EUROPEAN ECONOMIC COMMUNITY EUROPEAN ATOMIC ENERGY COMMUNITY

ECONOMIC AND SOCIAL COMMITTEE

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Study of the Economic and Social Committee on health and environmental hazards arising from the use of asbestos

Rapporteurs: Mr. Eboli and Mr. Piga

CES 230/79 PKK/as

C O N T E N T S

I. INTRODUCTION

At its meeting on 8 February 1977, the Bureau of the Section for Protection of the Environment, Public Health and Consumer Affairs discussed what matters might be suggested to the ESC Bureau for inclusion on the general programme of own-initiative work.

At its meeting on 10 May 1977, the Section decided on its suggestions for priority own-initiative work for inclusion on the general programme.

On 24 May 1977, the Section's Chairman at that time, Mr ROSEINGRAVE, wrote to the Committee's Chairman, Mr de FERRANTI, stressing the urgency of the issue of the use of asbestos.

The Section considered that the steadily increasing burden of scientific evidence pointed to the need for priority action to be taken on this issue under the second environment programme.

On 21 June 1977, the Committee's Bureau instructed the Section to draw up a Study on Health and Environmental Hazards arising from the Use of Asbestos. The idea was for the Study to "provide the Committee with sufficient basic data in case the Committee was requested for an Opinion on concrete Commission proposals".

On 8 July 1977, the Section set up a twelve-member Study Group under the chairmanship of Mr van RENS. Mr EBOLI was appointed Rapporteur and Mr BERNAERT Co-Rapporteur. During the constitutive meeting of the Section on 19 October 1978, Mr PIGA was appointed Rapporteur in place of Mr EBOLI, who is no longer a member of the Committee.

The Section issued its Study at its meeting on 21 November 1978.

The Study was adopted by nominal vote by the Committee at its 166th Plenary Session on 21-22 February 1979 (meeting of 22 February 1979) by 45 votes to 20 and 7 abstentions.

II. NATURE AND USES OF ASBESTOS

The term ASBESTOS (coming from the Greek meaning "inextinguishable" or "indestructible") is used to denote one of a group of minerals that readily separate into an almost infinite number of fibres of high tensile strength and flexibility.

By way of illustration, 26 hairs, 150 glass fibres or 10,000-50,000 fibres of asbestos all have a total diameter of 1 mm. The principal asbestos deposits are found in Canada, South Africa, the USSR and Italy. Fine, silky asbestos, such as chrysotile is sometimes termed "amianthus".

The term asbestos covers six types of silicates which occur naturally in fibrous form. Their physical/chemical make-up differs, but all six types share the same fibrous crystalline structure with the fibres strongly bound and lying predominantly in one direction. The six types classify into :

- chrysotile (sometimes called "serpentine asbestos") and

- amphiboles.

Chrysotile occurs in serpentine, a combination of magnesium and silica found in metamorphoric rock. The fibres are fine and white, flexible and strong. Chrysotile has a high heat-resistance and its fibres may be used for spinning and weaving.

Chrysotile is a hydrated magnesium silicate with significant trace amounts of metals such as nickel, chromium, cobalt and manganese (varying according to where the chrysotile was mined).

The amphiboles are complex silicates of iron, magnesium and calcium (with magnesium always predominating over calcium). Some amphiboles are :

a) monoclinic, others
b) orthorhombic.

The monoclinic amphiboles comprise crocidolite (blue asbestos), amosite (grey-brown), temolite and actinolite (of little commercial value). The special property of crocidolite and amosite is their resistance to acids. The springy nature of amosite and crocidolite fibres, giving a high volume to weight ratio has made them particularly suitable for thermal insulation materials.

Anthophyllites, which are mainly used in their native Finland, are orthorhombic amphiboles.

From the commercial point of view, the major types of asbestos are chrysolite, amosite, crocidolite and anthophyllite. Respectively, these account for 95.2%, 1.4%, 3.2% and 0.2% of the total asbestos extracted around the world (1). The physical/chemical and mechanical properties of the various types determine their applications and characteristics. Their most important physical/chemical properties are :

- non-flammability;
- heat resistance;
- resistance to corrosive chemicals;

(1) Data taken from Public Health Risks of Exposure to Asbestos (Prof. ZIELHUIS).

- resistance to micro-organisms;
- electrical resistance;
- resistance to mechanical abrasion.

What properties are present and to what degree depends on the composition of the particular type of asbestos, i.e. the metallic elements present in the siliceous structure, which is common to all the types, determine the physical/chemical properties.

The mechanical characteristics are determined by the surface area and structure of the fibres.

The elasticity and tensile strength are not determined by the fineness of the fibre. The tensile strength of crocidolite is greater than chrysotile and much greater than amosite. The flexural strength is similar for chrysotile and amosite but greater for crocidolite.

Asbestos-bearing rocks are mined in open-cast and underground mines. Annual world production is running at some five million tons of which approximately 2% is suitable for spinning. The earliest use of asbestos was for weaving. It was not until the late 19th century with the invention of asbestos rubber and asbestos cement that the use of short asbestos fibre became widespread. Asbestos undergoes initial processing at the mine where :

- the asbestos is separated from the parent rock by hand cobbing (crude asbestos) or by crushing, followed by drying, sieving, sorting in an air stream, etc.;

- partial separation takes place (opening or separation into fibres of the bundles of asbestos fibres by milling (milled asbestos);

- rock dust and other impurities are carefully removed;

- the asbestos is graded according to fibre length and the extent to which the fibres have been opened.

In the processing industry, the asbestos undergoes secondary processing as follows :

- air is blown through the asbestos which has been compacted in packing and transport,

- opening : the asbestos is separated into the longest possible fibres, and, if necessary,

- the asbestos is cleaned and graded, viz. the asbestos-dust, rock-dust and surface talc is removed.

The separation processes used depend on the use to which the asbestos is to be put. For yarn production, for instance, the asbestos fibre is mixed with organic materials and is carded.

Asbestos has been used from time immemorial. It was already used in Finland in 2,500 B.C. to strengthen clay pots. It was used by the Ancient Greeks, and Pliny the Elder wrote of the difficulties and hazards of working it. Marco Polo reported that the Tartars made cloths that would not burn. But it was not until about 1880 that the large Russian and Canadian deposits really began to be

exploited seriously. The industry has expanded considerably in the last 60 years, and especially since the Second World War, production having increased about one thousandfold. There are between 1,000 and 3,000 industrial uses for asbestos, of which a number of examples follow.

Most of the asbestos produced goes into asbestos cement. The key to the production process lies in the affinity of asbestos and cement when in the presence of water.

- Flat and corrugated asbestos cement sheets are used for roofing, cladding and decoration or as a support for tiling and slates are often made of this material.

- Asbestos cement can be moulded to make decorative facings, ornamental basins, flower stands and even garden seats.

- Additional qualities may be conferred on the asbestos cement by fillers, such as cellulose (lightweight elements for partitions, ceilings and lofts), silicates and coloured mineral claddings (confer colour and strength on facing material) and refractory silicates and fillers (fireproofing).

A major application for asbestos cement is in piping - domestic jointed pipes, pipes for use unpressurized underground, pressure pipes for use for water supply lines, drainage and sewerage.

Asbestos is used in refrigeration and air-conditioning plants, turbines, heating and chemical plants and refineries and to insulate boilers.

Asbestos is used in cloths and fabrics, and in flanges, moulds, panels and board which may be fixed in position as insulation and for protection against flame.

The application of asbestos by spraying has been widely used in the past, for protection against fire, noise and condensation, but this process is no longer common because of the serious health risks associated with it. Pure asbestos may be employed, although it is less common than elaborate mixtures of asbestos wool (40%) with rock wool in the presence of an inorganic binder. A hopper and a worm conveyor feed a fibre-opening machine in which the crude fibre is reduced to a manageable size. The asbestos then goes into a turbine and thence to the applicator through a hose. Compressed air and water are fed into the applicator through a mixer.

The first step is to apply a latex adhesive (by means of a spray-gun) to a metal grid fixed to the surface which is to be treated. Then the asbestos mixture is sprayed on until the desired thickness is obtained.

In shipbuilding, asbestos is used to sound - and heat-insulate the engines and various structures of ships and for the fire-resisting partitions. It is also used, under international conventions for safety of life at sea, for fire resisting partitions etc. It is either sprayed on or affixed as panels (containing

28.2% asbestos and 71.8% calcium silicate in the case of "Marinite").

One of the earliest uses for asbestos was in the manufacturing of fabrics. Chrysotile and crocidolite are best for spinning and weaving. First the fibres are opened, then follows carding, spinning and weaving.

Asbestos cloth is used for fireproof clothing and curtains and in insulating materials.

Asbestos is also extensively used in the car industry. It is the basis of clutch facings, brake linings, disc brake pads, gaskets and insulators. It is also used for fire resistant under-sealing.

In the plastics industry, asbestos is used as a filler to increase strength, durability and resistance to wear.

A combination of asbestos and plastics is used to produce asbestos-fibre joints, which are coated in polychlorofluorethylene.

Because it is resistant to acids, crocidolite is extensively used in electric battery cases and many forms of joints, gaskets and seals, where highly corrosive material or gases are present.

In addition, asbestos is used in the aerospace industry, for example, it is incorporated in metals used as heat shields.

Lastly, asbestos is used as a filter (e.g. in beer manufacturing, for clarifying wines and for pharmaceutical products).

