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AIA/20/2

30 July 1979

Dear Mr. Kelley,

The advice to the Executive Committee of this Association is that there is inadequate scientific evidence to justify the proposed threshold limits for crocidolite and amosite as set out in the notice of intended changes for mineral tests given in your 1978 booklet.

I am therefore writing on behalf of our members to request that these recommendations should be modified better to reflect the evidence that exists. This is set out in the attached memorandum which we believe presents a fair summary of the available facts and their implications.

This commentary was prepared by Dr. Richard Gaze, who is Chairman of the Executive Committee of AIA, and we shall be pleased to do our best to provide any further information you may require.

Yours sincerely,

N Stack

Sir Neville Stack
Director-General

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NEW THRESHOLD LIMIT VALUES FOR CROCIDOLITE AND AMOSITE ASBESTOS

proposed by the American Conference of Governmental Industrial Hygienists

A commentary by
Richard Gaze, BSc., PhD., FRIC

I. CROCIDOLITE

The proposal is that the TLV should be 0.2 f/cc - ie one tenth of that proposed for chrysotile. While there is no scientific evidence to justify a one tenth ratio in terms of hazard, there is a general philosophy that crocidolite is the most hazardous form and particularly so far as mesothelioma is concerned.

The evidence for this conclusion originates from Wagner's work in South Africa (1) and the reported lower incidence of mesothelioma in the Canadian chrysotile mines (2). This has been followed by reports of mesothelioma among workers from the Wittenoom mine in Australia (now closed) (3) and among workers in war-time plants assembling gas mask filters containing Australian crocidolite (4).

A difficulty in finding confirmatory evidence has been that in most situations, long term exposure to single asbestos types is very difficult to isolate. Careful analysis of the evidence provided from mixed exposures has provided some confirmation that in such exposures to mixed dusts, the incidence of disease appears to be higher when crocidolite is present. (Newhouse (5); Enterline (6); Weill (7))

This is believed to be the essential evidence indicating that crocidolite is the most dangerous form of asbestos, which view is summarised in the report of the Advisory Committee on Asbestos Cancers to the IRAC in 1972 (8) and by Wagner (9).

Experience of control in the use of asbestos leaves no doubt that a TLV of 0.2 f/cc is equivalent to a ban on the use of crocidolite as a raw material in very nearly all if not all industrial operations.

By far the major use of crocidolite today is in the manufacture of asbestos cement pressure pipe. This is a valuable product, being used throughout the world for water distribution and the handling of sewage. It is of particular importance today since while cast iron and plastic pipes may also be used, asbestos cement pipes have by far the lowest total energy content in their composition and manufacture. A high proportion of manufacturers regard crocidolite as an essential component if these pipes (and particularly those with the higher diameters) are to be produced economically.

If this use is to continue, then a higher TLV must be accepted for crocidolite or an exception made in some way (as in the Benelux countries). The question then arises whether there is in fact any

hazard when crocidolite is used for this purpose in modern processes. The following factors should be taken into consideration :

1) The evidence accumulated from the mining and use of crocidolite in the past involved techniques and processes resulting in exposure to dust concentrations at a level which would be entirely unacceptable and indeed unimaginable today. The stripping of crocidolite sprayed insulation from warships for example, produced fibre dust concentrations of many hundreds and indeed thousands of fibres per cc. (10)

2) With one exception (7) these processes are no longer used and can in no way be compared with the wet asbestos cement processes used to manufacture pressure pipes. Weill's account of the history of workers in asbestos cement plants in New Orleans (7) includes measurement of dust concentrations in current operations but not for the past under conditions to which his workers were exposed.

3) It is important to summarise the present evidence available from asbestos cement plants that have been using crocidolite for the past thirty to forty years.

Austria

Haider (11) reports no excess of mesothelioma in the regions in which asbestos cement industries were situated. Austria has the oldest asbestos cement industry in the world, excellent public health records, and has used crocidolite regularly since before the last war.

Switzerland

Rüttner (12) reports that of four cases of mesothelioma identified in Zurich from 1961 to 1976, only one had proven exposure as an asbestos cement worker. This country also has a long history of asbestos cement manufacture and has regularly used crocidolite.

Germany

Robock (13) reports only five cases of mesothelioma from the German asbestos cement industry (also a long term user of crocidolite) and these arise from one factory only where exceptional conditions existed.

Belgium

Lepoutre (14) reports that among current employees in a very large plant - also a long term user of crocidolite and with high dust levels in the past - there is no excess of lung malignancy and only one mesothelioma.

United States

From New Jersey, Borow (15) has reviewed the history of seventy-two cases of mesothelioma among workers at a large plant. The evidence unfortunately cannot be linked clearly with any one process since textiles, insulation and other products were made in addition to asbestos cement. The position is further confused by evidence from a similar plant in Illinois, of similar age and manufacturing similar products (with crocidolite). No comparable excess of mesothelioma has been found at this plant (16).

