In summary, the correct choice of system for the conditions and attention to the above details should result in improved working conditions at the face, and better roadway conditions outbye. Further trial applications of the more modern systems under a wide range of conditions are required. A better system to replace slushing for the thinner seams, avoiding the need for persons to enter the dirt morement track, is desireable.

6. Hydraulic and pneumatic stowing

6.1. Whilst both these processes have been known and used for a considerable time as a method of controlling roof bed movement on the main parts of longwall faces, their application to the construction of a gateside pack is relatively recent. There are a number of differences in the method for general application and gateside application.

6.2. In particular, the gateside pack has only a short length and must be self supporting at its sides. It is therefore usual to add setting agents to either the stone or raw coal used to construct the pack. These are generally in the form of cement or cement-bentonite mixtures, though in Germany, there is widespread use of anhydrite and anhydrite-flyash mixtures.

6.3. Hydraulic or pump packing systems

6.3.1. Screened run of mine coal, or dirt from a conventional ripping lip is normally carried a short distance outbye to a mixing station by a variable speed, narrow chain conveyor. Here water and a flow agent such as bentonite are added, and the mixture is pumped back to the face. Just before the material is emitted from the pipe, a setting agent is added to form a quick setting grout which is pumped into a shuttered area behind the face supports. The dirt or coal has normally to be screened to less than 25 mm in size. A pack can be placed in 30 minutes and the shuttering removed in 45 minutes after termination of the packing.

6.3.2. The great advantage of this systems is that it utilizes material directly available on site. With the proper control of the process it is speedy, and constructs a pack of fairly well determined but regulateable compressive strength.

6.3.3. Water control and mixture control is difficult, and with certain types of setting agent, protective clothing has to be worn.

6.3.4. The biggest single disadvantage of the system is that the frequent spillage of water on the floor of the gate road may cause increased floor lift with seams where the underlying beds contain appreciable amounts of fireclay.

6.3.5. Anhydrite based systems are usually largely compressed air fed systems, where water is added at the point of emission. In Germany, where the system has been applied for a number of years, it is frequently the practice to use no dirt from either the ripping or the advanced head, and to stow in solidly all timber props used for the support of the pack-hole. Hessian cloth tacked to the wood props is used to contain the pack. Consequently the amount of water used is much less, and the system may be better suited to the fireclay floor conditions associated with some seams.

Centralised and long distance dirt feed systems have been developed, (some applying fly ash from the surface and transporting through pipes for up to 4 km).

6.3.6. Again, such systems permit a pack to be built safely, speedily and with a known but regulateable compressure strength. The disadvantage of the anhydrite system is that normally dirt from the ripping or advance heading contaminates the coal produced, as it has to be sent out of the mine.

6.4. Pneumatic stowing

6.4.1. Both low and high pressure stowing units have been utilized for the construction of gateside packs (0,5-1bar and 5-6 bars), largely dependant on whether compressed air is widely available in the mine; low pressure units being generally used where there are no high pressure air lines for general application in the mine.

6.4.2. In the high pressure system, screened or crus ed dirt is sent to a stowing mac ine supplied with compressed air from the normal mine range. 0,26 m diameter pipes are used to deliver the dirt into the pack-hole.

6.4.3. The system is particularly suited to faces where advanced heading is used and in seams 1 to 1½ m thick. Pack quality is good, and if the pipe handling is properly mechanised there is little risk of injury either in the handling of pipes, or from falls of roof.

6.4.4. The low pressure system uses a compressor located close to the similar stower unit to the high pressure system. The dirt is blown to the face through 300 mm pipes. Graded or crushed dirt must be used.

6.4.5. A good quality pack can be built, at the rate of 20 to 40 tonnes per hour, but dust and noise have been a problem.

6.4.6. Both systems have proved to be effective, though pipe handling is something which requires to be mechanised and so arranged that there is no need for person to enter the stowing track. For this purpose, systems using pipes attached to the rear of powered supports merit serious investigation. Dust problems should be overcome by adding water to the dirt on entry to the stowing machine.

6.5. Annex I includes data submitted by the German delegation on the pneumatic and hydraulic systems of constructing gateside packs in that country, where they have been widely used

Annex II contains useful comparative information in tabular form.

7. CONCLUSIONS

7.1. A number of systems exist for the rapid placement of packs alongside the gates of longwall faces. These systems can result in improved safety for men working to construct the pack, and at the face/roadway junction, due to the improved support of the area as compared with earlier hand packing methods, using indigenous material.

7.2. The use of imported packing material for hand packing may result in much improved conditions in roadways outbye of the face; this improvement in mine conditions, may more than off-set the increased load on materials transport systems, and the risks to persons involved with that transport. The use of wood in gateside packs in any area liable to spontaneous heating, should be avoided.

7.3. The three mechanical systems of packing indigenous dirt merit further application and investigation, particularly when they are used in conjunction with powered supports adjacent to the pack area. They have the advantage of placing a pack quickly and in safety, without the use of water which in certain seams may cause floor lift in the gate outbye.

7.4. Pumped and pneumatic packing systems are ideally suited to the rapid and safe construction of a pack of known resistance. However the equipment can be cumbersome, and water loss onto soft floors can aggravate the difficulty with floor lift in the gate.

7.5. Mechanical and pneumatic/hydraulic packing systems generally reduce convergence in roadways and the risk of spontaneous combustion in mines where this was formerly a problem with hand placed wood or indigenous material. If these installations are not justified, then concrete blocks placed by hand can achieve the same ends. The development of a simple machine for placing such blocks from a position of safety is desirable.

7.6. The Working Party sends this report to the Mines Safety and Health Commission, with a recommendation that it be circulated as an Information Report in accordance with Article 3 of its mandate. That Commission may decide that a proposal be made to governments in accordance with Article 1 of its Terms of Reference, that further trials of the various types of mechanical and pneumatic/hydraulic systems of constructing gateside packs be completed over as wide a range of conditions as possible and that the results of these trials should be carefully recorded and summarised; these results would be useful for planning systems likely to improve general safety in mines.

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NOTE FROM MR GROTOWSKY ON PNEUMATIC/HYDRAULIC PACKING

1. Pneumatic and hydromechanical packing

1.1. Pneumatically built packs of hydraulically binding materials

This process is coming into increasing use in German mines. The maximum distance from a supply station to a discharge point is approximately 3000 m. However, by means of intermediate stations, supply can be made from above ground. Pack materials mainly consist of coarse-grained substances such as natural anhydrite, Quick Mix and Wülfrath mortar but finer-grained materials such as Stöcker mortar are also used. The transport capacity, which is greatly dependent on the travel distance, can be up to 20 m^3/h.
Since pneumatic transport requires high investment, the costs very much depend on the degree of utilization of the plant. It is therefore desirable to supply several packs from one station. The normal pack width is 0.6 to 0.8 times the thickness of the seam. With the aim of saving costs and improving strata control characteristics, tests have been conducted with packs widths of 0.2 to 0.4. times the seam thickness (but not less than 0.6. m) with successful results, especially in soft rock.
Compared with hydromechanical methods, the construction of shuttering is simple. Packs so built also attain highest strengh earlier.
However their disadvantage lie in greater dust formation and equipment wear. For greater seam thicknesses and cases where the caved goaf has to be made impermeable to air, these gateside packs are less expensive than wooden chocks (1).
Gateside packs stowed pneumatically into open shuttering have so far proved to have the best effect, on gateroad stability, compared with all other methods. This is due to their early, high load-bearing capacity of 5000 km/m^2 after 5 hours and the possibility of also filling roof cavities in packholes. This does not apply to powdery materials which have to be stowed pneumatically into closed containers. As far as strata control characteristics are concerned, these packs should be put in the same category as wooden chocks because they do not join on to the roof and are not early-bearing. Two thirds of all gateside packs built in West German mines from hydraulically binding materials are constructed from early-bearing material stowed pneumatically into open shuttering.

(1) Breer, W. und W. Götze : Saumversatz im bundesdeutschen Steinkohlenbergbau. Glückauf 109 (1973) pp. 1259-76.

2. Hydromechanically-built packs of hydraulically binding materials

This method, which is mainly employed in German mines, but has recently been introduced into British mines, is applied according to one of two systems ; with the pumping station near the pack, or with a central station above ground.
Both systems involve the construction of relatively complex, dense and compression-resistant shuttering with mainly fine-grained pack materials such as synthetic anhydride and Blitzdämmer.
In the case where the pumping station is located in the vicinity of the pack, the distance to the pack can be up to 200 m. However, this distance can be increased by employing intermediate pumping stations. An advantage of this method is that the ratio of water to solid matter can be kept low, i.e. thicker slurry can be used. As a result, there are lower requirements with regard to the impermeability of the shuttering. Moreover, the setting period for the pack material is shorter and the load-bearing capacity higher.
A disadvantage, however, lies in the higher costs since conventional transport and manual handling have to be used.
The system incorporating the use of a central station above ground is very efficient. However, it has to be operated with thin slurry. Also, large quantities of rinsing water (up to 5 m^3) are required at the face end. Stowing capacities of up to 25 m^3/h and maximum transport distances of up to 6000 m are possible.
The effectiveness of these packs in terms of strata control can be compared with that of wooden chocks. They are used for thin to medium-thick seams.

3. Packs from dirt and coal fines available underground combined with imported binding and flow agents

This method is called the pump packing system and is currently in use in British mines only. Screened ROM dirt and coal fines are stirred into a thick slurry with the addition of 2 % Bentonite, which acts as a flow agent. The slurry, which can be pumped over a distance of 1500 m, can remain in the line for six months without separation occuring.
Immediately prior to the coal-dirt mixture being poured out of the pipe and into the pack shuttering, the cement suspension is fed into it via a mixing nozzle.

The cement suspension is prepared in one of the two gateroads of a face from cement supplied in sacks. The mixer for the cement suspension is located a maximum of 200 m from the face. With the addition of a setting agent, the cement sets so quickly that the shuttering can be removed again after two hours (1). In order to set, the coal-dirt mix requires 10 % of its weight in high quality cement. The final compressive strength of 3000 N/m^2 is low. The packs must therefore be made very wide (twice the thickness of the seam). The shuttering is movable and is advanced to follow the face supports. It can be extended against the roof and seals off the stowing space from the face and caved goaf. The space between the roadway supports and the shuttering is sealed off manually with paper sacks filled by hand with small dirt.
The shuttering must be accessible from the caved goaf. One or two support chocks must therefore be placed behind the face end to protect the working force.
Substantial problems are encounted in advancing the shuttering when there are cavities in the packhole roof. The best areas of application are therefore roadways driven ahead of or in line with the face with good packhole conditions not liable to spalling roof.
Two manshifts per roadway packhole are required per shift - one manshift for the cement mixer and one for the mixer preparing the coal-dirt slurry.
Gateside packs built according to the pump packing system are considered to have a better effect on the stability of roadways than the packs built mechanically from roadhead rock (2,3).