III. DISEASES ASSOCIATED WITH ASBESTOS - RELEVANT STATISTICS

Inhalation of asbestos fibres may cause various diseases :

- asbestosis;
- bronchial cancer;
- mesothelioma (of the pleura and peritoneum);
- cancer of other parts of the body;
- non-tumourous pleural disease.

1. Asbestosis

Asbestosis is a form of fibrosis of the lung, which is caused by the inhalation of a specific size-range of asbestos fibres. The disease may develop either after exposure to asbestos over a period of years or after a short period of exposure. It has a sufficiently well-defined radiographic/clinical appearance, being frequently characterized by pleural thickening and pleural calcification. Once established, the disease is irreversible. Depending on how serious a form of asbestosis is present, the disease sooner or later may lead directly, or through the onset of complications, to the death of the victim. The progress of asbestosis, particularly as regards the functional effects, can often be slowed if the disease is diagnosed at a very early stage and exposure ceases thereafter. On the other hand, there is the problem of individuals who are particularly susceptible to the disease.

However, early diagnosis is difficult, as witness the asbestosis victims in whom signs of the disease only became apparent after they had given up the hazardous occupation. As a rule it is very difficult to stabilize the disease if it has progressed far enough for the clinical/radiological symptoms to be definite. The literature suggests that there is a correlation between the number of asbestos fibres in the lung and the degree of asbestosis. The retention of asbestos fibres in the lungs is the end-result of a complex process, whereby dust inhaled into the respiratory system is eliminated. This process is not fully understood. For instance it is not known what proportion of asbestos fibres is isolated in cases where asbestos has been inhaled over a period of years. As a result, the number of fibres found in the lungs is not an accurate guide to the total number of fibres which have been inhaled. However, it has been estimated that fibrosis, even if only in a mild form, is bound to be present where there are 10,000 to 100,000 asbestos fibres per gram of dry lung (= approx. 10 g. of wet lung). This leads one to believe that inhalation of a small quantity of asbestos over an average working life will cause sufficient asbestos fibres to accumulate in the lung tissue as to cause asbestosis to develop.

This possibility is confirmed by observation of asbestos-induced pleural and pulmonary lesions in clinical and radiographic tests and post mortem examinations carried out on persons who were not occupationally exposed to asbestos but merely lived in the neighbourhood of asbestos mines and factories handling asbestos. Also, slight fibrosis of the lung has been observed, and histologically

documented, in animals which were not experimentally constrained to inhale asbestos, but merely lived near deposits of the mineral. Such findings must be taken into consideration when laying down maximum fibre concentration per unit volume of air.

2. Bronchial Cancer

Numerous epidemiological studies have shown that there is an association between bronchial cancer and exposure to asbestos fibres.

Histologically, it is impossible to distinguish cancers associated with asbestos from those produced by other causes, although smoking multiplies the risk of bronchial cancer developing in asbestos workers. However, it does not seem that the appearance of bronchial cancer is linked with the severity of asbestosis. In any event, asbestos is officially recognized as being a potential cause of cancer.

Page 37 of a West German scientific committee document giving maximum allowable concentrations (MAC values) for 1977, states that inhalable asbestos dust causes cancer of the respiratory system and observes that smoking increases the risk of bronchial cancer. Page 45 states that the various forms of asbestos cause malignant tumours (carcinomas and mesotheliomas) and, as a result, no MAC values may be laid down for them. Yet for operational and technical purposes, limits are given in connection with the fibrogenic effect of

amosite and chrysotile, although it is made clear that, in the present state of knowledge, it is impossible to state that keeping within such limits would rule out the risk of cancer. No operational or technical limit is given for crocidolite because of the great risk of mesothelioma.

In a document published in 1977, the American Conference of Governmental Industrial Hygienists held that all forms of asbestos were carcinogenic to man and included them in the category of substances with ceiling limits. In the ILO's booklet, Asbestos : Health Hazards and their Prevention, it is stated that the standard for concentrations of asbestos dust which had been adopted by some member countries and proposed by others relate to the fibrogenic effect and not to the carcinogenic effects (p.9 of the English version). Moreover, it should be borne in mind that the carcinogenicity of asbestos is deduced mainly from epidemiological evidence. As a result, it may turn out to be difficult in any given case to establish a cause-effect relationship. Moreover, numerous other factors may have been instrumental, these relating not just to the individual but also to the type of work, material used and length of exposure, not forgetting that most of the workers concerned are exposed to a variety of types of asbestos and other minerals. In addition, it should be noted that better dust control has led to a decrease in the incidence of asbestosis. For bronchial cancer, given the long latent period for such tumours, exposure will have occurred many years earlier. All these factors explain why often no documentary evidence exists.

3. Mesothelioma (of the pleura and the peritoneum)

Primitive neoplasias of the serous membranes are infrequently encountered and difficult to diagnose. The association of mesothelioma with exposure to asbestos is not assessed by

all the authorities in the same way. In the various surveys, according to international scientific literature, between 11% and 86% of mesothelioma victims turned out to have been occupationally exposed to asbestos (the highest values were observed in areas where there are crocidolite deposits). The incidence of mesothelioma is also considerable in persons who lived over a long period in the immediate vicinity (½ mile) of factories handling asbestos. Some facts relating to asbestos' responsibility for causing mesothelioma have been demonstrated with certainty : (1) inhaled asbestos fibres migrate to and are deposited in the pleura (as well as elsewhere); (2) intra-pleural injection of asbestos has led to the formation of mesotheliomas in animals; (3) the frequency of mesothelioma is greater to a statistically significant degree in persons who have been occupationally exposed to asbestos; (4) mesothelioma develops after long periods of exposure, but can also appear (after a period of many years) following a short exposure; (5) asbestos fibres and asbestos bodies are present in the area of asbestos tumourous tissues; (6) it is estimated that 8% to 11% of certain groups of asbestos workers will die of mesothelioma (*).

A much more difficult question to resolve is that of mesothelioma in persons not known to have been exposed to asbestos. As a result of relatively recent research, asbestos fibres and fibrils were discovered in more than 80% of the post mortem examinations conducted in London and New York on persons who had died for various reasons. Accordingly, our most serious conclusion might be that asbestos should be considered to be an endemic contaminant of people's lungs but not invariably the cause of all mesotheliomas. An analogy can be made with smoking : not all smokers get lung cancer, but the frequency of lung cancer is very high in smokers. This is obviously food for thought, although much more research will have to be done before any definitive

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(*) "British Journal of Industrial Medicine, 33"

conclusions can be drawn about this problem which is truly worrying given the wide use of asbestos in domestic applications.

4. Cancers of Other Parts of the Body

There have been several reports attributing to asbestos the formation of cancers in sites other than the bronchi and the serous membranes, and especially gastro-intestinal tract cancers (attributed to the use of asbestos in filters for drinks). These reports need further corroboration and specific research.

5. Non-Tumourous Pleural Disease caused by Asbestos

According to some authors, hyalin pleural plaques, calcified plagues and benign asbestos-induced pleurisies may be caused by a moderate, but prolonged, exposure to asbestos even in the absence of fibrosis of the lungs. It is reported that hyalin pleural plaques, particularly on the parietal pleura, are detectable in more than half the autopsies carried out on persons who have been exposed to asbestos. In 85% of cases the plaques are invisible on chest radiographs and cause no impairment of lung function. The calcified pleural plaques develop in the later stages (more than 30 years after the onset of exposure) within the hyalin plaques. The plaques are parietal, bilateral and predominate at the base and at the diaphragm. They are clinically undetectable, showing up only on radiographs. Benign asbestos-induced pleurisies are rare and have only recently been discovered. They tend to occur early and even in persons who have only been moderately exposed to asbestos. Pleurisies of this nature could be the first clinical signs of the pathological effects of asbestos; they tend to clear up spontaneously.

This disease is interesting as its origination and development is unknown. It was previously classed as cryptogenic and constitutes a possible indicator of abnormal exposure to asbestos requiring radiological and clinical surveillance over a very long period. Indeed, some authors maintain that mesothelioma can develop many years (more than 40) after exposure.

From the above it is clear that no definite conclusions can yet be drawn even for these non-cancerous pleural diseases. But it is important to determine whether they are the result of specific, early and reversible lesions.

To round off this examination of the pathological effects of asbestos, it is evident that the work that is being done on clarifying the relationship between asbestos and the diseases described above needs to be coordinated, not so much as to safeguard us against what seems to our present knowledge to be a major risk, but more so as to enable us to find suitable means of combating it.

6. Difficulties with Statistics on Diseases associated with Asbestos

There are practical difficulties in providing comparable statistics showing the incidence of diseases (and especially tumorous diseases) associated with the use of asbestos.

Italian industrial sources indicate that 10,000 of the 12,000 employed in the various asbestos industries are exposed to risk.

Under Italian law only disability in excess of 20% qualifies for compensation; moreover, asbestosis is difficult to diagnose and has a long latent period. As a result, general conclusions about the incidence of asbestosis cannot be drawn from the official data in our possession.

However, an incidence of around 14%, with the more evident forms of the disease tending to be on the decrease, was revealed by regular ENPI (Italian national accident-prevention body) X-ray examinations of a sample of persons at risk (in 1967-1976, between 1,000 and 4,000 persons were examined annually).

Data are also available from the UK (source : Health and Safety Executive Reports and House of Commons Hansard). According to these statistics, there were 1,189 awards of benefit to new cases as asbestosis, 1,031 deaths from asbestosis, 1,931 cases of mesothelioma recorded in the mesothelioma register and 1,612 deaths from mesothelioma, between 1969 and 1976.