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(1) Breer, W. und W. Gotze : Mitgefahrene und nachgefahrene Abbaustrechen im britischen Steinkohlenbergbau.
Gluckauf 112 (1976) pp 70-75

(2) National Coal Board "Ideal requirements of packs"
Progress report Nr. 6, July-December 1977

(3) Wills, N.B. :
" The Pumped Packs System at Markham Main Colliery"
Colleiry Guardian, Dec. 1977 pp 901-906

Packhole stowing methods — Table 1

Type of construction	Material used	Pack characteristics Load bearing		Air permeability	Costs Per m roadway for seam thickness of			Proportion of costs	
		Start	Capacity		1 m	1.5. m	2.0 m	Labour	Material
Hand	Dirt	Late	Low	High	200-400 DM	300-600 DM	400-600 DM	Very high	Very low
	Wooden chocks	Late	Low	High	100-250	150-350	200-500	High	Low
	2 wooden chocks with Isoschaum	Late	Low	Medium-low	approx. 350	approx. 500	approx. 700	High	Low-medium
	Concrete blocks	Average	Medium-low	High	approx. 150	approx. 220	approx. 300	High	Low
Mechanical (scrapers, ploughs, Cam-Packer etc.)	Dirt	Late	Low	High	100-200	150-300	200-400	Medium	Low-medium
Hydromechanical (Mixer, pumps, leakproof shuttering)	Dirt or coal with binding agent	Average	Low	Medium	approx. 300	approx. 350	approx. 400	Medium	Medium
	Hydr. binding materials	Average	Medium	Medium	200-400	250-500	400-800	Medium	Medium
Pneumatic stowing machine	Hydr. binding materials	Early	High	Low	150-250	200-350	300-600	Low	High
and ancillary equipment	Dirt with binding agent	Average to early	Medium	Low	approx. 300	approx. 400	approx. 500	Low	High

Table 1 shows the different materials used for gateside packs, classed according to the type of construction, including their characteristics and the estimated costs of the different systems according to seam thickness. The cost estimates are based on the normal pack widths for the different processes and an average length of workings of 1 000 m.

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Glückauf 102 (1966)pp. 241-45
(3) Spruth, F. : Muss der Streckensaum einer Abbaustrecke gesichert werden ?
Glückauf 105 (1969)pp. 981-86
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Glückauf 112 (1976)pp. 70-75

2. Mechanical packing (scraper, Cam-Packer, Dowty-Table, Webster-Packer)

(1) Williams P. and D. M. Wright : Roadhead Systems.
Colliery Guardian, December 1975.
(2) Breer, W. and W. Götze : Mitgefahrene und nachgefahrene Abbaustrecken im britischen Steinkohlenbergbau.
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(2) Mc Carty, K. : Experiences in Roadside Packing with the Low Pressure Jet Stower at Daw Mill Mine (Presented at the Institution of Mining Engineers Junior Section'Summer Meeting, Grand Hotel, Scarborough, Tuesday, 14 May 1974).
(3) Breer, W. and W. Götze Mitgefahrene und nachgefahrene Abbaustrecken im britischen Steinkohlenbergbau. Glückauf 112 (1976) pp 70-75.

4. Packs built with imported material (wood, concrete, sill timber)

(1) Breer, W. und W. Götze : Saumversatz im bundesdeutschen Steinkohlenbergbau.
Glückauf 109 (1973) pp. 1259-1267.

ANNEX IX

THE USE OF FILTER SELF-RESCUERS IN COAL MINES IN MEMBER STATES OF THE EUROPEAN COMMUNITY

PART III

FUTURE DEVELOPMENTS

A report established by a Committee of experts
which was adopted by the Working Party on Rescue Arrangements, Mine Fires and Underground Combustions
on 10th November 1978
and the Safety and Health Commission on 27th March 1979
as an information report which should be sent to Mines Inspectorates,
Managements and other interested parties
in accordance with Articles 3 and 6 of its Terms of reference

3919/79 E (Part I – II – III)

USE OF FILTER SELF-RESCUERS IN MEMBER STATES OF THE EUROPEAN COMMUNITIES

PART III

FUTURE DEVELOPMENTS

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USE OF FILTER SELF–RESCUERS IN COAL MINES IN MEMBER STATES OF THE EUROPEAN COMMUNITIES PART III FUTURE DEVELOPMENTS

1. GENERAL

The following discussion refers solely to the future development of filter self-rescuers and associated problems. It must be stressed that other rescue systems are also feasible, with particular reference to the so called "oxygen self-rescuers". These devices have - among several drawbacks - the advantage that they are in use independent of the surrounding atmosphere. (It is proposed to make this type of apparatus the subject of a special investigation). Like most technical instruments and apparatus the filter self-rescuers with which most of the European miners are equipped, represent a compromise between an ideal and technical practicability. In particular the requirement as set out in Part II - that the F S R should always be carried on the person restricts its dimensions and weight and thus limits its development. The following discussion, therefore takes account of the criteria laid down in Part. I. Within the framework of these technical requirements the useful life of the latest FSRs has been considerably extended.

The evaluation of experiences with self-rescuers used in incidents underground is also of great importance for the improvement of the FSR. Such practical experience should be pooled and systematically evaluated in order to obtain a basis for further FSR development.

The applicability of an FSR escape system cannot be judged in isolation from general conditions in underground workings. Of particular importance is the question of fire intensity and the chances of a really large fire developing. Improvements in fire protection and of the self-rescuers must be regarded as important and complementary.

There is a general opinion that the current design of FSR' can be regarded in the main as fully developed. It is not expected that fundamental improvements can be achieved in the near future. This could surely be possible only at an enormous expense. It seems doubtful whether such an expenditure would be warranted in view of the results likely to be achieved. However, the following pages are intended as guidelines that should be taken into account, so far as possible, in the future development of the FSR.

It has been established that the efficiency of the FSR may be impaired by smouldering or burning plastics. In this context, the term plastics refers to all organic matter of high molecular weight, including the elastomers which may be contained in conveyor belts. According to observations so far, the gaseous matter produced when these plastics smoulder or burn is retained sufficiently by the FSR now used, whereas certain materials can cause the FSR to become blocked with soot or other particles.

It is therefore considered essential that in mines where filter self-rescuers are used only plastics which do not impair the functioning of the FSR in the event of a fire,should be used underground .

2. FURTHER TECHNICAL DEVELOPMENT OF THE FSR

2.1. SIZE AND SHAPE

As the FSR has to be carried "on the person" underground at all times, any large increases in the dimensions and weights specified in Part I appear unlikely It would be desireable to aim at a shape better adapted to the human body when carried. Even with the early types of European FSR attempts were made to provide a kidney-shaped cross-section. Such a design, however presents difficulties in the packing of chemical layers and it seems doubtful whether a satisfactory resistance to mechanical shocks and vibration could be achieved.

A high resistance to vibration and shocks is a desirable aim of further development. Aluminium alloys should not be used for the case of the filter self-rescuers. The hazards of electrostatic charges likely to occur with the use of plastic materials should also be investigated.

In the future development of filter self-rescuer it would be advantageous to develop an indicator showing in a simple manner that the filter self-rescuer is in a satisfactory condition for use. It would be a step forward if a system to indicate the ingress of air into the self-rescuer case could be devised. This would not, however, affect the life of the filter self-rescuer.

2.2. CARRYING POSSIBILITIES

Whilst it is difficult to fit the shape of the FSR to the human body it seems possible to improve its carrying on the body. Here it must be borne in mind that - on the one hand - there is sufficient insulation between the metal case and the body and - on the other hand - that the FSR cannot swing about when the man is walking or working. Another attempt should be made to check how practicable it is to have the FSR in a "pocket" or bag that can be attached to the belt or included in miner's trousers. Consideration should also be given to the picking up and return of the FSR before and after a shift and to the storing of the apparatus outside working hours.

2.3. BREATHING CONNECTIONS

Only mouthpieces or full-face masks can be considered under this heading. Half-masks must be rejected because of the hazard of leaks.

The mouthpieces in almost exclusive use today should be improved as far as possible so that no irritation of the mucous membranes can take place even during prolonged use. Attention must be paid to the quality of the rubber with respect to prolonged storage in a very dry atmosphere.

Some people may find the use of a mouth piece very unpleasant. This disadvantage may be overcome by a full-face mask, but this in its turn creates new problems. The dimensions of the FSR would have to be increased. Because of the long contact line with the face the danger of leakage is much greater. Although face-masks protect the eyes and allow speech, these advantages are counteracted by the difficulty of keeping the lenses clear and by the longer donning time.

The advantage of better communication is regarded as very important by some experts, leading to a consideration whether supervisory underground personnel should not be equipped with face-mask FSRs.

In the end the mouthpiece appears to be - for its purpose - the safer method.

2.4. BREATHING TUBE

The difficulty of holding the FSR "at the mouth" and the problems with the head-harness, considered in more detail in 2.5., are much reduced when the FSR is worn on the chest and connects with the mouthpiece by means of a corrugated breathing tube. This design has been used in some European FSRs and is usual in the oxygen self-rescuers. Another advantage is the possible cooling of inspired air.

A disadvantage of such a design is the greater weight, bigger dimensions and difficulties associated with the carrying of the FSR on the chest which have not yet been eliminated. There is also the danger of a "kinked" breathing tube.

For these reasons the general trend in the Western European countries is not to use a breathing tube.

2.5. HEAD-HARNESS

The head-harness should support the greater part of the weight of the FSR when worn. Difficulties can arise because of differences in head sizes. The design of the harness must be such that on small heads there is sufficient support and on large heads the tight fit does not cause pain. The donning of the harness must also be simple and easily carried out in the dark.

Investigations into the best design of the harness are currently in progress in several member states.

2.6. NOSE CLIP

Wearing the current nose clip for a long time can cause difficulties to some people and can be very painful to men with large noses.

The purpose of the nose clip is to seal the nose. As in the case of the head-harness the technical difficulties arise from the very variable anatomical shape of the human nose. In the history of breathing apparatus development there are a number of proposed solutions for a suitable nose-seal ; but the nose clip has proved to be the most reliable method. However, it is considered to be advisable to carry out special investigations into this question. For special cases it may be necessary to design special devices. (an example of this is the development of a special nose-seal for Korean miners in Germany).

2.7. GOGGLES

There is to date no known instance of an incident where the lack of protective goggles has been of any lasting consequence. On the other hand daily carrying of such goggles would increase the weight and size of the FSR. Additional difficulties arise as in the case of face-masks, from the need to keep lenses clear of condensation and dust. The provision of the goggles currently is not regarded as essential.

2.8. CHEMICALS

A considerable proportion of the weight of a FSR derives from the drier. The FSR therefore could be made lighterand smaller if a CO-catalyst could be developed that would have without pre-drying, the same performance as the currently employed Hopcalite. The search for such a catalyst has been going on for decades. Such catalyst could also lead to reduced breathing resistance. However, the prospects of discovering such a catalyst are very remote. It is not suggested that special research should be undertaken in this field but progress in the technical developments of catalysts should be followed carefully.

The same applies to the improvement of the performance of the drying agent used in filter self-rescuer. Both the Hopcalite and the drier must satisfy a large number of technical requirements which need not be discussed here. Apart from the development of new reagents a step forward would be a successful reduction in the degradation of chemicals during carrying. Such degradation can be disagreeable to the user.

Prolonged carrying of FSRs underground with associated shocks and vibration may lead to an accumulation of reagent fines in the case and in the FSR itself Large amounts of dust reduce the performance of the FSR. But even small amounts of reagent dust can be unpleasant and disturbing to the wearer. An improvement in the stability of the reagents and in the filling technique is therefore desirable.

2.9. TEMPERATURE OF INHALED AIR

The inhaled air temperature is raised in a FSR by the oxidation of CO to CO2, and by the absorption of water vapour by the drying agent. Heat exchangers and other devices are introduced to remove a large part of this heat. At higher CO contents the temperatures of the inspired air and of the actual FSR (in close proximity to the wearer's chin) are so high that wearing the FSR becomes unpleasant. New designs should therefore consider improved coolers and better protection for the lips and chin of the wearer.

3. IMPROVED CHECKING AND MAINTENANCE PROCEDURES FOR FILTER SELF-RESCUERS.

3.1. NON DESTRUCTIVE TESTING

In countries where filter self-rescuers are used by the mining industry their quality is checked both by testing specimens off the production line and by taking spot-samples in the field. The performance testing of a self-rescuer involves its destruction. Although at the moment there appears to be no non-destructive test method in sight the desirability of developing such a test should not be forgotten. A non-destructive test would considerably increase the certainty that the filter self-rescuers will have the required performance.

3.2. TREND ANALYSIS

A further improvement in the checking of filter-rescuer stocks could be achieved by the establishment of a trend analysis. For this it would be advisable to store all test results of self-rescuers in a given series in a computer data bank and to devise a data processing programme for predicting with sufficient accuracy the likely test life of filter self-rescuers.

3.3. ANALYSIS OF DETERIORATION FACTORS

The self-rescuers deteriorate after several years for various reasons. Some of the factors, e.g. water vapour absorption and aging of rubber, are known. Others, such as vibration and shock effects, are difficult to quantify exactly.

An investigation of the type and seriousness of these factors could provide useful information for monitoring filter self-rescuer stocks and for the construction of new apparatus.

4. IMPROVEMENTS IN FSR TRAINING

4.1. EVALUATIONOF PRACTICALEXPERIENCE IN INCIDENTS

Experience in the use of the FSR in fires or following explosions must be evaluated very carefully because of its importance for the further technical development of this apparatus and, in particular, all questions relating to the training of the workforce in its use. There is general agreement that after using an FSR, all miners should be questioned thoroughly on their experiences. For this purpose, an FSR questionnaire has been drawn up and introduced in Germany. The questionnaire in ANNEX I has the advantage of being easy to evaluate statistically while providing the guarantee that no important questions are omitted. In addition, a general survey should be conducted.

It is suggested that the exchange of experiences in wearing the FSR in incidents should be continued and improved within the Working Party on Mine Fires by establishing a routine for the exchange of experience reports. For this purpose, a uniform questionnaire would be desirable.

4.2. IMPROVEMENTS TO THE TRAINING MODEL SELF-RESCUERS

Training model self-rescuers are an important element in the training of the workforce in the use of the FSR. In their outer structure and, above all, the way they are handled, they should differ as little as possible from the original apparatus. The training model self-rescuers currently on the market largely meet this requirement except for the fact that they do not simulate the heating of the inhaled air as a result of the conversion of carbon monoxide to carbon dioxide and the absorption of water vapour by the drier.

However, the heating of the inhaled air is considered so important that developments in this field should be promoted.

In this regard, the developments in the United Kingdom in particular appear to be promising, where the concept of the heating of inhaled air by means of a chemical reaction is being studied. In the training model self-rescuers, the filter container is filled with soda lime (Atemkalk) . The exhalation valve of the training model self-rescuer is sealed, with the result that the filter is used for both inhalation and exhalation.

The combination of carbon dioxide, water vapour and soda lime is an exothermic reaction with which the heating of the original apparatus during inhalation of noxious gases can be simulated.

It is proposed to continue work on the development in cooperation with the manufacturers and to introduce the training model self-rescuer on a trial basis to begin with.

4.3. TRAINING EXERCISE ALONG THE NORMAL ESCAPE ROUTES

The layout of present-day coal mine workings is such that the workforce's normal route to the place of work frequently does not correspond to the presumed escape route in the event of a fire or similar incident. However, it is highly important that the miner should be acquainted with the escape route to be followed when using the filter self-rescuer. Each miner should wherever possible go along the different escape routes at set intervals.

4.4. NEW SCHEME FOR FILTER SELF-RESCUER TRAINING IN THE UNITED-KINGDOM

In the United Kingdom, training in the use of filter self-rescuer has been reorganized. The new training scheme is to be introduced at several mines on a trial basis.

A summary of the proposed training scheme is given in ANNEX 2.

***

REPORT ON THE USE OF FILTER SELF - RESCUERS COLLIERY	Date, Place and Nature of the Incident		
Type of FSR / Series / Year of Manufacture	Name of wearer	Age	Occupation u/g
1. Where were you at the time of the incident?			
2. Who and/or what caused you to put on your FSR?	1. Instruction 2. Own decision	3.☐ Smoke, Fumes Smell 4.☐ Open Fire	5.☐ Other reasons
3. Where was your FSR at time of incident?	1. On your belt	2. Close to hand	3, Elsewhere
4. When did you put your FSR on?	1. Immediately	2. During escape	
5. Did you have any difficulty in opening and removing the FSR?	1. Yes, If Yes 2. No,	11. Opening lever 12. Lid	13. Sticking in case 14. Other difficulties
6. Any difficulty in donning the FSR?	1. Yes, If Yes 2. No	11. Mouthpiece 12. Nose clip	13. Head Harness 14. Other
7. Did you find any defects or damage to the FSR?	1. Yes, If Yes 2. No	11. Mouthpiece 12. Noseclip	13. Head Harness 14. Dust 15. Other defects
8. How did you escape?	1. Walking normally 2. Running	3. Crawling 4. Climbing	5. By touch 6. Mechanical transport
9. Did you find the escape strenuous or have any difficulties?	1. Yes, If Yes 2. No	3. Breathing difficulty 4. Nausea 5. Headache	14. Eye irritation 15. Other difficulties

10. How was the temperature by inhaled air?	1.	Normal	3.	Hot		
	2.	Warm	4.	Intolerably hot		
11. How was the breathing through the FSR?	1.	Normal	3.	Very difficult		
	2.	Difficult	4.	Intolerably difficult		
12. Did you interrupt the use of the FSR?	1.	Yes, If Yes	11.	Air too hot	13.	Nausea
	2.	No	12.	air resistance to high	14.	Other reasons
13. What was the visibility like during the escape?	1.	Normal	3.	Much impaired		
	2.	Slightly impaired	4.	Could not see (blackout)		
14. How long was the escape route?	.... m		1.	up to 1500 m	3.	3000–4000 m
			2.	1500 – 3000m	4.	4500 m
15. How long did you escpape take?	...........min.		1.	up to 30 min.	3.	60–90 min.
			2.	30–50 min.	4.	90 min.
16. How long ago did you have your last FSR training?	1.	up to 6 months	3.	12–18 months		
	2.	6–12 months	4.	18–24 months		
Additional comments and explanations						
Place	Date			Signature		

Tick where appropriate

ANNEX 2

SUMMARY OF THE PROPOSED REVISION OF THE NATIONAL COAL BOARD'S SELF-RESCUER TRAINING SCHEME

(to be validated by pit trials)

INTRODUCTION

The report on the explosion at Houghton Main Mine, in the UK on 12 June 1975 recommended in paragraph 129 (3) that the NCB Committee studying the design of self rescuers should be reconvened as soon as possible and that the membership and terms of reference should be reviewed. That committee set up a Working Party to consider self rescuer training, to review the current training procedures and suggest improvement.

A summary of the National Coal Board's self rescuers training scheme proposed by the Committee was presented to the Committee of Experts on Filter Self Rescuers by the UK members at Edinburgh on 19 July 1978.

The revised self rescuer training scheme is to be implemented at three mines in the UK to assess its suitability for implementation at all UK mines.

1. <u>NATURE OF TRAINING</u>

1.1. To train persons more effectively there is a need to simulate more closely the conditions in which the rescuer might be used.

1.2. It is considered that both classroom and underground training sessions be incorporated into a new training scheme. Accordingly Phase 1 training would be on the surface and Phase 2 underground. A training model would be used in both phases. There should be practice in donning the self rescuer in darkness.

1.3. It is not suggested that all self rescuer trainees be required to breathe warm dry air during training but optional facilities should be provided. Prior to this optional facility being incorporated into a Self Rescuer Training Scheme, a pilot trial of this form of simulation by ordinary colliery personnel at a selection of mines should be carried out. The inspired air during any such training should be dry and of a sufficiently high temperature to be sensed as being warm. This temperature should not exceed 70° C.

2. ORGANISATION OF TRAINING

2.1. The "make-up" of the session is an all important factor. It will be advantageous to have men from various sections of the mine trained at one time because small groups of men uniformly spread through the mine would have relatively recently undergone training. These men should, therefore, be capable of taking a lead if an emergency arose.

2.2. The timing of the sessions is important and small groups should be trained each week. The maximum number of persons being trained in any group should not exceed 20. This continuous training will improve the probability in an emergency of there being a relatively recently trained man in any team of workmen. The number of groups and the size of the classes will depend on the size of the colliery, in order that, by these weekly training sessions, the whole colliery workforce would be trained within the stipulated period (2 years).

2.3. This organisation would apply to both Phase 1 and 2 situation. Underground contractors at collieries would be regarded as colliery employees and integrated into this organisation. There should be different training for :

a) colliery employees going underground and,
b) other personnel (visitors).

The training for other personnel whose pit visits are less frequent may be less comprehensive, in view of the fact that they would be accompanied on their visits by colliery personnel.

2.4. H.M. Inspectors of Mines and Quarries would be excluded from the Visitor Scheme and separate arrangements made for them. Separate arrangements are also advised for permanent employees of Unions.

3. THE PERIODICITY OF TRAINING FOR COLLIERY EMPLOYEES

3.1. It is proposed that the two phases of training should be completed within each 2 year period. The sequence of Phases for any colliery employee would be Phase 1, Phase 2, Phase 1, Phase 2 ... etc. Each Phase would be separated by at least 9 months and accordingly the intervals between any two consecutive phases would be 12 $\pm$ 3 months (2 phases completed in each 24 month period).

3.2. The Phase 1 training in the classroom may include the optional facility of breathing warm air. It would be necessary for special facilities to be provided.

Phase 2 would provide for persons travelling from their work place to an assumed place of safety and where appropriate the second means of egress could be incorporated in the training.

The more detailed draft syllabuses for Phase 1 and Phase 2 training are attached as Appendices 1 and 2 respectively.

4. CONTINUOUS COMMUNICATION

In addition to the formal training sessions it is necessary for some form of continual reminder to be given on the essential elements of wearing the Self Rescuer. With a view to achieving this aim displays of notices, personal reminder cards, display cabinets etc. should be provided.

ANNEX 2.1.

PROPOSED SYLLABUS - PHASE 1

1. Explain the need for the Self Rescuer and the purpose of the training.

2. Describe the gases produced by fires and explosions and the hazards arising from carbon monoxide.

3. Describe the prime purposes of the Self Rescuer to act as a filter to give protection against carbon monoxide and to provide the wearer with an apparatus for escape purposes only.