But data are only available from two Member States and are not comparable. In addition, there is no certain reference datum with regard to the number exposed to risk. This prevents any

conclusions being drawn as to the value of statistics on diseases arising as a result of the use of asbestos, but it does also underscore the need to promote an exchange of information at Community level without delay.

This is vital if data are to be obtained which will provide sound, inter-comparable statistics for use in curtailing the asbestos hazard.

IV. PROTECTION OF THE WORKER AND THE POPULATION AT LARGE

a) Member State Legislation

There are real difficulties in making an in-depth examination of statutory provisions in force in the various Member States (see Appendix I), as a result of the differing sources from which they originate. As a general rule, workers who are exposed to the risk of inhaling asbestos fibres are protected by general occupational health standards or by provisions relating specifically to asbestos. To take Italy as an example, Articles 19 and 21 of the Industrial Health Regulation (1) cover all dusty work, but there is no specific reference to asbestos or to the determination of maximum allowable concentrations. Nevertheless, maximum concentrations in the atmosphere are stipulated in employment contracts in the various industries handling asbestos.

In contrast, France recently enacted standards which principally concern persons occupationally exposed to asbestos and lay down reference methods of sampling, analysis and evaluation together with a maximum allowable limit. They also concern the transport of waste materials.

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(1) See DPR No. 303 of 19 March 1956

The United Kingdom, likewise, has maximum allowable limits. Similar limits are applied in practice in the Federal Republic of Germany. A large number of countries stipulate preventive, periodic medical checks. In Italy, these checks are laid down in a statute on occupational illness insurance (2). Annual checks are compulsory for workers in the mining industry (miners and workers engaged in the processing of asbestos), and where asbestos or asbestos-containing materials are processed, used or applied and there is consequently an asbestos-dust hazard.

The interval between medical checks varies from country to country. Some countries have rules on the age and sex of employees who may be exposed to risk. Typically the employer is responsible for carrying out the preventive measures - which, as mentioned earlier, are sometimes defined in general terms (Italy), sometimes in great detail (France and United Kingdom).

The information to hand suggests that there is a good case for harmonizing, in a progressive sense, at Community level the national regulations governing protection against asbestos hazards.

b) Measures taken by Industry to minimize the Risk from the Use of Asbestos

The steps taken by industry to minimize the asbestos hazard depend on the type of technology concerned and the criteria deemed to be appropriate. Considerable effort has been put into reducing, or eliminating the risk to the worker and the public at large. At the US factory, Raybestos-Manhattan (a factory engaged in the production of brake linings in which process asbestos is used) at Ovens, Co. Cork, Ireland, measures to protect the occupationally

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(2) See DPR No. 1124 of 30 June 1965 combined, as far as asbestos is concerned, with Law No. 780 of 27 December 1976.

exposed and the general public were introduced. The texts of the planning permissions granted for the Raybestos-Manhattan factory at Ovens, Co. Cork, and for the operation of an asbestos waste disposal site at Ringaskiddy, Co. Cork, are set out in the Appendix III.

According to the German asbestos industry, their safety equipment and hygiene standard are continually being updated.

There follow some examples from Germany :

- only specially selected asbestos fibres are to be used in the manufacture of asbestos cement. The aim here is to bind the asbestos within the cement, so that the fibres cannot become airborne;

- compressed air may not be used for cleaning machinery and clothing; instead, vacuum-cleaning plant must be used;

- dust extraction machinery must be maintained at regular intervals;

- removal of all wastes (after wetting or by using vacuum cleaners);

- protective masks must be worn in case dust control machinery is not effective;

- regular preventive medical examinations.

The Dutch industry has installed special decontamination facilities and provides protective clothing and headgear. Protective equipment must be worn when it is not possible adequately to control dust levels by dust extraction equipment or, for example,

when servicing, maintaining or cleaning such equipment. Extensive work on health research and the development of controls has also been carried out over many years in Denmark, Belgium and the United Kingdom.

An agreement has been reached between the employers and trade unions (works council) in an Italian company, on the use of asbestos insulating material on ships under construction or repair, and on ships being broken up (see tables in Appendix II on the trade union agreement of 9 June 1977 made with the Trieste ship-yards and Decree No. 1382 of 28 October 1977 issued by the Chairman of the Genoa Harbour Authority governing the use and working of asbestos in repairs, maintenance, alterations and breaking up ships).

c) Steps to Eliminate the Risk Due to Asbestos

The object of prevention is to prevent people coming into contact with dangerous substances. In the present situation the best solution would be to replace asbestos by substitutes that are technologically equivalent but less dangerous to health. But the substitution of asbestos in every application is not feasible. Yet in some Member States there are almost one hundred percent bans on the use of some types of asbestos (crocidolite in particular) and on the use of any type of asbestos for certain applications (notably, packaging and certain building applications). The Committee considers that the Commission should give thought to the possibility of partly or totally incorporating these bans within Community legislation.

Some members consider that such legislation should be based on the following four points :

i) A ban on crocidolite. A transitional period of two years could be adopted. During this period derogations could be allowed after consulting the workers, but with a maximum of 0.2. fibres/cm^3.

ii) As an essential corollary to this, imports of crocidolite into the Member States would be prohibited.

iii) In the case of asbestos fibres other than crocidolite all available technical means should be used to keep concentrations down to as near 0 fibres/cm^3 as possible. The maximum permissible technical limit would be 2 fibres/cm^3 and this must not be exceeded.

However, the following applications would also be prohibited :

- in air filter units;
- spraying (flocking and painting);
- in thermal and accoustic insulation;
- floor coverings and road surfacing;
- in decorating.

iv) The handling of asbestos by hand would also be prohibited.

Other members consider that the measures to be taken could be based on the following :

- Ban on the use of crocidolite, except for asbestos-cement pipes and packings.

- Ban on the use of asbestos :

  a) for spraying;
  b) in air-filtering equipment, thermal and acoustic insulation, floor coverings and decorative uses, except when the harmful emission of fibres is avoided.

- Use should be made of all technical means available in order to keep the airborne fibre concentration as low as possible, the maximum technical limit allowed being 2 fibres/ml Time Weighted Average (TWA).

v) Pride of place should be given to collective rather than individual protection.

The Committee believes that for those cases where asbestos is used, it is still necessary to take a series of measures, bearing in mind that because asbestos dust is fibrous, it tends to remain in suspension longer and therefore tends to accumulate.

The measures should cover, in particular :

- controlling the dumping, storage and neutralization of waste materials;

- minimizing dust formation;

- preventing the dispersion of dust into the air;

- trapping the dust at the place where it is produced;

- optimizing individual and collective hygiene;

- providing the workers with personal means of protection.

These measures are not to be looked upon as mutually exclusive. Obviously they can all be used together, even though they are not, individually, of equal effectiveness.

This is not the proper place to discuss how to put these measures into effect. Each is fraught with complex difficulties for which there is no universally valid solution, i.e. which can be solved only in the context of a particular work situation. Each has technological and biological implications, not to mention economic and social effects. The replacement of asbestos by substitutes is typical in that although it seems to be the easiest and most obvious solution it is not always practical in our present stage of knowledge, and cannot be effected until all the consequences have been thoroughly explored.

The use of new technology, is effective and successful (e.g. wet processes); but new technology is not universally applicable, or at least does not always have the same results.

It is possible to design closed systems which prevent dust from dispersing, but the possible applications are not widespread.

It is usually most practical to combine partial enclosure with dust extraction equipment. Such equipment requires careful and specialist design, and reliable maintenance and inspection by competent personnel.

In many respects, dust extraction techniques are complicated to put into practice and may create other health-protection difficulties. Exhaust air from the various work-stations and other points in the workplace and from depressurized hoods should have the dust removed from it by a process which effectively captures the asbestos fibres. The filtered air should not be recirculated in the workplace.

Individual and collective hygiene is obviously valuable (cleaning of premises, machines and clothing by vacuum or methods other than dry brushing) but by no means the complete answer. The provision of a complete change of clothing for work and compulsory cleansing before rejoining the community are essential.

Personal protection for the individual is the last-ditch effort in individual cases. It also has to be considered from the point of view of how long it can be tolerated by the wearer. Such protection must not only provide effective protection against asbestos it must also comply with precise ergonomic standards. In the case of asbestos, masks pose a complex problem - for instance, they make breathing more difficult and are burdensome, especially where there exist particular impairments of the respiratory system. Accordingly, workers must be informed of the risks involved and of the necessary preventive measures and must be instructed in the use of protective equipment.

Some of the above points are covered by industrial regulations and practices, although there is no uniformity throughout the Community nor within individual Member States. In general, it is only fair to say that an effort has been made in recent years to diminish the asbestos hazard.

Consequently, rules calculated to improve the working environment have been drawn up in some countries and there are signs of a drop in the incidence of asbestos-related industrial illnesses.

The results obtained so far must not lead to complacency. The hygiene problems connected with the use of asbestos still remain unsolved. These results may encourage the more extensive implementation of effective, harmonized measures with the aim of reducing the asbestos hazards as soon and as much as possible pending the banning of asbestos.

Progress to this point will depend on what use is made (within the framework of a coordinated Community programme) of legislation, technical knowledge, scientific advances, consultations between the two sides of industry and industrial economic resources.

d) Maximum Concentrations

- for the Worker

Any programme of preventive action against a harmful substance should include a reference parameter in the shape of a maximum allowable concentration of that substance in the air. As things

stand, it is not always possible to eliminate a particular hazard altogether. But whatever allowable concentration is chosen, it must never be considered as the ultimate aim but merely as a means of improving safety. A particular concentration will be accepted solely because in a given situation it is the best that can be obtained using all the scientific and technological resources at hand.

The Member States have laid down maximum allowable asbestos concentrations in the air (see Appendix III).

These limits are not always statutory. Given the criteria used, they should guarantee that the pulmonary fibrosis associated with asbestos does not occur. But there is no certainty that the maximum concentration standards preclude neoplasia. Furthermore, the limits (always time-weighted) relate to healthy subjects and do not make allowance for any biological alterations present in any given individual. No account is taken of the cumulative or multiplier synergistic effects of other environmental pollutants.

Three lines for planning future action emerge from the above :

1. Maximum allowable concentrations should be standardized at Community level together with the methods used to determine them and evaluation criteria. The standards should have the same legal significance everywhere.

2. Maximum allowable concentrations should be progressively reduced - on the basis of research and within the framework of a precise programme - so as to decrease the margin of uncertainty which is inherent in the very concept of a limit.

3. The lowest possible limits which are not to be exceeded should be fixed for all the Member States, pending the replacement of asbestos by non-harmful substitutes.

- for the Public at Large

The above refers to the occupationally exposed. For the general public, there are no convincing data which could be used to propose even tentative values for the control of asbestos-fibre pollution.

In the Federal Republic of Germany, emissions from factories processing asbestos are governed by a statute which lays down maximum admissible limits, and are under constant surveillance.

The Commission document on levels of environmental pollution from the main contaminants (*) states that concentration of asbestos fibres in the air is usually 10^{-9} g/m^3, except for areas around factories where asbestos is handled. Fibre length varies between 0.1 and I/um. Improved measuring and analytical techniques for use in industry and the environment are urgently required. Electron microscopy should be used.

In the Netherlands, some experts have established that drinking water from asbestos-cement pipes contains between 0.1 x 10^6 and 0.3 x 10^6 fibres per litre. But on the other hand, some experts disagree that this level of asbestos fibres in drinking water is due

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(*) No. EUR 5730 in the series Environment and Quality of Life - 1977.

to the use of asbestos-cement pipes. Industry states that surveys in the United Kingdom indicate that in the vicinity of asbestos factories concentrations of the order of 10^{-7} g/m^3 were the maximum observed. Investigations into the presence of asbestos fibres in the natural environment, drinking water and food should be carried out urgently.

V. CONCLUSIONS

The conclusions and recommendations of our Study must take account of the following facts :

1. There is no doubt that exposure to asbestos fibres may cause serious, often fatal, diseases for which no cure is yet known, such as asbestosis, lung cancer, mesothelioma and gastro-intestinal cancer.

2. Exposure to asbestos can increase the risk of cancer.

In this connection, the International Agency for Research on Cancer (IARC) in its monograph on asbestos (No. 14, 1977) concludes that "at present, it is not possible to assess whether there is a level of exposure in humans below which cancers will not occur".

Such a statement from such an authoritative source cannot be ignored.

In view of the fact that asbestos may be deemed to be a carcinogen, account must be taken of the Convention on Occupational

Cancer, which was adopted by the ILO (International Labour Organization) on 26 June 1974. Smoking greatly increases the risk of lung cancer.

3. In the state of present knowledge, it is unrealistic to contemplate an indiscriminate ban on asbestos; but the harmful exposure of workers during the production, processing and handling of asbestos is inadmissible unless the proper precautions are taken. It is equally inadmissible to subject the population at large to those risks.

In the light of the foregoing, there is a definite need for the risk to be severely curbed, although it should be borne in mind that the subsistence of even a minimal degree of risk is incompatible with the strictest requirements of prevention.

As things stand, this approach is justified by manifold social, economic and technological considerations and, in particular, by our lack of knowledge. Research should be stimulated with a view to eliminating or reducing the cost in terms of human health of the production and use of asbestos. In addition, legal requirements should be improved where necessary in line with new research findings.

Where hazardous exposure is inevitable, materials and technologies affording greater safety and not spreading very fine fibres, must be used. Consequently, research in this field should be stepped up.

The following Community action should be taken or continued in order to contain the risk :

a) encouragement and planning of research in various fields (further epidemiological, medical, engineering, technological/sociological, etc., investigations) with a view to solving the general difficulties involved in preventing asbestos risks at the work place and elsewhere; in particular, research is needed and should be concentrated on (1) improving the methods of measuring, dust control techniques and continuous dust control equipment at the workplace, (2) discovering and introducing less harmful substitutes, (3) discovering the best possible processing and manufacturing technology in order to improve our knowledge about the effects of asbestos on the human body with a view to eliminating or reducing the cost in terms of human health of the production and use of asbestos;

b) encouragement of research into more effective methods of dust suppression;

c) determining the lowest possible value limits for permissible concentrations of dangerous fibres at the work place (these to be mandatory and based on standardized methods of sampling, measurement and analysis). Concentrations must be kept down as near as possible to 0 fibres/cm^3, the maximum technical limit being 2 fibres/cm^3, which should not be exceeded;

d) emission of asbestos dust from the working environment into the natural environment to be controlled and limits for the said emission to be fixed;

e) planned procedures for the supervision of working and living environments by Community and government bodies after notifying producers and users in industry;

f) ban on the use of asbestos in certain processes and technologies;

- in manufacturing processes where substitutes are available which do not have the hazardous properties of asbestos;

- where liquids are processed for human consumption;

- where the limits are not, or cannot be, adhered to;

g) ban the use of crocidolite, this being the most harmful form of asbestos and accounting for only 3.2% of the asbestos mined around the world; exceptions to this ban could be allowed where the use of crocidolite responds to irrefutable technical needs, on condition that the companies concerned prove and guarantee that the use is absolutely harmless;

h) labelling of asbestos products and the packaging of asbestos containing materials in general, in order to protect the worker, consumer and the public at large;

i) at work stations where asbestos is used, the following measures should be taken :

- closed systems to be provided where technically feasible, capable of providing effective protection;

- dust formation should be minimized; dust should be prevented from being dispersed in the air and should be trapped where it is produced;

- systems to be installed which are accessible to the workers for continuous surveillance of the level of concentration of asbestos dust in the workplace;

- it should be possible for the workers' representatives to stop the work when the concentration exceeds the authorized limit values;

- suitable packaging of asbestos designed to rule out all losses;

- optimization of individual and collective hygiene arrangements;

- the workers of the firms concerned and all those who will be called on to handle asbestos, even on a temporary basis, to be given training and information in respect of the risks and the collective and personal protection measures to take in order to avoid the risks;

- protective clothing and personal protection of an approved kind to be provided;

j) restrict the use of asbestos in the building trade and in packaging; at the same time there should also be a ban on the use of asbestos :

- in air filter units;
- for spraying (flocking and painting);
- in thermal and acoustic insulation;

- for replacing existing asbestos insulation;
- for floor coverings and road surfacing;
- in decorating;
- for replacing water supply systems; and
- in dwellings, offices, factories and workshops;

k) lay down rules on waste neutralization; waste containing asbestos to be removed as safely as possible and stored under government supervision;

l) specialized health care for workers coming into contact with asbestos; the electronic microscope to be put into generalized use in the said health checks; the checks would be effected in accordance with standardized criteria and procedures by specialists in industrial medicine in order to make the records of mesothelioma and other asbestos-linked diseases more effective; the results must be made available to the workers in question; in addition, a suitable system must be introduced for recording cases of exposure to dangerous substances and the state of health of the persons concerned; this system could be easily linked to the national population statistics, in particular the death register or preferably the register of cases of cancer; this linking to the national statistics is extremely important for tracing former workers, even if they are no longer in employment;

m) records to be kept of :

. persons exposed to asbestos

. environmental data;

. the findings made in health checks (these findings must be introduced in the personal health record of the person at risk);

. the person concerned and the doctor of his choice must have access to the findings made in health checks and entered on his personal health record;

. the European Community should collect the statistical findings centrally and anonymously and make them available for the aims of research and information;

n) campaign to increase workers' and the general public awareness of asbestos hazards, and means of protection.

The European Community and the national governments have an obligation to make generally available, in a non-expensive form, and in readily comprehensible wording, information about asbestos and the hazards associated with its use. Employers too should be obliged to inform their workers about (a) all the types of dangerous substances (including asbestos) used and produced in their plants, (b) any dangerous effects these substances may have and (c) the measures taken to protect workers.

Done at Brussels, 22 February 1979.

The Chairman
of the
Economic and Social Committee

Fabrizia BADUEL GLORIOSO

The Secretary-General
of the
Economic and Social Committee

Roger LOUET

APPENDIX I

Legislation in Member States relating to Safety Provisions, Hygiene Standards and Measurements of Airborne Dust Concentrations differ greatly. This is one area where harmonization would be of the greatest benefit to the worker and to the environment.

United Kingdom

For the United Kingdom there exist statutory instruments (The Asbestos Regulations 1969, No. 690). These regulations concern application and interpretation and also include certain cases of exemption. Furthermore, these regulations cover exhaust ventilation and protective equipment as well as cleanliness of premises and plant, storage and distribution, accommodation for and cleaning of protective equipment, and young persons. The Asbestos Regulations 1969 apply to all factories and to other premises, including construction sites, electrical stations and ships under construction or repair, where a process involving asbestos is undertaken.