4. Describe the construction and operation of the Self Rescuer.

5. Summarise main points and invite questions as a basis for discussion.

6. Demonstrate the importance of the position of the Self Rescuer on the belt relative to the cap lamp battery, etc. (Instructor's own waist belt and attachments to be used).

7. Demonstrate the fitting of the Self Rescuer from the normal carrying position on the waist belt to the fully fitted position on the head, noting the breaking of the seal, the release of the canister from the belt when the release lever is pulled, the firm gradual withdrawal from the carrying case, the correct fitting of the mouthpiece, nose clip and head harness. Discuss the need of personal decision on dentures and spectacles.

8. Explain the correct method of travelling whilst wearing the Self Rescuer. Emphasise the need to rest

for short periods to reduce any discomfort or distress and to avoid at all costs removing the Self Rescuer from the wearing position.

9. Re-emphasise main points by showing the film "YOUR SELF RESCUER".

10. Invite questions.

ISSUE 1ST SELF RESCUER TRAINING MODEL

11. Practise removal of the Self Rescuer from the waist belt and carrying case fitting it correctly, and movement whilst wearing as follows :

a) Standing for several minutes to permit Instructor to carry out the inspection of the fitted Rescuers ;	Illumination main beam cap lamps
b) Walking at a brisk pace for 5 minutes to induce movement of Self Rescuer to verify fit and comfort ;	supplemented by any general lighting
c) Standing for several minutes to enable the Instructor to recheck fitting of Rescuers.	

12. Remove Self Rescuer and discuss with Trainees the first practice wearing of Self Rescuer.

ISSUE 2ND SELF RESCUER TRAINING MODEL

13. Don the Self Rescuer in complete darkness and then repeat Item 11 (a).

14. Outline the need for care during daily carrying of the Self Rescuer. Emphasise that a broken seal or open canister occurring during the shift should be reported to an official but will not necessarily result in the Self Rescuer being inoperative during that shift.

15. Summarise main points.

16. Supervise trainees opting to experience breathing of warm air.

ANNEX 2. 2.

PROPOSED SYLLABUS - PHASE 2

1. Phase 2 of the Self Rescuer Training for new entrants should be implemented within one month of their receiving Phase 1.

2. The Instructor will need to make appropriate arrangements, through the district official(s) to take sufficient Training Models of the Self Rescuer underground and issue them to the trainees involved, and inform them of the agreed travelling route. A suitable disposal bag should be provided on each occasion for transporting used Self Rescuers out of the mine.

3. Trainees should be pre-informed of the time to don their Self Rescuer at their own working place and after collecting as a group proceed to travel the agreed route to the point of assumed safety.

4. The district official should lead the group and the Instructor should travel out at the rear of the group to give any assistance that may be required. The group should pause for a short rest at approximately 500 yard intervals and allow the group to re-form.

5. At the point of assumed safety, when instructions have been given to remove the Self Rescuer they should be returned to the Instructor and be carried out of the mine in the disposable bag.

6. The Instructor should briefly question each trainee on the training experience before they proceed to the surface.

7. Any trainee expressing lack of personal satisfaction with the training should be encouraged to attend further training and asked to give his name to the Instructor for inclusion for a future session to repeat either or both Phases of Self Rescuer Training.

ANNEX X

PROPOSAL TO GOVERNMENTS
for
DRILLING WELLHEAD SAFETY INSTALLATIONS OFFSHORE

This proposal is the second stage of the work of the Committee of experts referred to in paragraph 2 (2.2.) of paper 3318/6/77 and forms the continuation of that document.

Adopted by the SAFETY AND HEALTH COMMISSION
FOR THE MINING AND EXTRACTIVE INDUSTRIES
on 1st December 1978
in accordance with articles 1 and 4 of the terms of reference,
and articles 1 and 2.2. of the Council decision of 27 june 1974
on the extension of the responsabilities of the Safety and Health Commission

BASIC INFORMATION WHICH WHOULD BE CONTAINED IN DRILLING PROGRAMMES OF OFFSHORE WELLS

W. S. I.

1. The W.S.I will be required when drilling for oil and gas offshore.

1.1. The W.S.I. depends on the depth of the well, the setting depth of the various casing and the contents and pressures of the formations to be drilled.

2.1.1 If shallow gas can be expected or is known to exist a diverter or a similar system should be installed after setting of the first casing, whether driven, jetted or drilled.

Other methods may be adopted, after justification has been submitted to the competent authority.

2.1.2. After setting the next casing, the W.S.I. must at least consist of an annular type preventer which can close off the borehole with or without drilling tools in the hole.

2.1.3. After setting subsequent casing strings, the W.S.I. must consist of :

2.1.3.1. An annular type preventer which can close off a borehole with or without drilling tools in the hole.

2.1.3.2. A ram type blow out preventer with blind or shear rams.

2.1.3.3. Two ram type blow out preventers with pipe rams appropriate to the diameter of pipes in the borehole.

2.1.3.4. Safety valves for the drill pipe and the drill collar string should be kept at hand on the drilling floor for immediate use ;

2.1.3.5. An upper - and lower kelly valve.

2.2.1. The blow out preventers in 2.1.3.1., 2.1.3.2., 2.1.3.3. should have remote control and where appropriate, manual control.

2.2.2. The apparatus for the energy supply to the W.S.I. must be located at a safe and easily accessible place.

2.2.3. The apparatus must be constructed and maintained to guarantee that there is always sufficient stored energy available to operate the W.S.I. properly.

2.2.4. The lines for the energy supply to the W.S.I. must be able to withstand at least the same pressure as can prevail in the apparatus referred to 2.2.2.

2.2.5. A control panel for the W.S.I. must be located on the derrick floor at a place which is easily accessible to the driller.

2.2.6. Furthermore, there must be another control panel for the W.S.I. at an easily accessible place at a safe distance from the drilling floor.

3. If casing head housings or casing spools fitted with side outlets can be exposed to pressure, two valves should be fitted at each outlet.

4.1. The W.S.I. must tolerate the discharge of fluid and gas as well as the injection of fluids into the well either separately or simultaneously.

4.2. Each discharge or injection point on the W.S.I. must have two valves, at least one of which must be operated by remote control.

4.3. At the injection point, connections for rig pumps and a high pressure pump must be provided.

4.4. All lines serving the W.S.I. must be flexible to allow for movement of the drilling platform.

5.1. The choke manifold must be easily accessible.

5.2. The choke manifold must be provided with at least two chokes which can be replaced separately with the manifold in operation.

5.3. A mud gas separator with by-pass facilities must be installed in the discharge line from the choke manifold.

5.4. A mechanically operated degasser is required in the mud system.

6. The choke manifold and the discharge lines from the choke manifold must be so fixed as to absorb reaction forces from the discharge of liquid and gas without movement of the choke manifold or discharge lines.

7. Ram type preventers must be able to withstand the maximum pressure expected at the wellhead.

8. The lines from the W.S.I. to the choke manifold must be able to withstand the same pressure as the ram type preventers.

9.1. The W.S.I. should be tested regularly for proper operation.

9.2. The W.S.I. (with the exception of the annular preventer) must be tested to a pressure at least equal to the maximum pressure to be expected in the bore-hole at the wellhead.

9.3. The annular preventer may be tested to a lower pressure than in 9.2.

9.4. Pressure tests should be carried out at weekly intervals, before drilling out the cement in the casing, after changing rams, after each reconnection (for dynamically positioned floaters and drillships) and whenever repairs have been carried out. These pressure tests must be maintained for at least 15 min.

10. A well control drill should be held, at least weekly for each crew.

11. All tests and well control drills must be recorded.

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ANNEX XI

PROPOSAL TO GOVERNMENTS
for
BASIC INFORMATION WHICH SHOULD BE CONTAINED IN DRILLING PROGRAMMES OF OFFSHORE WELLS

Adopted by the SAFETY AND HEALTH COMMISSION
FOR THE MINING AND EXTRACTIVE INDUSTRIES
on 1st December 1978
in accordance with articles 1 and 4 of the terms of reference,
and articles 1 and 2.2. of the Council decision of 27 june 1974
on the extension of the responsabilities of the Safety and Health Commission

DRILLING WELLHEAD SAFETY INSTALLATIONS OFFSHORE

1. This Draft proposal was prepared by the Committee of Experts on well control. It refers to offshore wells and concerns the risk of blow-outs occuring especially in the case of drilling for, or producing oil and gas in offshore operations. The terms of reference were defined in the light of the conclusions of the enquiry into the Bravo Ekofisk disaster, which occured on 22th. April 1977.

2. It was decided that it was logical to consider this subject in several stages; each one being an entire draft, which may be applied without waiting for the remaining parts.

2.1. Drilling programmes (a summary of data necessary for drilling a well)

2.2. Drilling well head safety installations

2.3. Production well completion

2.4. Work over programme, and well head safety equipment in offshore operations.

2.5. Well documentation

3. General remarks.

3.1. These requirements apply to many aspects of drilling offshore, not only the prevention of blow-outs, for it seems impossible to consider this subject without reference to general safety precautions.

3.2. Certain of these measures for accident prevention also apply to the protection of the environment; however measures which apply solely to environmental protection or to contingency plans for major accidents and emergency situations have not been included.

3.3. The safety of operations depends largely on the skill of the workforce. Regular protective safety drills and safety meetings should be held. Separate proposals will be made in further papers.

4. The Governments of Member States of the European Community require the submission of a drilling programme for each well before drilling operations commencent.

5. By asking for the drilling programme to contain minimum data, the risk of unforeseen circumstances leading to accidents, and in particular, blow-outs will be reduced.

6. The content of such a programme is outlined under item 7 which includes "Remarks" drawing attention to matters to be borne in mind when preparing a drilling programme.

7. A written drilling programme should, at least, include the following :

7.1. The name and number of the well and its geographical coordinates, the depth reference point and the distance of the depth reference point to the average waterlevel and seabed.

7.2. Objectives and the proposed depth of the well.
All available relevant information should be used when drawing up the drilling programme such as available seismic information and information from surrounding wells.
The programme should contain the predicted geological formation depth, the expected hydrocarbon accumulations, the expected abnormal formation pressure gradients, possible intervals with mud losses, indications as to the likelihood of squeezing formations.
The above information may be shown in a striplog or otherwise.

7.3. The type of drilling installation to be used.

7.4. Proposed diameters of the hole and depths.

7.5. Proposed diameters and depths of the casing strings including the specifications of the casings.

Remark : The surface and subsequent casing shoes depth should be programmed such that sufficient formation strength exists to prevent cratering.

7.5.1. Testing procedures to be applied to the casings.

Remark 1 : Casings should be pressure tested before drilling out the cement of the shoe and, when warranted, the formation should be pressure tested after drilling through the cement of the shoe.

Casing pressure tests should be made at a pressure, which equals at least the maximum expected pressure. The production casing should be tested to the expected wellhead pressure.

The results of pressure tests should be recorded.

Remark 2 : Where tests, such as leak off tests, lead to revisions being necessary, the revised provisions numbers 7.4., 7.5., and 7.5.1. shall form part of a new programme of casing and casing shoe depth. This programme should be issued as soon as possible.