Hygiene standards for chrysotile asbestos dust have been published by the Committee on Hygiene Standards of the British Occupational Hygiene Society. Only in the case of asbestosis has a quantitative relationship been derived between the airborne concentration of asbestos dust and the disease. The Guidance Note from the Health and Safety Executive (December 1976) also includes considerations for sampling, evaluation of bulk samples and environmental sampling. Sampling instruments are also listed including personal samplers and general purpose background samplers.

Federal Republic of Germany

The Main Federation of Industrial Mutual Accident Insurance Associations (Hauptverband der gewerblichen Berufsgenossenschaften) has published a collection of individual accident prevention regulations of the industrial mutual accident insurance associations against harmful mineral dust (VGB 119, 1 April 1973). These regulations apply to works in which harmful mineral dust may be evolved (these regulations do not apply in so far as their object is covered by national statutory provisions). Harmful mineral dust is defined as dust which contains free crystalline silicio acid or asbestos and can induce diseases. There is a compulsory notification which means that if materials containing asbestos or more than 2% frec crystalline silicic acid are used and dust is evolved, the employer shall notify the industrial mutual accident insurance association and the authorities responsible for occupational safety and health. In particular, the employer must ensure that the ambient air at the workplace of insured persons is kept free of harmful mineral dust so that the possibility is practically excluded.

There are further regulations in the collection of individual accident prevention measures that include respiratory protection, cleaning, extracted air, maintenance, preventive medical examinations, fitness tests, regular medical examinations and settlement of disputes by the industrial mutual accident insurance association.

Netherlands

There exists in the Netherlands at present the Asbestos Decree based on the Silicosis Act (Stb. 1951, 134) which contains

regulations to prevent asbestosis and mesothelioma. This will take effect starting from April 1978. It is decreed that the offering for sale, working or processing of crocidolite or materials containing crocidolite shall be prohibited. Spraying of asbestos or materials or products containing asbestos shall be prohibited. Working or processing of asbestos or materials or products containing asbestos shall be prohibited for thermal insulation, acoustic purposes, preservative purposes and decorative purposes. Provision is made for the concentration of asbestos dust in inspired air to be kept as low as possible. The prohibition of the use of asbestos for certain purposes will be introduced gradually. The Asbestos Decree offers more scope for ensuring that production processes using asbestos are supervized by the authorities and if necessary reorganized to protect the workers. It is also required that the management of an undertaking, as soon as it intends to modify the production process involving asbestos or process asbestos in a new type of product, must inform the district head of the Labour Inspectorate.

France

Within the French legislation on asbestos there are several decrees :

- Prohibition of flock spraying of asbestos-base finishings in dwellings (3492 - 1 July 1977) - (Official Journal of the French

Rep.). The use of asbestos or products containing asbestos for the flock spraying of finishings on walls, units and other sections of dwellings shall be prohibited.

- Decree No. 77-949 of 17 August 1977 concerning the special hygiene measures to be applied in establishments where the staff is exposed to the effects of asbestos dust. The provisions of this decree concern parts of premises or working areas where the staff is exposed to the inhalation of asbestos dust in suspension in the atmosphere, especially where the work consists in the transport, handling treatment, processing, application and elimination of asbestos and all products or objects which may be a source of asbestos fibres. The employer shall issue written notifications containing information as to the potential risks of the work and precautions which must be taken to avoid these risks to any person performing the type of work mentioned above. Each employee exposed to the inhalation of asbestos dust must be provided individually with breathing apparatus and protective clothing.

- Annex to the Order of 25 August 1977 concerning dust monitoring in establishments where the staff is exposed to the effects of asbestos dust. In this annex to the Order of 25 August 1977 procedures for sampling and counting asbestos fibres are listed. A count is made of the asbestos fibres contained in a certain number of microscopic fields demarcated by a graticule and spread over the whole surface of the filter.

- Dust monitoring in establishments where the staff is exposed to the effects of asbestos-dust (4633 - 18 September 1977 - OJ of the French Republic). Section I of this decree concerns the monitoring of

dust in establishments where the staff is exposed to the effects of asbestos dust. In order to implement Article 16, first paragraph, of Decree No. 77-949 of 17 August 1977, the head of the establishment shall provide the industrial medical officer after each dust check with a list of the employees exposed to the inhalation of asbestos dust. Within the information must be revealed, for example, the type of work performed and the concentration(s) of asbestos dust shown by the samplings. In Section II (4634 Official Journal of the French Republic - 18 September 1977) there are provisions for the organizations responsible for dust monitoring.

There are also general provisions relating to preventive safety measures against the dangers inherent in the use of asbestos or its compounds capable of evolving asbestos dust (for example, CRAM de Nantes, Service de Prévention). Irrespective of statutory measures and regulations in force with regard to general health and safety measures, undertakings in which all or part of the personnel covered by the general social security scheme are engaged in work capable of evolving asbestos dust must comply with a further set of regulations. These include hygiene criteria, safety measures, cleaning of premises, wastes, maintenance and checking of equipment. There are regional as well as general provisions. There exist general regional provisions which may be extended to the whole country after an experimental stage.

Denmark

There are several communications and notifications in force. There is first of all the Communication No. 5/1970 of the Labour Inspection Directorate respecting safety precautions for

work with asbestos and materials containing asbestos. It appears that blue asbestos is no longer in use in Denmark, although it was used in the past. In the Communication No. 5/1970 there are a number of general rules applying for example to wetting of asbestos material; enclosing of machines and conveying plant; use of respirators; cleaning of dust filters in exhaust ventilation plant; maintenance of working clothes and employment of young persons. There are also special rules regarding carding, grinding and mixing asbestos; the production of asbestos yarn, string, ribbon or woven fabric, and related work; the working of asbestos sheeting, moulding articles and brake linings and the insulation with asbestos and related work. For work with asbestos not mentioned above, the Communication states that measures shall ~~be taken as necessary in~~ each individual case.

There is also the Ministry of Employment Notification of 14 January 1972 which is entitled "Notification respecting the prohibition of the use of asbestos in certain types of insulation". Within this notification it shall be prohibited to use asbestos or products containing asbestos for thermal insulation, soundproofing or insulation against damp if the work involves laying, coating or spraying. However, the Director of Labour Inspection may authorize the use of such materials if it is established that the installation and later removal of asbestos material will not present a health risk.

There is also the Communication No. 7/1972 of the Labour Inspection Directorate respecting precautions to be taken in the dismantling of insulation containing asbestos. In this Communication it is set out clearly that the inhalation of dust may give rise to

pneumoconiosis and that numerous fatal cases of asbestosis have been reported. Although the use of asbestos or materials containing asbestos for the purposes of insulation has been banned in Denmark since 1 March 1972, the use of hard construction sheeting containing asbestos for insulation purposes was not included in the ban. The Communication states that since it will be necessary for many years to come to dismantle, repair and strip off old asbestos insulation, safety precautions must be followed carefully on every site where such work is carried out. Precautions are provided for wetting, exhaust ventilation, respirators, working clothes and cleaning.

Ireland

In Ireland there are Statutory Instruments No. 238 of 1975 entitled Factories (Asbestos Processes) Regulations, 1975. These Regulations concern exhaust ventilation equipment and personal protective equipment; cleanliness of premises and plant; storage and distribution; accommodation for and cleaning of personal protective equipment; employment of young persons; instructions and duties of persons employed. The Factories (Asbestos Processes) Regulations require for example that a person shall not be employed to perform any work in relation to which respiratory protective equipment is provided unless he has been fully instructed previously in the proper use of that equipment. In relation to every premises or ship, all loose asbestos when not in use, shall be kept in closed receptacles which prevent the escape of asbestos dust, and all asbestos waste shall, when stored, be kept in like receptacles. Receptacles which contain crocidolite should be clearly and boldly marked "Blue

asbestos - DO NOT INHALE DUST". The Regulations also provide that a young person shall not be employed in any process or any part of premises into which asbestos dust would be liable to escape unless the requirements of Regulation 7 are complied with. It is also stated that a person shall not be employed in any process in a premises or ship unless he has received adequate training and instruction before and during such employment.

Italy

There are many points in Italian statutes capable of providing authority for preventive action against asbestos dust.

DPR 19.3.1956 No. 303 (Art. 19) requires employers to carry out dangerous or dirty processes in separate places in order not to expose needlessly workers who are employed on other processes. Article 21 of the same decree deals with dust control measures. It requires the employer to minimize or stop the creation and dispersion of dust at the workplace, with due account being made of air concentration levels. The decree provides that, where it is not possible to find a substitute for the dusty material, processes must be done in closed plant or in plant equipped with dust-extraction and collection systems designed to prevent the dispersion of dust. Rules are also laid down regarding dust-extraction, collection and disposal; wet processes are also covered. Article 21 provides that the Factory Inspectorate may lay down extra requirements as to the working environment and individual protection equipment where, owing to particular technical snags, the above mentioned precautions are inadequate.

Asbestos winning is covered by the rules which apply to mines and quarries in general (DPR 9 April 1959 No. 128).

Title 14 of that decree deals with dust which is harmful to workers' health. Article 617 prescribes that in both underground and open-air operations, such working methods and primary and secondary ventilation systems must be used as will avert the production, accumulation and dispersion of harmful airborne dust such as to endanger workers' health. Title 14 also requires checks to be made on atmospheric concentrations (Articles 634 et seq.) and the results to be recorded (Art. 637). Article 619 deals with the physical fitness of existing and prospective employees in underground workings where there are dangerous levels of harmful dust. It also deals with medical checks, which have to be carried out at least once a year if not more frequently. As regards individual protection, Article 638 provides for the use of masks of an approved type in addition to the other types of protection. Article 639 governs the use of such masks.

The consolidated instrument laying down obligatory rules on accidents and diseases at work (DPR 30.6.75 No. 1124) provides in its Article 157 for preventive, periodic checks (to be held at least once a year). These are the responsibility of and at the charge of the employer. Staff affected are those employed on the winning and processing of asbestos in mines, manufacturing work and other work involving the use or application of asbestos or asbestos-bearing materials or staff who are otherwise exposed to the risk of inhaling asbestos dust. Insurance benefits are paid to persons exposed to risk (Article 4 of Law of 27.12.1975 No. 780) in all cases of asbestosis and directly consequential disease which results in death or in

permanent disability of more than 20%. They are also payable in all cases of asbestosis which are associated with other diseases of the respiratory system or of the heart and circulatory system. In such cases, damage is assessed globally.

Finally, employment contracts and supplementary company agreements with those exposed to asbestos contain specific preventive provisions which often refer to maximum concentrations in the air (generally the criteria proposed by the ACGIH are followed).

A P P E N D I X II

Decree No. 1382 of 28 October 1977 issued by the Chairman of the Genoa Harbour Authority governing the Use and Working of Asbestos in Repairs,-Maintenance, Alterations and Breaking Up of Ships

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Article 123(a) below supplements Title V, Chapter II of the abovementioned Regulation :

Article 123(a) (application, transport, and destruction of asbestos-based materials).

The use of materials whose main component is crocidolite, commonly known as "blue asbestos" will no longer be permitted for insulation.

The spraying of materials containing any kind of asbestos fibres is also prohibited.

Fabrics or cords whose main component is crocidolite may continue to be used for insulation at temperatures of over 400°, valves, expansion joints, discharge pipes, etc., provided the surfaces are treated with hardeners, heat-resistant paint or other materials to make the structure compact.

Before undertaking any insulation work in fitting-out and/or repairs, the companies concerned must inform the Harbour Authority (1) of the materials they intend to use. Wherever possible, they must use replacements for asbestos-based materials, subject to the

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(1) State planning and operations office.

provisions of the first two paragraphs of this Article, and must wait for the relevant authorization, which will indicate any special precautions to be taken.

Similar authorization must be obtained before undertaking the destruction of bulkheads, panels and other insulating materials. This authorization will be given subject to compliance by the companies concerned with the preventive measures prescribed therein.

Art. 2

Art. 131(a) below supplements Title VI, Chapter I of the abovementioned Regulation.

Art. 131(a) (protective measures for working with asbestos-based materials)

Workers who are directly exposed to dust inhalation from the use of materials containing asbestos fibres must be equipeed with proper breathing masks, protective overalls and equipment to protect the eyes and hands.

Implementing Regulation

1. Companies wishing to carry out insulation work must inform the Ufficio Avviamento at the time they submit their application to employ personnel on board, of the materials they intend to use and must specify the composition, even if they do not contain asbestos. Obviously, in the case of asbestos-based materials, which must not be crocidolite, except where expressly provided by Article 1 of the

abovementioned Decree, the companies concerned must specify the exact name and composition of the material, in order to determine the amount of asbestos it contains and, thus, its danger level. Before initiating the work, the companies concerned must wait for the authorization of the Ufficio Avviamento, which will indicate any special measures to be taken.

2. Storage areas must be set aside on board or on the quay for materials containing asbestos, in order to avoid the leakage of dust which would be dangerous for those working in the vicinity These storage areas must be thoroughly cleaned at regular intervals in the manner prescribed.

3. The above materials must only be transported from the storage area to the place of work when they are to be used.

4. Workers who are not directly involved in the work must be denied access to those areas in which asbestos is being used, except in the case of short or minor operations.

5. With regard to work for which the use of fabrics or cords with a crocidolite base is still permitted, the companies concerned must take preventive measures before using it, to reduce handling it to a minimum. Authorization for such work will be given subject to the conditions laid down periodically by the Ufficio, taking into account, the place of work, the quality of the material to be used, the duration of the work, other work being carried out, environmental conditions, etc.

6. The destruction of bulkheads, panels and other insulating materials on a large scale must be staggered. Persons not directly involved in the work must be prohibited from entering the area. Partially demolished insulation areas which remain in operation must be protected with a covering of polyethylene or similar material or treated with hardeners, to avoid the risk of asbestos dust or fibres escaping during the subsequent work (dismantling of valves, flanges and other equipment).

7. The areas in which this demolition work is carried out must be thoroughly cleaned after each work shift and the residues and dust removed. The companies concerned must remove the largest pieces and place them in appropriate containers or polyethylene or similar material for disposal. The smaller pieces must be vacuumed up and placed in the abovementioned containers for disposal.

At the end of the operation, the area must be properly ventilated.

APPENDIX II

TABLE OUTLINING THE TRADE UNION AGREEMENT OF 2 JUNE 1977 CONCLUDED AT THE TRIESTE SHIPYARDS

Subject	Remarks	Decisions taken and date implemented
a) Sprayed asbestos		- immediate ban; replaced by rock wool
b) Asbestos fabric		- substitutes to be used within 5 months. Pending this, may only be used outside working hours and with adequate protection.
c) Asbestos cord and lagging		- to be substituted in 40 days. Pending this, may only be used outside working hours and with adequate protection.
d) Marinite		- will be used on Castoro 6. The remainder will be used on the pontoon Sadar (350 metric tons - delivery date 31.3.1978) since the panels do not have to be worked on board. After Castoro 6 and delivery of pontoon Sadar of 350 metric tons to be banned.
e) Asbestos used on boilers and engines		- substitutes to be found; research is under way.
f) Asbestos fabric protection when on board and when working on board		- substitute glass fabric has been found. In addition, within week of 13-17 MO shipyard will supply glass fabric with aluminium insert. In any case, the search for other materials will continue.
g) Breaking up	- Works Council has supplied Control & Safety Guide No. 1 to the company, requesting it to implement all its provisions.	- breaking of asbestos-based insulation must not go on at the same time as other work; - operator must wet parts to be broken up and wear suitable protective clothing; - waste must be extracted *in situ* and carried away in nylon bags; - the operator must have a changing room with a shower isolated from other workers. Changing room will be provided within 4 months; pending this, suitable temporary facilities will be fitted out should the need arise.

A P P E N D I X III

CORK COUNTY COUNCIL

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACT, 1963

Notification of Decision to Grant a Permission (Subject to Conditions) under Section 26 of the Act.

Reference No.
in Planning
Register : 2670/75

To Industrial Development Authority,
Lansdowne House,
Dublin 4.

In pursuance of the powers conferred upon them by the above-mentioned Act, the Council of the County of Cork have by order dated ..... decided to grant a permission for the development of land namely :

Erection of factory premises at Barnagore, Ovens,

in accordance with the plans and particulars submitted by the applicant on 28 October 1975 as amended on ..... and subject to the conditions set out in Column 1 of the Schedule attached hereto. The reasons for the imposition of the said conditions are set out in Column 2 of the Schedule.

If there is no appeal against the said decision, a grant of Permission in accordance with the decision will be issued after the expiration of the period within which an appeal may be made to the Minister for Local Government.

It should be noted that until a grant of permission has been issued, the development in question is NOT AUTHORIZED.

Room 1001,
County Hall,
Cork.

Signed on behalf of the said Council.

D.A. MURPHY

Date : 22 December 1975.

S C H E D U L E

Reference No. in Planning Register : 2670/75

Column 1 - Condition	Column 2 - Reason
Provided that :	
(1) Chrysotile Asbestos only shall be used in the process and Crocidolite Asbestos shall not be used in any process.	In the interests of public health, and to safeguard the amenities of the area.
(2) The plant shall be designed, constructed, operated, and maintained in accordance with the Factories (Asbestos Processes) Regulations 1972 (S.I. No. 188 of 1972).	do.
(3) The permissible occupational exposure to air-borne concentrations of asbestos fibres shall not exceed the following limits:- Two fibres, in excess of 5 microns per cubic centimetre averaged over an eight hour period and ten fibres in excess of 5 microns per cubic centimetre averaged over a ten minute period.	do.
(4a) Separate or central fabric filters shall be installed at:- (1) All bag opening stations. (2) Raw material storage. (3) Mixer vents. (4) All wheelabrators and friction mix screens. (5) All surface grinders. (6) Screening units. (7) Grooving machines.	To control dust emission in the interests of public health.
(4b) All dust filters and general dust control by vacuum cleaners shall be of the high efficiency type, capable of removing	

S C H E D U L E

Reference No. in Planning Register : 2670/75

Column 1 - Condition	Column 2 - Reason
99.95% by weight of the inlet dust load and limiting dust emissions to one fibre per cubic centimetre averaged over 24 hours. Filters shall be designed so as to permit isolation and replacement of any damaged bag without by passing the filter. The design and maintenance of all local exhaust ventilation shall comply with the provisions of American Standard No. ANSI/Z9.2/1971.	
(5) Solid wastes containing asbestos (1) and including :- (a) Waste paper from the bag and opening area; (b) Waste asbestos dust from dust collectors; (c) Off spec pads, shall be stored in sealed containers on-site. Sludge degreasing sludges and paint spray booth sludges shall be combined, stored and removed periodically for disposal.	To ensure the safe storage and disposal of asbestos waste.
(5) All solid wastes containing or (2) contaminated with asbestos shall be transported to an approved disposal site. Before commencing any part of the development full details of proposed solid waste disposal area shall be submitted to and agreed with the Planning Authority. The approved site shall be operated in accordance	do.