7.6. A statement on the cementation.

Remark 1 : It is expected that all abnormally pressured formations should be cemented off. Every effort should be made to cement the first casing in which subsequent casings are landed from the setting depth to the sea bed or mudline suspension.

Remark 2 : Where wells will be completed as sub-sea completion wells or will be abandoned (even temporarily), careful consideration should be given to the desirability of overlapping cement columns in the annular space. Critical cementations should be checked with available monitoring devices such as cement bond logs, cement temperature logs, etc..

7.7. A statement on the planned core intervals.

7.8. A statement on the planned petrophysical logs.

7.9. A statement on the planned methods of formation tests and equipment.

7.10. A statement on the mud system to be used.

Remark 1 : The presssure exerted by the mud column should exceed the expected pressure of the formation to be drilled.

Remark 2 : Adequate stocks of mud or mud chemicals should be readily available to deal with mud losses or excessive pressures at all stages of the drilling operations.

7.11. A statement of the planned well deviation and azimuth, and the measurement technique used as well as the survey plot of adjacent wells.

7.12. A statement of the well head safety installation (B.O.P.) in connection with each casing, stating the type of safety devices, as well as pressure rating and working pressures.

Remark : For the requirements for well control see separate paper on Wellhead safety installations.

7.13. A statement of the mechanical mud treatment and mud monitoring equipment such as mud pit level indicator, degasser, etc...

GENERAL REMARKS

1. Details on the method of completion and the approximate installation depth of down hole equipment, the working pressure for which the christmas tree is rated, the diameter of the flow-string, the type and depth of wireline devices, the type and depth of packers and downhole safety devices should be given in a separate programme.

2. In case of abandonment a separate programme should be issued.

3. Important changes of programme must, when safety conditions permit, be notified in advance.

ANNEX XII

BIBLIOGRAPHY OF THE WORK OF THE SAFETY AND HEALTH COMMISSION

updated 1.12.1979

C VENTILATION, FIREDAMP AND OTHER MINE GASES

Printed separately

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   6th Report of the MSHC, Annex III, September 1969

3. Circular 181 of the Belgian Ministry of Economic Affairs relating to the prevention of outbursts of Firedamp

   11th Report of the MSHC, Annex X, May 1974

4, Conditions under which exemption might be granted to raise maximum permitted CH_4 limits in Member States

   12th Report of the MSHC, Annex V

5. Notes for guidance on the measures to be taken to stabilise ventilation in the event of open fires underground (Except in shafts)

   14th Report of the MSHC, Annex IX, June 1977

6. First Report on Ignitions of Firedamp by Power loaders and Heading Machines

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7. Information report on two accidents (explosions) arising from the use of hand-held gas monitoring instruments in the Ruhr and Saar Coalfields — Doc. 4582/1/77 E F D I N DK

D WINDING ROPES AND SHAFT GUIDES, WINDING ENGINES AND WINCHES

1.	Report on the electro-magnetic examination of winding ropes 3rd Report of the MSHC, Annex VI November 1966	Printed separately
2.	Final report on electro-magnetic tests carried out with the financial aid of the High Authority in the Bochum Rope-testing Station 3rd Report of the MSHC, Annex XIa, November 1966	
3.	Report on the use of accelerometers for testing winding installations 3rd Report of the MSHC, Annex V, November 1966	
4.	Report on measurement and testing procedures for shaft and roadway winding ropes and for guides for shaft and roadway haulage installations 7th Report of the MSHC, Annex VII, September 1970	
5.	Report of the Rope Testing Office of the Westfälische Berggewerkschaftskasse Bochum on rope testing means and procedures for improving safety in mine shafts and roadways employing rope haulage 10th Report of the MSHC, Annex V, June 1973	
6.	New aspects of the testing of ropes in winding installations subject to high and maximum stress (Arnold's report 1975) Printed separately - 1980	Doc. 4044/74 E F D I DK
7.	Safety requirements for brakes on winding engines and winches in the shaft winding plant of the German mining industry (HAEUSLER - 1975) Printed separately - 1980	Doc. 3254/74 E F D
8.	Shaft winding and safety (HOISCHEN - 1975) Printed separately, July 1975	Doc. 4046/74 E F D

9. Minimum safety requirements for winding and balance rope suspension gear, for shaft winding and sinking installations

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E STRATA CONTROL AND STABILITY OF GROUND

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   May 1974

2. Notes on operating statistics in the coal mining industry of the European Community countries as established for 1972

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4. Strata reinforcement by bolting and injection techniques
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   E F D

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   E F D I N DK

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2. The use of non-flammable materials for the manufacture of electric cables and leads for underground use

   2nd Report of the MSHC, p. 5, June 1961

3. Requirements which must be met by electrical shotfiring leads

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4. Protection of the underground electrical network against the danger of electric shocks

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6. Report on firedamp-proof electrical switchgear for nominal voltages above 1100 volts

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   7th Report of the MSHC, Annex V
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- Oil immersed contacts in switchgear
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- Provisions for locking off aparatus
  in the opencircuit condition
  12th Report of the MSHC, Annex VIII
  July 1975
- Use of Light Alloys
  13th Report of the MSHC, Annex IX
  1976

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1. Psychological and sociological factors in mine safety

1.1. Report on the psychological and sociological factors affecting safety

3rd Report of the MSHC, Annex XII
November 1966

1.2. Recommendations on the psychological and sociological factors affecting safety

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November 1966

2. Effects of remuneration methods on safety

2.1. Report on the implications of payment at piece rates for mine safety

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December 1967

2.2. Recommendations as to principles to be observed in view of the possible influence of payment at piece rates on safety in coal mines

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December 1967

3. Medical problems

3.1. Report on pre-entry and routine medical examinations and recommendations

2nd Report of the MSHC, p. 74, June 1961

3.2. Colliery medical services in the countries of the Community and the United Kingdom

2nd Report of the MSHC, Annex C
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4. Safety training

4.1. Report on the study "Measures relating to the safety training of mine workers employed in the mines of the European Community."

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E F D

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	16th Report of the MSHC, Annex X	Doc. 3767/4/77 E F D I N DK
3.	Workover programme offshore	
	17th Report of the MSHC, Annex ...	Doc. 4945/3/78 E F D I N DK
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	17 Report of the MSHC, Annex ...	Doc. 2487/5/78 E F D I N DK

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   8th Report of the MSHC, Annex VIII
   June 1971

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   May 1974

7. Examples of proven and effective methods of installing and operating water sprays on plough faces (Annex to the guide lines concerning the design and use of coal getting and heading machines, relating to the reduction of airborne dust, which were printed as Annex XI to the 11th Report

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N RESCUE ARRANGEMENTS, FIRES AND UNDERGROUND COMBUSTION

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1.1. Report on tour of central rescue stations in the Community countries and Great Britain
(First Report on the organization of mine rescue services 1958/59)

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1.2. Second Report on the organization of mine rescue services, 1960

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1.3. Third Report on the organization of mine rescue services, 1961

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1.7. Seventh Report on the organization of mine rescue services, 1967/68

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9th Report of the MSHC, Annex VI Doc. 3845/1/70

1.12. Ninth Report on Mine Rescue Services, Organization, Personnel, Apparatus available, and recent developments for rescue work in irrespirable atmospheres, giving the position in Member States of the Community as at 31.12.1975

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2.1. Interim report on the continued development of the CO-filter self-rescuer
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2.3. First report on filter self-rescuers for use in coal mines in the European Community countries - Part I : minimum design requirements and testing procedures

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2.4. The Use of Filter Self Rescuers in European Coal Mines Part II. Maintenance and Training

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2.5. The Use of Filter Self Rescuers in European Coal Mines Part III. Future developments

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Part III- Future developments

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4.1. List of specialists for borehole rescue work and equipment available in Community countries

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13th Report of the MSHC, Annex VI, 1976

II Fires and underground combustion

1. Shaft fires at great depth

1.1. Recommendation on the equipment having regard to the prevention of open fires

1st Report on the MSHC, April 1959

1.2. Fighting of fires in shafts by bringing in water

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June 1961

see also modification contained in 10th Report of MSHC, Annex VI, June 1972

1.3. Final report on experiments with shaft fires carried out by the Experimental Roadway Association in Dortmund, with the financial aid of the High Authority, at Dorstfeld Colliery, Dortmund

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1.4. Explanatory notes and views of the Working Parties on Underground Combustion and Fires and Mine Rescue Organization, and their expert sub-committees, concerning the final report of the Experimental Roadway Association, Dortmund, on the shaft fire experiment at Dorstfeld Colliery

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1.5. Memorandum on the Neutralization of Mine Fires by the Injection of Nitrogen

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2. <u>Fire stoppings (dams)</u>

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2.2. Report on trials with explosion-proof dams carried out by the Experimental Roadway Association in Dortmund at the request of the Safety Commission and with financial aid of the High Authority - Statement of policy regarding the erection of advance dams of plaster as a fire fighting measure

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3.3. Third Report on specifications and testing conditions relating to fire-resistant fluids for power transmission

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4.2. Study on the reopening of sealed-off fire areas by Bergassessor a.D.G. Lehmann

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5. <u>Use of urethane foam for sealing</u>

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6. <u>Conveyor belts</u>

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6.2. The check testing of conveyor belts with textile carcas for use underground in coal mines. Resistance to flame.

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1. Report and Recommendations on the preparation of common statistics on victims of accidents underground, in accordance with Community Definitions

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1.2.	20th Anniversary of the Mines Safety and Health Commission 21/22 November 1977 in Luxembourg Printed officially	EUR 6360 E F D I N DK
1.3.	International conference for safety representatives (Workmen's inspectors) responsible for inspection underground 28/29 September 1978 in Luxembourg Printed officially 1980	Doc. 4282/79 f
1.4.	Medical aspects of diving accidents 12/13 October 1978 Printed separately 1979 Available in 1980	Doc. 5204/79 E F D

B. DIVERS

1.4.	As above	
1.5.	Guidance notes for safe diving Volume I - General recommendations Printed separately	Doc. 3735/78 E
1.6.	Volume II - Directory of information sources for diving operations in Western Europe only available in E	Doc. without No

C. SIGNS AT WORK

1.	Harmonization and applications of safety signs at work in coal mines 16th Report of the MSHC, Annex VII Printed separately 1979	Doc. 3040/3/78 E F D I N DK

ANNEX XIII

STATISTICAL TABLES

FOR THE OTHER

THAN COAL INDUSTRIES FOR 1978

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 1 - 1

Year : 1978

FEDERAL REPUBLIC OF GERMANY

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
COAL	S	43	83 964 899	t saleable	187 219
	O				
LIGNITE	O	48	123 596 863		18 465
OIL	D	150	5 058 943	t	7 087
NATURAL GAS	D	240	19 382 638	1000 m^3	
IRON	S	10	1 600 781	t	913
ALUMINIUM (ores)	S	1	280	t	
COPPER (ore)	S		821	t Cu	
LEAD (ore)	S	3	23 181	t Pb	1 233
ZINC (ore)	S		97 405	t Zn	
POTASH SALTS	S	11	5 018 001	t K_2O	8 513
ROCK SALT (except sea salt)	S	8	6 845 765	t	1 670
MARBLE FOR POLISHING					
MARBLE FOR SEDIMENTARY ""					
MARBLE IGNEOUS					
Total MARBLE					
SANDS (SLATE, FOUNDRY AND OTHER INDUSTRIAL SANDS)	S + O	24	80 054	t	548
ALLUVIAL SANDS AND GRAVEL		1 398	178	Million t	25 048