S C H E D U L E

Reference No. in Planning Register : 2670/75

Column 1 - Condition	Column 2 - Reason
with the best practice for the safe disposal of asbestos-containing wastes. All wastes shall be covered over immediately with a 12" layer of earth or other solid material and compacted.	
(6) Surface waters shall be discharged to soak-pits on site.	To ensure satisfactory disposal of site surface water.
(7) All sanitary sewage shall be treated on site to the following standards :- Biochemical oxygen demand 20 mg/litre Suspended Solids 30 mg/litre and discharged into the sewer. Boiler blow down water and spent cooling water not exceeding 60 cubic meters per day and at temperature not exceeding 23dgs.C. shall be discharged to the sewer.	To ensure proper treatment of sewage
(8) Solvent Vapour Emissions arising from :- (a) Vacuum Tumble Drying Operation; (b) Application of cement to the steel backing plates; (c) Curing the bond; (d) Painting and drying the pads; shall be condensed and re-used. The wasted portion of emission and not exceeding 15 kilograms per day shall be discharged directly to atmosphere at a height not less than 2 meters above the eaves of the nearest building. Exhausts from the	To reduce fume emission and to safeguard the amenities of the area.

S C H E D U L E

Reference No. in Planning Register : 2670/75

Column 1 - Condition	Column 2 - Reason
roller coated machine and drying tunnel, arising from the application and drying of bonding cement to the steel backing plate shall be exhausted to a fume incineration unit. Polymerization Products generated in the curing ovens shall be exhausted through a high temperature incinerator. Paint solvent fume arising from the painting of disc pads shall be exhausted to an incinerator.	
(9) The discharge of sulpher dioxide arising from the steam boiler shall be through a stack 13 meters above ground level.	
(10) The developer shall devise and operate a regular monitoring system to ascertain the concentration of asbestos dust:- (a) within the factory atmosphere; (b) in the neighbourhood of the proposed factory site; (c) at the adjoining public road. Before production is commenced concentrations of asbestos dust in the neighbourhood of the proposed factory and near the adjoining public road shall be measured by the developer.	To ensure adequate monitoring of dust emission in the interests of public health.

S C H E D U L E

Reference No. in Planning Register : 2670/75

Column 1 - Condition	Column 2 - Reason
Details of the monitoring system shall be submitted to and agreed with the Planning Authority before production commences. Full records of the monitoring shall be made available for inspection at all reasonable times by authorized officers and agents of the Planning Authority.	
(11) The noise levels from the development shall not exceed 35 d.b.a from 10 p.m. to 8 a.m. and shall not exceed 45 d.b.a at other times when measured at the factory site boundary.	To contact noise emission and to protect the amenities of the area.
(12) Before commencing any part of the development, details of a comprehensive landscaping and colour treatment scheme shall be submitted and agreed with the planning authority in respect of the screening of the development, the seeding and planting of the site, fencing colour treatment of all structures and external ancillary equipment.	To ensure that the development does not obtrude unduly on the landscape in the interests of visual amenity and to preserve as far as possible the character of the area.

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PL. 4/5/38170

AN BORD PLEANALA

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS, 1963 AND 1976

County Cork

Planning Register Reference Number : 246/77

APPEALS by Edward O'CALLAGHAN of Barnahely, Ringaskiddy, County Cork, and others and by the Industrial Development Authority of 89/90 South Mall, Cork, against the decision made on the 4th day of March, 1977, by the Council of the County of Cork deciding to grant subject to conditions a permission to the Industrial Development Authority of 89/90 South Mall, Cork for the use of a site at Barnahely, Ringaskiddy, for the disposal of asbestos waste in accordance with plans and particulars lodged with the said Council :

DECISION: Pursuant to the Local Government (Planning and Development) Acts, 1963 and 1976, it is hereby decided, for the reason set out in the First Schedule hereto, to grant permission for the use of the said site for the disposal of asbestos waste, in accordance with the said plans and particulars, subject to the conditions specified in column 1 of the Second Schedule hereto, the reasons for the imposition of the said conditions being as set out in column 2 of the said Second Schedule and the said permission is hereby granted subject to the said conditions.

FIRST SCHEDULE

It is considered that the proposed development, carried out in accordance with the requirements of the Second Schedule, would provide for the satisfactory disposal of asbestos waste and would not be contrary to the proper planning and development of the area.

SECOND SCHEDULE

Column 1 - Conditions	Column 2 - Reasons for Conditions
1. The site shall not be used for any purpose other than the disposal of asbestos waste, including waste containing or contaminated by asbestos.	1. To enable controls for the disposal of the said asbestos waste to be exercized efficiently in the interests of public health.

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SECOND SCHEDULE (CONT.)

Column 1 - Conditions	Column 2 - Reasons for Conditions
2. Prior to the commencement of dumping, a security fence not less than 2.4 metres high shall be erected along the entire perimeter of the site. A secure gate, with warning signs, shall be erected at the entrance to the site and that gate shall be kept securely locked. The said fence, gate and signs shall be properly maintained.	2. To prevent unauthorized entry to the site and to minimize the risk of interference with dumped material in the interests of public health.
3. Prior to the commencement of the development, details of the junction of the site access road with the public road shall be submitted to and agreed with the planning authority.	3. To ensure the provision of a properly designed entrance to the site from the public road intthe interests of the protection of road users.
4. (a) All asbestos waste, including asbestos-containing waste, to be disposed of on the site other than waste arising from plant vacuum cleaning and rejected disc pads, shall be pelletized by the admixture of water and cement to the said waste. The pellets shall withstand a compression test of 4 kg. per pellet and the pellets shall have a size range of from 6 millimetres to 13 millimetres. Prior to the commencement of dumping, a programme of compression testing of pellets shall be agreed with the planning authority. The results of compression tests shall be forwarded to the planning authority. (b) All asbestos-contaminated waste in the form of empty bags, as well as asbestos-containing waste in the form of rejected disc pads and vacuum cleanings, to be disposed of on the site, shall be enveloped in polythene bags of 500 guage and sealed.	4. In the interests of public health to reduce the possibility of free asbestos fibres becoming airborne.

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SECOND SCHEDULE (CONT.)

Column 1 - Conditions	Column 2 - Reasons for Conditions
(c) Pellets which do not reach the standards specified in condition 4 (a), whether due to malfunctioning of the pelletizing machine or to other causes, shall be disposed of as provided by condition 4 (b).	
5. All waste while being transported to the site shall be contained in sealed metal containers and shall remain in such sealed containers until deposited in accordance with condition 6.	
6. All waste shall be deposited into a series of trenches not exceeding 2.5 metres deep and 1.5 metres wide, with a minimum centre to centre spacing of 2.5 metres. The trenches shall run in a north/south direction commencing at the western extremity of the site. The edge of the first trench shall not be less than 3 metres from the boundary fence of the site and the excavated material shall be placed in the area between the fence and the trench edge.	6. To ensure the effective and safe disposal of the said waste in the interests of public health.
7. Where both pelletized waste and bagged waste are being dumped at the same time, the bagged waste shall be placed at the bottom of the trench.	7. To confine the bagged waste in the trenches prior to soil backfilling in the interests of public health.
8. The depth of bagged waste shall not exceed 1 metre.	8. To permit the effective consolidation of the restored site and to secure reasonable surface stability in the interests of public health.
9. No waste shall come within 0.5 metres of the original ground surface of the trench.	9. To ensure the effective and safe disposal of the said waste in the interests of public health.

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SECOND SCHEDULE (CONT.)

Column 1 - Conditions	Column 2 - Reasons for Conditions
10. Dumping shall not take place if there is a water depth in the open trenches of more than 0.3 metres.	10. In the interests of public health to prevent the upward movement of bagged waste and the possibility of asbestos-contaminated water reaching the surface.
11. Immediately following the deposit of any waste material, the said material shall be covered with soil to a depth of not less than 150 millimetres. No deposited waste shall remain uncovered overnight.	11. In the interests of public health to reduce the possibility of waste becoming airborne.
12. At not more than monthly intervals the sections of the trenches in which waste has been dumped shall be completely backfilled up to the original ground level and the backfill material shall be compacted. Surplus soil shall then be spread uniformly over the site in the immediate area of the backfilled trenches.	12. To restore the site to its former condition in the interests of public health.
13. No dumping shall take place except at the times and on the days specified in a schedule of dumping operations to be prepared and submitted to the planning authority for their agreement prior to the commencement of the dumping operations. Any alteration in the arrangements for these operations shall be notified in advance to the planning authority for their agreement.	13. To ensure a planned regimen of dumping which can be monitored in the interests of public health.
14. Prior to the commencement of dumping operations, there shall be forwarded to the planning authority the results of tests carried out in accordance with a planned schedule (which shall include appropriate methods of sampling and analysis) agreed in advance with the said authority to determine background asbestos levels in	14. In the interests of public health to establish if any increase in the levels of asbestos in the air occurs subsequent to dumping.

SECOND SCHEDULE (CONT.)