S : deep mining O : opencast mining or quarring D : boreholes

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 1 - 2

Year : 1978

FEDERAL REPUBLIC OF GERMANY

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
HARD DIMENSION STONE		1 280	51 833	m^3	34 495 *
- BUILDING STONE					
- PAVING STONE					
- MONUMENTAL STONE					
HARD CRUSHED STONE		?	135 000 000	m^3	? *
- FOR CONCRETE					
- ROAD BASES					
- SURFACING					
Chalk and Lime		113	68 000 000	t	10.577
Gypsum	0	40	1 749 136	t	1 421
Steatite		4	9 673		51
Kaolin	0	29	520 982	t	1 676
Pegmatite	0	12	88 570	t	133
Calcspar	0	5	11 817	t	19
Sandstone	0	1	37 600 000	piece	25
Dolomite	0	2	636 001	t	35
Sulphur	D	3	767 790	t	178
Pyrite	S	3	501 696	t	837
Graphite	S	1	11 927	t	192
Fluorspar		13	75 722	t	171
Feldspar	S	18	385 590	t	171
Uranium	S	13	9 770	t	147
Talc	0	5	5 773	t	16
Natural Stone					
Limestone	S	9	2 614 617	t	182
Barytes	0/S	7	182 948	t	272

* Combined Workforce

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 2 - 1

Year : 1978 **BELGIUM**

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
COAL	S	9	6 590 268	t saleable	23 023
	O				
LIGNITE	S	1	450		
OIL					
NATURAL GAS					
IRON	S	1	42 540	t	16
ALUMINIUM (ores)					
COPPER (ore)					
LEAD (ore)					
ZINC (ore)					
POTASH SALTS					
ROCK SALT (except sea salt)					
MARBLE FOR POLISHING	S	1	3 608	m^3	13
MARBLE FOR SEDIMENTARY ""	O	5	211 002	m^2 (20 mm)	21
MARBLE IGNEOUS					
Total MARBLE					
SLATE	S	2	no fig.available		87
	O	6	id.		3
SANDS (SLATE, FOUNDRY AND OTHER INDUSTRIAL SANDS)	O + D	429	19 030 355	t	2 070
ALLUVIAL SANDS AND GRAVEL					
			Total		25 233

S : deep mining O : opencast mining or quarring D : boreholes

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 2 - 2

Year : 1978

BELGIUM

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
HARD DIMENSION STONE	0	65	1 057 419		1 269
- BUILDING STONE					
- PAVING STONE					
- MONUMENTAL STONE					
HARD CRUSHED STONE	0	112	31 324 026		2 383
- FOR CONCRETE					
- ROAD BASES					
- SURFACING					
HARD STONE FOR CALCINATION	0	24	10 902 261		1 743
- FOR LIME					
- FOR CEMENT KILNS					
CHALK and MARL	0	13	4 274 157		136
GYPSUM					
OTHER ROCKS :					
DOLOMITE	0	11	3 655 855		421
KAOLIN	0	5	39 717		10
CLAY	0	114	5 200 000*		4 576

* estimations

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 3 - 1

Year : 1978

DENMARK

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
COAL					
LIGNITE					
OIL	D		no fig.available		no figures available
NATURAL GAS			id.	1 000 m^3	id.
IRON					
ALUMINIUM (ores)					
COPPER (ore)					
LEAD (ore) (1)	S			Pb	
ZINC (ore) (2)	S	1	621 000	t Zn	300
POTASH SALTS or sea salts NACI	D	1	338 000	t	id.
ROCK SALT (except sea salt)					
PEAT (for soil improvement)	O	18	322 953	m^3	id.
MARBLE FOR POLISHING					
MARBLE FOR SEDIMENTARY """					
MARBLE IGNEOUS					
Total MARBLE					
SLATE	O	2	795		id.
SANDS (SLATE, FOUNDRY AND OTHER INDUSTRIAL SANDS)	O	926	30 049 205		id.
ALLUVIAL SANDS AND GRAVEL (sea)	O		4 584 219		id.

(1) Pb 42.000 t concentrate (with silver)
(2) Zn 148 000 t

S : deep mining O : opencast mining or quarring D : boreholes

Year : 1978

DENMARK

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
SUPPLEMENTARY INFORMATION					
HARD DIMENSION STONE	0	?	55 492		?
- BUILDING STONE					
- PAVING STONE					
- MONUMENTAL STONE					
HARD CRUSHED STONE					
- FOR CONCRETE					
- ROAD BASES					
- SURFACING					
HARD STONE FOR CALCINATION					
- FOR LIME					
- FOR CEMENT KILNS					
CHALK , LIME		28	3 175 417	m^3	?
GYPSUM					
OTHER ROCKS :					
FIRE CLAY	0	11	119 121	m^3	?
CLAY, BRICKS, TILES	0	123	2 311 676	m^3	?

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 4 - 1

Year : 1978

IRELAND

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
COAL	S	8	24 000*	t ROM	265
	O	4	7 059	t ROM	12
LIGNITE					
OIL	D	8	no production	-	911
NATURAL GAS	D	no figures available	no fig. available	1000 m^3	no figures available
IRON					
ALUMINIUM (ores)					
COPPER (ore)	S O	1 3	777 955 20 196	t ROM concentrate	222
LEAD (ore)			74 155	concen-trate	
ZINC (ore)	S	3	312 185		1 635
POTASH SALTS					
ROCK SALT (except sea salt)					
MARBLE FOR POLISHING	O	no figures available	no fig. available	no fig. avail.	17
MARBLE FOR SEDIMENTARY ""					
MARBLE IGNEOUS					
Total MARBLE					
SANDS (SLATE, FOUNDRY AND OTHER INDUSTRIAL SANDS)					
ALLUVIAL SANDS AND GRAVEL	D	380	no fig. available	no fig. avail.	919

* Shortfall due to prolonged industrial dispute

S : deep mining O : opencast mining or quarring D : boreholes

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 4 - 2

Year : 1978

IRELAND

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION dry metric tons	TONS ROM ORE OF MINERAL	PERSONS
HARD DIMENSION STONE	0	22			
- BUILDING STONE					
- PAVING STONE	0	5	no fig.available	no fig. avail.	13
- MONUMENTAL STONE	0	17	no fig.available	no fig. avail.	114
HARD CRUSHED STONE	0	64	no fig.available	no fig. avail.	613
- FOR CONCRETE					
- ROAD BASES					
- SURFACING					
HARD STONE FOR CALCINATION					
- FOR LIME					
- FOR CEMENT KILNS					
CHALK					
GYPSUM	S	2	385 791	R.O.M.	74
OTHER ROCKS :					
LIMESTONE	0	92	no fig.available	no fig. avail.	1 308
SHALE	0	6	no fig.available	no fig. avail.	9
BARYTES	S	1	42 542 12 473	R.O.M. concetr.	60
PYRITE	?	3	338 100 41 793	R.O.M. concetr.	75

* byproduct of copper ores (already included under 'copper')

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 5 - 1

Year : 1978

I T A L Y

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
COAL	S	1		t ROM	163
	O				
LIGNITE	O	2	1 868 078		676
OIL					
NATURAL GAS					
IRON	S+O	3+1	348 972	40 % Fe	533
ALUMINIUM (ores)	O	2	24 410	t	6
COPPER (ore)	S	3	1 932		190
LEAD (ore)					
ZINC (ore)		24(1)	73 558	t Zn	2 674(1)
POTASH SALTS	S	5	1 636 304	tK_2O (12%	1 353
ROCK SALT (except sea salt)	S	7	3 721 258		303
	O	4			
MARBLE FOR POLISHING					
MARBLE FOR SEDIMENTARY """					
MARBLE IGNEOUS					
Total MARBLE					
SLATE		100	100 000		400
SANDS (SLATE, FOUNDRY AND OTHER INDUSTRIAL SANDS)		100	4 200 000		560
ALLUVIAL SANDS AND GRAVEL		2 500	120 000 000		8 650
SAND OF volcanic origin		15	150 000		20
EARTH COLOURS		14	170 000		55
POZZOLANA (sand)		100 (2)	5 000 000		250(2)

S : deep mining O : opencast mining or quarring D : boreholes

Also included in activity and work force : 1) lead ores
2) hard stone for calcination (see following page)

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 5 - 2

Year : 1978

ITALY

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
HARD DIMENSION STONE					
- BUILDING STONE		50	22 060 000		250
- PAVING STONE					
- MONUMENTAL STONE		2 900	9 326 000		16 000
SEDIMENTARY MARBLE		135	1 044 000		1 350
METAMORPHIC MARBLE		1 010	1 935 000		7 250
HARD CRUSHED STONE					
- FOR CONCRETE					
- ROAD BASES					
- SURFACING					
HARD STONE FOR CALCINATION		*	35 400 000		*
- FOR LIME					
- FOR CEMENT KILNS					
CHALK		90	4 050 000		550
GYPSUM					
OTHER ROCKS :					
CLAY		1 050	36 000 000		2 500
DOLOMITE		13	1 100 000		100
GRAVEL		included under other headings	65 920 000		included elsewhere

* Combined

ANNEX XIII - 5 - 3

Year : 1978

I T A L Y

MINERAL	MINE, QUARRY OR BORE HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
PYRITE	S	5	786.666	37,8% S	873
MANGANESE	S	1	9 741	39 % Mn	13
SULPHUR	S	12	357 444	12 % S	1 758
ANHYDRITE	0	15	49 531		124
ASBESTOS	[illegible]	2	135 402		323
BARYTES	S	14	236 613		343
FELDSPAR	S	7	251 083		105
FLUORSPAR	S/0	11	171 216	85%CaF2	871
GRAPHITE	S	1	4 108		19
MARL	0	27	10 309 239		307
ASPHALTIC ROCK FOR SURFACING	0	3	68 560		27
BITUMINOUS ROCK	0	1	46 638		16
HYDRATED ALUMINIUM SILICATES	s/0	40	663 879		212
TALC AND STEATITE	S	16	175 157		460
MERCURY	S				811
ANTIMONY	0		1 855	50,2% SS	54
CELESTITE	0	1	365		2
STEAM	D	12	29 104 120		261
CLAY	0				
PEAT	0				

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 6 - 1

Year : 1978

NETHERLANDS

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
COAL				t ROM	
LIGNITE					
OIL	D	1	1 402 254	t	± 2 400
NATURAL GAS	D	6	$94\ 995 \times 10^6$	m^3	
IRON					
ALUMINIUM (ores)					
COPPER (ore)					
LEAD (ore)					
ZINC (ore)					
POTASH SALTS	D	1	6 407	t K_2O	10
ROCK SALT (except sea salt)	D	1	2 936 858	t	53
MARL	O	3	2 992 755	t	79
SANDSTONE	O	1	196 000	t	4
MARBLE FOR POLISHING					
MARBLE FOR SEDIMENTARY """					
MARBLE IGNEOUS					
Total MARBLE					
SANDS (SLATE, FOUNDRY AND OTHER INDUSTRIAL SANDS)					
ALLUVIAL SANDS AND GRAVEL	O	?	34 429 000	t	?

S : deep mining O : opencast mining or quarring D : boreholes

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 7 - 1

Year : 1978

UNITED KINGDOM

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
COAL	S	411	107 696	t ROM	248 100
	O	173	14 730		8 477
LIGNITE	S	1	8		2
OIL					
NATURAL GAS				1000 m^3	
IRON STONE	S	2	584		292
	O	11	3 670		622
ALUMINIUM (ores)					
COPPER (ore)					
LEAD (ore)					
ZINC (ore)					
POTASH SALTS	S	1	945	t K_2O	1 228
ROCK SALT (except sea salt)	S	1	1 311		363
MARBLE FOR POLISHING					
MARBLE FOR SEDIMENTARY ""					
MARBLE IGNEOUS					
Total MARBLE					
SANDS (SLATE, FOUNDRY AND OTHER INDUSTRIAL SANDS)	O	1 395	6 224		1 330
ALLUVIAL SANDS AND GRAVEL	O		90 146		10 533

S : deep mining O : opencast mining or quarring D : boreholes

ANNEX XIII - 7 - 2

Year : 1978

UNITED KINGDOM

MINERAL	MINE, QUARRY OR BORE HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
LIMESTONE	S	6	557		101
	O	489	85 797		12 264
CLAY SHALE	S	1	218		26
	O	230	25 473		1 660
CHALK & CHERT	O	26	16 373		1 020
IGNEOUS ROCK	O	303	27 807		5 476
SANDSTONE	S	2			212
	O	241	10 424		2 119
CLAY	S	29	705		397
	O	158	4 920		4 117
CALCSPARE	S+O	3	13		38
GYPSUM & ANHYDRITE	S+O	12	3 322		680
BARYTES	S+O		54		?
OTHER ROCKS :					
CHALK	O	16	16 321		1 011
GYPSUM	S+O		3 230		661

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 8 - 1

Year : 1978 FRANCE

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
COAL	S	24	18 351 000	t ROM	
	O	3	1 339 000		54 814
	O	1	1 167 000	t ROM	
LIGNITE	S	1	1 565 000		1 668
OIL	S	-	1 117 000	t ROM	-
NATURAL GAS	S	5	11 297 000	1000 m^3	-
IRON ORE	S	25	33 454 000	t	6 036
ALUMINIUM (ores)		12	1 977 000	t	676
COPPER (ore)					
LEAD (ore)		4	35 200	t Pb	737
ZINC (ore)		3	39 900	t Zn	
POTASH SALTS		3	1 795 000	t K_2O	4 542
ROCK SALT (except sea salt)		20	6 169 000	t	1 020
MARBLE FOR POLISHING		132	?		6 345
MARBLE FOR SEDIMENTARY ""					
MARBLE IGNEOUS					
Total MARBLE					
SLATE		18	84 000	t	2 000
SANDS (SLATE, FOUNDRY AND OTHER INDUSTRIAL SANDS)					
ALLUVIAL SANDS AND GRAVEL		1 962	228 140 000	t	14 621

S : deep mining O : opencast mining or quarring D : boreholes

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 8 - 2

Year : 1978

FRANCE

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
HARD DIMENSION STONE			not available		
- BUILDING STONE					
- PAVING STONE					
- MONUMENTAL STONE					
HARD CRUSHED STONE		853	122 360 000	t	9 500
- FOR CONCRETE					
- ROAD BASES					
- SURFACING					
HARD STONE FOR CALCINATION		65	4 519 600	t	3 416
- FOR LIME					
- FOR CEMENT KILNS					
CHALK		?	?		?
GYPSUM AND PLASTER		55	6 071 100	t	4 266
OTHER ROCKS :					
URANIUM	S		2 561	t	2 106
TUNGSTEN	S		767	t WO_3	200
GOLD			185	t	161
FLUOSPAR			260 000	t	604
BARYTES			225 000	t	173
TALC			275 000	t	561

STATISTICAL TABLES FOR EXTRACTIVE INDUSTRIES OTHER THAN COAL

ANNEX XIII - 9 - 1

Year : 1978

LUXEMBOURG

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
COAL					
LIGNITE					
OIL					
NATURAL GAS					
SILICIOUS	S	2	834 905	t 32,55%	282 (1)
IRON ORE	O	2		t	
ALUMINIUM (ores)					
COPPER (ore)					
LEAD (ore)					
ZINC (ore)					
PHOSPHATES				0,67 %	(1)
POTASH SALTS					
ROCK SALT (except sea salt)					
MARBLE FOR POLISHING					
MARBLE FOR SEDIMENTARY ""					
MARBLE IGNEOUS					
Total MARBLE					

(1) Combined

S : deep mining O : opencast mining or quarring D : boreholes

Year : 1978

LUXEMBOURG

MINERAL	MINE, QUARRY OR BORE-HOLE	NUMBER OF SITES WHERE MINERAL IS WORKED	PRODUCTION	TONS ROM ORE OF MINERAL	PERSONS
HARD DIMENSION STONE					
- BUILDING STONE			6 630	m^3	
- PAVING STONE			14	1000 p	?
- MONUMENTAL STONE			460	m^2	
SIZED STONE	0		72	m^3	
FACING STONE		35	2 717	m^3	
			714 958		
SAND			614.623		
GRAVEL			212.687		
FOUNDRY SAND			2.771		
HARD STONE FOR CALCINATION					
- FOR LIME					
- FOR CEMENT KILNS					
CHALK					
GYPSUM		?	4 476		?
SLATE	S	1	1 363	1000 p	
POLISHED MONUMENTAL STONE			3 283	1000 p	54
MONUMENTAL STONE			568	t	

V

TEXT OF A RESOLUTION

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By letter of 19 January 1978 the President of the European Parliament authorized the Committee on the Environment, Public Health and Consumer Protection to draw up a report on the 6th, 7th, 8th and 9th reports of the Steel Industry Safety and Health Commission and the 12th, 13th and 14th reports of the Mines Safety and Health Commission.

On 21 March the committee appointed Mr Ellis rapporteur.

Discussion of the draft report took place on 20 June and 25 September 1978.

At its meeting of 25 September the Committee unanimously adopted the motion for a resolution and explanatory statement.

Present: Mrs Krouwel-Vlam, Chairman; Lord Bethell, Vice-Chairman; Mr Ellis, rapporteur; Mr Alber, Mr Brown, Mr Edwards, Lord Kennet, Mr Lamberts, Mr W. Müller and Mr Noé.

C [redacted] T E N T S

A - [redacted] ON ....
[redacted] ... [redacted] .
[redacted] ..... [redacted] .
[redacted] .... [redacted] ....
[redacted] .... [redacted] ....
ANNEX IV ....

The Committee on the Environment, Public Health and Consumer Protection hereby submits to the European Parliament the following motion for a resolution together with explanatory statement.

MOTION FOR A RESOLUTION

on the 6th, 7th, 8th and 9th reports of the Steel Industry Safety and Health Commission and the 12th, 13th and 14th reports of the Mines Safety and Health Commission.

The European Parliament,

- having regard to the 6th, 7th, 8th and 9th reports of the Steel Industry Safety and Health Commission and the 12th, 13th and 14th reports of the Mines Safety and Health Commission;

- having regard to the report of the Committee on the Environment, Public Health and Consumer Protection (Doc.327/78);

1. Confirms that for the period under review both the Steel Industry Safety and Health Commission and the Mines Safety and Health Commission have managed well, but that because of the staffing, administrative and partly financial difficulties that have arisen they have been unable to cover the whole field of safety and health at work;

2. Is concerned about the shortage of staff in both organizations considering that the working population is the mainspring of development in the Community and that it should be safeguarded for humanitarian and economic reasons by every possible means;

3. Deplores the fact that the Mines Safety and Health Commission because of shortage of staff has not been able to extend the correlation of the statistics of the Community of the Six and the United Kingdom to all mineral extracting industries;

4. States that the Steel Safety and Health Commission due to serious administrative difficulties was unable to hold any meetings of the Commission or its working parties in 1976;

5. Deplores that for financial reasons it has been impossible for the Steel Industry Safety and Health Commission to organize a planned colloquy in 1978 and that its realisation in 1979 depends on whether the Council finally will provide the necessary funds in the next year's budget;

6. Emphasizes the importance of completing the special study into serious accidents started in 1976 by the Steel Industry Safety and Health Commission and scheduled to enter an important and expensive phase in 1979;

7. Notes that the Mines Safety and Health Commission, whose responsibility has been extended in 1974 to all mineral extracting industries, because of staffing reasons has made little progress in implementing this new area;

8. Invites the Mines Safety and Health Commission to devote in the near future more time and attention to health questions, specially to the major problem of dust faced by miners;

9. Calls upon the Steel Industry Safety and Health Commission to report in its next annual report on the different studies carried out or being carried out, i.e. the study on the significance of accident statistics, their comparability and their trends and the special study on major accidents initiated in 1976;

10. Calls upon the Commission and the Council of the European Community to provide the necessary staff and funds to both Safety and Health Commissions in order to enable them to operate properly and efficiently;

11. Points out that until the question of the staffing of these two Commissions is settled, proposing new areas of study or new fields of action is not considered useful;

12. Requests its President to forward this resolution and the report of its committee to the Council and Commission of the European Communities.

EXPLANATORY STATEMENT

INTRODUCTION

1. Until 1975 the European Parliament has drawn up reports at regular intervals on the reports of both these Commissions. However, since that date none of the annual reports have been published with considerable delays and it was not considered opportune to continue as in the past. Moreover, the general question of whether or not the Committee on the Environment, Public Health and Consumer Protection should draw up reports on reports has been raised.

2. As the reports of both these Safety and Health Commissions are fairly voluminous and contain a large number of statistical tables, perhaps it would be a better idea for the future to have a representative from each of the organizations to come and give a brief outline of the results achieved during a set period than for the rapporteur to have to examine in detail these reports.

3. When the Committee decided to draw up a report only the 12th, 13th and 14th reports of the Mines Safety and Health Commission (covering the years 1974 to 1976) and the 6th, 7th, and 8th reports of the Steel Industry Safety and Health Commission (also 1974 to 1976) were available. The 9th report of the Steel Industry Safety an Health Commission, covering its activities in 1977, has just been published .

STEEL INDUSTRY SAFETY AND HEALTH COMMISSION

4. This body was set up by the ECSC High Authority in 1964 with the aim of encouraging an exchange of experience and research within the Community so that the best ways of tackling safety and health problems in the iron and steel industry could be found.

5. The four reports under review outline the activities of this Commission between 1974 and the end of 1977 i.e. the activities of its various working parties and any special activities organised. A major conclusion that can be drawn from these reports is that fatal accidents in the iron and steel sectors have diminished, whereas minor accidents are on the increase[1]. The

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1 See annexes I and II

reason for these trends is not known but a number of studies being carried out are examining this problem.

6. Perhaps the most important study being undertaken by the Commission is the study of serious accidents. This study was started in 1977 and was expected to last for 2 or 3 years. It should result in the finalising of a standard questionnaire to be used in surveys on very serious accidents, providing initial information on the categories of causes of very serious accidents and the establishment of a method of research into the causes of such accidents. The next stage of the study which will be undertaken in 1979 could seriously be jeopardised, if the Council will not provide the necessary funds.