Column 1 - Conditions	Column 2 - Reasons for Conditions
the ambient air at each of at least four separate points. The monitoring points shall include a point in the vicinity of the O'CALLAGHAN residence outside the south-east corner of the site and the remaining points shall be agreed with the planning authority. Subsequent to the commencement of dumping operations, monitoring of the air at the same points shall be conducted at monthly intervals for the first six months of operation and subsequently at frequencies to be agreed with the planning authority. Details of weather conditions obtaining for 24 hours preceding and during sampling shall be recorded and forwarded to the planning authority. The tests shall be carried out using transmission electron microscopy and the results shall be recorded in weight/volume units.	
15. Prior to the commencement of dumping operations, there shall be forwarded to the planning authority the results of tests carried out in accordance with a planned schedule (which shall include appropriate methods of sampling and analysis) agreed in advance with the said authority to determine background asbestos levels in waters in the vicinity of the site at each of at least four separate points. The monitoring points shall include ground waters in the site, waters issuing from wells in the marsh area to the south-east of the site and tidal waters in the estuary. Subsequent to the commencement of dumping operations, monitoring of water at the same	15. In the interests of public health to establish if any increase in the levels of asbestos in waters occurs subsequent to dumping.

SECOND SCHEDULE (CONT.)

Column 1 - Conditions	Column 2 - Reasons for Conditions
points shall be conducted at monthly intervals for the first six months of operation and subsequently at frequencies to be agreed with the planning authority. Details of weather conditions obtaining for 24 hours preceding and during sampling shall be recorded and forwarded to the planning authority. The tests shall be carried out using transmission electron microscopy and the results shall be recorded in weight/volume units.	
16. Should the results of monitoring at any of the points referred to in conditions 14 and 15 show that increases in asbestos levels exceed by three orders of magnitude (10^3) the said background ambient levels at the said points, immediate steps shall be taken under the supervision of the planning authority to establish the reasons for the higher levels. If it is established that the higher levels are related to the dumping operations, measures shall be taken to effect the appropriate reduction. In the event of the said higher levels persisting and any remedial measures failing to effect the appropriate reduction in levels within six months of the first high reading being obtained, all dumping operations shall cease. Dumping shall not be resumed without the prior written authorization of the planning authority based upon such further and other remedial measures as are proposed to secure the said reduction in asbestos levels.	16. In the interests of public health to provide for the effective control of dumping operations

SECOND SCHEDULE (CONT.)

Column 1 - Conditions	Column 2 - Reasons for Conditions
17. A scheme for the regrading of the site subsequent to the completion of dumping operations shall be prepared and submitted to the planning authority for their agreement within six months of the date of commencement of dumping operations. The scheme shall show ultimate ground levels. At not more than yearly intervals or in the event of dumping operations ceasing, the grading of that part of the site where disposal operations have been completed shall be carried out in accordance with the scheme. The area shall be prepared and seeded with a suitable grass seed.	17. To restore sections of the site to their former general condition and appearance in the interests of amenity and to secure the stability of the soil cover in the interests of public health.
18. Authorized officers and servants of the planning authority shall be afforded access to the site at all times for inspection and monitoring purposes and the planning authority shall be supplied with a key for the entrance gate.	18. To provide for the effective control of dumping operations in the interests of public health.

A P P E N D I X IV

taken from
Public Health Risks of Exposure to Asbestos
Report of a Working Group of Experts prepared for the
Commission of the European Communities, Directorate-General
for Social Affairs, Health and Safety Directorate
(Published by Pergamon Press) Page 112

EXISTING PERMISSIBLE LIMITS

Workroom Air

United Kingdom

Chrysotile, amosite, fibrous anthophyllite : 2.0 fibres/ml averaged over a four hour sampling period; 12 f/ml over a 10 min. sampling period. Crocidolite : 0.2 f/ml averaged over a 10 min. sampling period. Fibres mean particles with length > 5 µm, length to breadth ratio 3 : 1, observed by transmitted light by means of a microscope at magnification of approx. 500x (Techn. Data Note 13 (Rev) 1969).

Federal Republic of Germany (*)

The following concentrations are provided as a guide for technical measures and supervision at the workplace :

(*) MAK-Wert-Liste 1977 (1977 list of maximum allowable concentrations)

Amosite	2 fibres (*) /cm^3 or 0.1 mg/m^3 (dust)
Dust containing amosite	4.0 mg/m^3
Chrysotile	2 fibres (*) /cm^3 or 0.1 mg/m^3 (dust)
Dust containing chrysotile	4.0 mg/m^3.

These concentrations are designed to rule out the risk of asbestosis as a result of exposure to amosite or chrysotile.

Italy (**)

5 fibres/ml, to be lowered to 2 fibres/ml.

France

Suggested by the INRS (Lardeux 1975) :

- < 2 fibres/cm^3 : acceptable
- > 2 - <12 fibres/cm^3 : take a 4 hour sample
- if <2 fibres/cm^3 : acceptable
- if >2 fibres/cm^3 : exposure should be lowered

(*) Fibres are considered to be particles with a length of more than 5 µm and a diameter of less than 3 µm and a length to diameter ratio of at least 3 : 1. The Concentrations are as observed by transmitted light by means of a microscope (magnification 40 x 12.5, positive phase contrast).

(**) To be updated.

- >12 fibres/cm^3 : take a 10 min. sample; if ?12 fibres/cm^3 : take strict protective measures
- only taken into account fibres ?5 /um, with ratio length/ diameter ?3.

Denmark

2 fibres/ml; ban on asbestos for insulation work; crocidolite not to be employed without special permission.

Netherlands

Excerpt of proposed legislation on the use of asbestos and asbestos containing materials in the Netherlands.

It is prohibited :

a) to have in stock, to manufacture, to machine or to use crocidolite and/or crocidolite containing materials or products;

b) to apply or to manufacture asbestos and/or asbestos containing materials or products for thermal insulation and/or for acoustical, preservative or decorative purposes;

c) to apply or to manufacture asbestos and/or asbestos containing materials or products for other purposes than those mentioned in (b) above if a concentration of asbestos dust occurs dangerous to health (at present there is a permissible unit of 2 fibres/ml averaged over a 4 hour sampling period);

d) to spray asbestos and/or asbestos containing materials or products;

e) exemption from these measures is possible.

A P P E N D I X

to the Study of the Economic and Social Committee

The following amendments were rejected in the course of the discussions :

Page 22

Add to the 6th indent :

"where, because of circumstances beyond one's control, collective protection is impossible".

Result of the vote

For : 34
Against : 39
Abstentions : 13

Page 27 - Point 2

Delete first paragraph.

Result of the vote

For : 37
Against : 47
Abstentions : 13

Page 27 - Point 2 - fourth paragraph

Delete "may be deemed to be" and replace by "is".

Result of the vote

For : 37
Against : 47
Abstentions : 13

Page 28 - third paragraph

Delete "and, in particular, by our lack of knowledge".

Result of the vote

For : 38
Against : 53
Abstentions : 12

Page 29 - first paragraph

In the fourth and fifth lines amend "less harmful substitutes" to read "harmless substitutes".

Result of the vote

For : 42
Against : 44
Abstentions : 10

Page 30 - point g) - first indent

Replace "which do not have the hazardous properties of asbestos" by :

"which are not dangerous to man".

Result of the vote

For : 24
Against : 49
Abstentions : 23

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Page 30 - point g) - second indent

Add after "human consumption" :

"unless the emission of asbestos fibres can be avoided".

Result of the vote

For : 14
Against : 75
Abstentions : 7

Page 30

Add to point h): "before a tripartite supervisory body".

Result of the vote

For : 45
Against : 46
Abstentions : 12

Page 30 - point j), first indent

Delete "technically feasible".

Result of the vote

For : 46
Against : 52
Abstentions : 3

Page 31 - point k)

Replace by :

"k) Restrict the use in the building trade and in packaging of products whose asbestos is not locked in".

Result of the vote

For : 43
Against : 54
Abstentions : 7

The following texts of the Section's Study have been deleted following the acceptance of amendments proposed during the debate :

Page 19 - first and second lines

".... as a result of pressure brought to bear by the local population".

Result of the vote

For : 26
Against : 16
Abstentions : majority

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Page 25 - second paragraph

"Accordingly, there can be no limit which, if respected, will guarantee there is no risk to any given individual. Even less can compliance or non-compliance with the maximum limit be used for legal/medical purposes to prove that a given illness was caused or not caused by exposure to the risk".

Result of the vote

For : 42
Against : 39
Abstentions : 13

The following texts of the Section's Opinion have been replaced following the acceptance of amendments proposed during the debate

Page 9 - Chapter III - Point 1 - 3rd line

"In general, the disease develops after exposure to asbestos over a period of years".

Result of the vote

For : great majority

Page 27 - point 1

"Exposure to asbestos fibres with particular characteristics can cause asbestosis, which is a serious pulmonary disease.

This risk can be reduced by adopting ceilings for the concentration in the air of dangerous fibres".

Result of the vote

For : majority
Against : -
Abstentions : 18

Page 29 - point d)

"the limits which would be designed to make the risk as small as possible, would be determined in the light of the current state of knowledge and reviewed regularly;".

Result of the vote

For : unanimously

The following texts of the Section's Opinion have been modified following the acceptance of amendments proposed during the debate

Page 12 - end of second paragraph

"Often no documentary evidence exists".

Result of the vote

For : great majority

Page 31 - third indent

"- training and information to be given to the workers;".

Result of the vote

For : unanimously

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