7. The 8th report (covering 1976) starts by indicating that 1976 was a year of very little activity for the Steel Industry Safety and Health Commission due to the serious administrative difficulties. It is a fact that the secretariat of this Commission has always been understaffed and attention has been drawn to this on numerous occasions in reports drawn up by the European Parliament. The ludicrousness of the situation was highlighted in 1976 when the only secretary assigned to the secretariat left, with the result that not a single meeting of the Commission or its working parties was held during that year. This is obviously an internal Commission problem but it is surely one that can be solved without too much difficulty. If an organization such as the Steel Industry Commission is to be taken seriously by those whom it purports to help, then it must be given the means to operate efficiently.

8. In the 9th report mention is made of a decision taken by the Health and Safety Commission to organise a colloquy in 1978 on the results of the work being done by the Commission. This would be essentially aimed at those responsible for safety in the iron and steel industries. It is also pointed out that when a similar colloquy was organised in Luxembourg in 1970, over 700 persons from 14 different countries participated and the meeting itself was extremely successful.

9. For financial reasons it was not possible to organize this colloquy in 1978 and it depends on the Budget for 1979 if it can be organized next year. Considering that the prime task of this Health and Safety Commission is to disseminate the information it obtains as a result of exchanges of experience, the Committee thinks that the organization of such a meeting is of prime importance and indeed asks why years have passed since the organization of the last.

MINES SAFETY AND HEALTH COMMISSION [1]

10. The Mines Safety and Health Commission was set up in 1957 following the mine disaster in 1956 in Marcinelle (Belgium) in which 262 miners died. A conference on Safety in Coal Mines was held shortly after the disaster resulting in a report containing recommendations for actions by governments in the field of safety, and it was the task of the Mines Safety Commission to continue the work of this conference and to seek solutions to the problems of safety in coal mines.

11. Since that date the terms of reference of the Mines Safety Commission have been extended to include factors affecting health and to cover all mineral extracting industries. Contrary to the Steel Industry Safety and Health Commission, the Mines Safety and Health Commission submits proposals to the governments of the Member States for the improvement of safety and health and keeps itself informed of any action taken on these proposals. In recent years most of the proposals made by the Mines Safety and Health Commission have, in fact, been incorporated in national legislation.

12. As far as the general activities of the Commission and its working parties are concerned, there is little comment to be made. In fact, the Commission is to be congratulated on having managed to hold so many meetings and to draw up and distribute so many reports in spite of severe staffing difficulties. For example, in 1974 although 77 meetings were held, the secretariat were unable to keep pace with the demands of the Commission and its working parties. It was in this year that the Council of Ministers decided to extend the responsibility of the Mines Safety and Health Commission to all mineral extracting industries.

13. In 1975 we note that the working party on health in mines met only once to study the problems of dust, noise and lighting. The following year, 1976, this working party did not meet at all due to staffing difficulties. It must be pointed out that while the study of major accidents and their causes is extremely worthwhile and must be continued, the major problem facing miners is the problem of dust. It is true to say that overall, pneumoconiosis and silicosis are ultimately more lethal than accidents. The question must be posed as to whether the Mines Safety and Health Commission should not devote more time and attention to health questions.

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[1] For accident statistics see Annexes III and IV

CONCLUSIONS

14. The committee has no intention of criticising the work done by either of the two Safety and Health Commissions, that on the contrary, both organisations have managed extremely well in spite of the numerous difficulties of staffing that have arisen.

15. The committee further points out, that until the whole question of the staffing of these two organizations is settled once and for all, it does not see the utility of proposing new areas of study or new fields of action for either of the Commissions. It would seem illogical to ask for either an extension of competence or for new tasks to be performed by an organisation which has difficulty in fulfilling the duties already conferred on it.

ANNEX I

STEEL INDUSTRY

Fatal accidents in the Community of Nine

Year	Number of fatalities	Frequency rate (1)	Accidents:production ratio (2)
1974	137	0,13	0,88
1975	110	0,12	0,88
1976	88	0,09	0,86
1977			
1978			
1979			

(1) Number of fatal accidents per million hours worked

(2) Number of fatal accidents per million tonnes of crude steel

Source: Ninth report of the steel industry safety and health commission (1977), Doc. 2164/78

STEEL INDUSTRY

Accidents causing absence from work in the Community of Nine

Year	No. of workers	Accidents resulting in $\geq$ 1 day's absence			Accidents resulting in > 3 day's absence		Percentage of accidents resulting in between 1 and 3 day's absence
		Number	f.r.(1)	acc:prod.(2)	Number	f.r.(1)	
1974	585.267	90.581	85	582	76.394	72	15,3
1975	568.772	74.854	78	598	63.606	67	14,1
1976	548.446	75.568	80	563	63.069	67	16,2
1977							
1978							

(1) frequency rate : number of accidents per million hours worked

(2) number of accidents per million tonnes crude steel

Source: Ninth report of the steel industry safety and health commission (1977), Doc. 2164/78

MINING INDUSTRY

ANNEX III

D. RECAPITULATION : COMMUNITY OF THE SIX

Year	Extraction (1)	Underground o.m.s. (kg.)	Million man-hours worked	Fatalities	Serious injuries (4) (disablement for 8 weeks or over	Fatalities per m. tons	Serious injuries (4) per m. tons	Fatalities per m. man-hours	Serious injuries per m. man-hours
1958	252 278	1 634	1 260	770	17 074	3,052	67,68	0,610	13,551
1959	240 602	1 788	1 122	622	14 539	2,585	60,43	0,590	12,950
1960	239 967	1 958	1 037	526	13 459	2,192	56,09	0,507	12,986
1961	235 848	2 100	962	527	12 720	2,235	53,93	0,548	13,227
1962	233 233	2 229	901	840 (3) 541 (4)	12 418	3,602 (3) 2,320 (4)	53,24	0,932 (3) 0,600 (4)	13,781
1963	229 769	2 331	849	465	11 686	2,024	50,86	0,547	13,761
1964	235 007	2 395	841	411	11 726	1,749	49,89	0,493	13,860
1965	224 249	2 461	784	410	10 595	1,828	47,25	0,522	13,506
1966	210 189	2 611	698	374	9 247	1,779	43,99	0,536	13 [illegible]42
1967	189 484	2 824	587	269	7 781	1,420	41,06	0,457	13,246
1968	181 016	3 065	522	240	7 501	1,326	41,44	0,460	14,370
1969	176 749	3 265	476	209	7 222	1,181	40,82	0,438	15,160
1970	170 355	3 442	438	188	6 591	1,104	38,69	0,429	15,047
1971	164 910	3 514	414	182	6 249	1,104	37,89	0,440	15,088
1972	151 809	3 659	369	147	5 763	1,033	26,34	0,399	15,60
1973	139 700	3 755	332	137	5 560	0,981	39,80	0,413	16,77
1974	133 300	3 742	313	143	5 054	1,073	37,91	0,456	16,12
1975	129 100	3 632	319	110	4 795	0,852	37,14	0,35	15,05
1976	125 600	3 710	301	125	4 491	0,995	35,76	0,415	14,92
1977									
1978									

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

UNITED KINGDOM

1973	130 200	3 598	306	74	490	0,568	3,76	0,242	1,60
1974	109 200	3 260	268	37	417	0,339	3,82	0,138	1,555
1975	127 700	3 493	303	55	522	0,431	4,09	0,181	1,722
1976	122 100	3 407	287	45	2 407 (1) 444	0,369	19,71 (1) 3,64	0,157	8,[illegible]7 (1) 1,536
1977									
1978									

Note : It is only possible to compare the figgers in table I (Community of the Six) with those in table 2, by refering to the explanatory notes in Section IV, paragraphe 4.2.

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

Source: 14th report of the mines safety and health commission for the year 1976

ANNEX IV

MINING INDUSTRY

Accident levels since 1971 (Community of the Six)

	1971	1972	1973	1974	1975	1976
4 - 20 days - actual	47 203	40 376	37 384	34 797	33 535	30 643
Frequency rate	113,98	109,31	112,77	110,97	106,67	101,77
Increase/decrease on previous year (%)	-	-4 (s)	+3,17 (s)	-1,6 (s)	-3,9 (s)	-4,8 (s)
21-56 days - actual	21 116	18 531	17 325	15 875	15 454	13 923
Frequency rate	50,98	50,17	52,26	50,62	48,5	45,24
Increase/decrease on previous year (%)	-	-1,59	+4,17 (s)	-3 (s)	-4,2 (s)	-4,8 (s)
more than 56 days - actual	6 249	5 763	5 560	5 054	4 795	4 791
Frequency rate	15,09	15,60	16,77	16,12	15,05	14,92
Increase/decrease on previous year (%)	-	+3,4 (s)	+ 7 (s)	-4 (s)	-6,7 (s)	-0,8 (s)
Fatalities total actual	182	147	137	143	110	125
Frequency rate	0,440	0,399	0,413	0,456	0,345	0,415
Increase/decrease on previous year (%)	-	-10	+3,9	+10,4	-24	+20
Actual without group-accident (actual group accident)	162 (3)	141 (1)	128 (1)	96 (2)	110 (0)	109 (1)
Frequency rate	0,391	0,382	0,385	0,307	0,345	0,362
Increase/decrease on previous year (%)	-	-2,3	+1%	-21 (s)	+12	+4,9

(s) significant variation

Sou rce: 14th report of the mines safety and health commission for the year 1976

SUMMARY

The 16th Annual Report of the Mines Safety and Health Commission provides a general summary of its activities in 1978, as well as those of its 11 Working Parties and 11 Committees of Experts, relating to the coal industry and the other extractive industries, notably the prevention of uncontrolled blowouts during the exploration and exploitation of offshore oil and gas deposits.

The Report begins with socioeconomic statistics on the coal mines and the same statistics in skeleton form on the Nine's other extractive industries.

In Section I, the Mines Safety and Health Commission's activities are summarized as follows:

- 6 proposals to the Governments for changes in their regulations, three of these proposals concerning tests for the quality control of conveyor belts, mechanization in coalwinning areas and safety signs in coal mines, the other three relating to the prevention of uncontrolled offshore blowouts of gas and oil.

- 2 information reports on conveyor belts.

- 1 proposal for a Council directive on the design of electrical equipment.

A summary of the information symposium for workmen's inspectors concerning the participation of workers in the supervision of safety and health in mines is also included.

There is also a summary of the conference on 'Medical aspects of deep-sea diving'.

Section II reports on the progress of the Working Parties, listing the working documents used; these are available in English, French and German upon request from the Mines Safety and Health Commission Secretariat.

Section III deals with the action taken by the Governments on the proposals of the Mines Safety and Health Commission listed in Annex V.

Section IV provides details and comments on the accident statistics for coal mines which are in a standardized form for the Nine.

The 13 Annexes give the terms of reference of the Mines Safety and Health Commission and its Working Parties, the names of the members, the bibliography of the work of the MSHC, the proposals and reports adopted in 1978 and lastly a proposal on the construction of gateside packs and a report on self-rescuers, adopted at the beginning of 1979 by the MSHC.

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