Weill (7) concludes that workers exposed in the New Orleans asbestos cement plants were subject to higher risks of respiratory malginancy in departments where crocidolite was used. The comparison is not entirely convincing however because the two processes - one using crocidolite and one not - are different. They use different raw materials and raw material processing methods, different forming techniques and manufacturing different products. Bearing this in mind together with the small overall numbers of those affected and the uncertainties of level of exposure in the past, more evidence is needed before more than a tentative conclusion can be drawn.

United Kingdom

For various technical reasons, crocidolite has not been used to any significant extent in asbestos cement manufacture.

The reputation that crocidolite has acquired in the United Kingdom stems from its use in entirely different processes associated - as we now know - with very high dust levels.

Conclusion

It is clear that the evidence upon which a TLV for crocidolite - equivalent to a ban on its use - is proposed relates almost entirely

to conditions in the past which do not apply today. Thus none of the excessively dusty processes such as insulation and acoustic spray, gas mask filters, mattress making and lagging now employ crocidolite.

Evidence from the asbestos cement side - the only major remaining use for crocidolite - is by no means as unfavourable and the contention of those who use it that at the same fibre levels, there is no greater risk with crocidolite than with chrysotile, has not been satisfactorily answered.

It must be accepted that under similar conditions crocidolite is liable to produce more dust than chrysotile so that extra precautions may be necessary in order to achieve the same fibre dust levels but there is not yet evidence to indicate that provided this is done in asbestos cement manufacture, there is undue risk.

As has been stated, the only significant use of crocidolite in the United States and elsewhere is in asbestos cement manufacture and so far as the United States alone is concerned, only in the manufacture of asbestos cement pressure pipes.

For use in such processes, there is not adequate justification for the application of a separate standard for crocidolite.

II. AMOSITE

The proposal is that the TLV should be 0.5 f/cc - ie intermediate between that for chrysotile (2.0 f/cc) and that for crocidolite (0.2 f/cc).

This stems from a philosophy that amosite occupies such a position and this has gradually developed over the past ten years, being expressed in the report of the Advisory Committee on Asbestos Cancers to the IARC in 1972 (8), by Wagner (9) and Enterline (6). It is in fact very difficult to find hard evidence for such a conclusion and it is indeed very much more slender than that advanced in connection with crocidolite. In spite of contrary evidence that has been brought forward to indicate a different conclusion, the 'feeling' that amosite should have a special intermediate position has persisted.

The evidence such as it is, is derived from Selikoff's studies of insulators and the workers in the factory where amosite insulation materials were produced (17). Amosite was the preferred fibre for these insulations and working conditions were undoubtedly bad by today's standards. Much of the exposure took place in war-time when there was a tremendous demand for the materials, particularly from the Navy, and precautions were minimal. As is now well known, many workers have suffered, the symptoms appearing a considerable time after exposure to the dust.

There is virtually no other evidence.

In considering this evidence, the following should be borne in mind :

1) The processes and products with which Selikoff's workers were involved are no longer used. The use of amosite is now confined to wet processes or to other processes where dust levels can be readily controlled.

2) The dust levels developed in manufacture and use (including stripping) of these products were around two orders of magnitude higher than those encountered in asbestos processes today.

3) Over 90% of the world's supply of amosite comes from the Penge mine in South Africa. This mine has operated for over fifty years and in spite of intensive search, and in spite of the fact that conditions must have been bad by today's standards in days gone by, only two cases of mesothelioma related to pure amosite exposure have come to light. (Webster (18))

4) McDonald's examination of miners exposed to fibrous grunerite (amosite) in the Homestake mine did not reveal any excess of pulmonary cancer among miners with long service and regular exposure to this dust. (19)

5) Experiments with animals do not reveal conclusive differences between the toxicity of different fibre types. In these careful experiments, inhalation of amosite dust did not produce a greater incidence of lung cancer or mesothelioma than when other types of asbestos were used. (Davies (20))

Conclusion

The evidence for placing amosite at a TLV of one quarter of that of chrysotile is exceedingly slender and based largely upon a 'feeling'.

The effect of this TLV, if applied to amosite, would be disastrous and few manufacturers would be able to use this valuable raw material. The facts do not justify such an extreme step.

RG/WFG

REFERENCES

1) Wagner, J.D.; Sleggs, C.A.; Marchand, P.: Diffuse Pleural Mesothelioma and Asbestos Exposure in the North West Cape Province. Brit. J. Indust. Med. 17 : 260-271, (1960).

2) McDonald, J.C. : Exposure Relationships and Malignant Mesothelioma. Asbestos Symposium. Johannesburg 1977. Edited by H.W. Glen. pp. 67-78

3) Palfreyman, R. Private communication.

4) Jones,J.S.P.; Pooley, F.D. ; Smith, P.G.: Factory Populations Exposed to Crocidolite Asbestos. Insern., vol 52. 1976. pp. 117-120.

5) Newhouse, M.L. : A Study of the Mortality of Workers in an Asbestos Factory. Brit. J. Indus. Med. 26: 294-301, (1969).

6) Enterline, P.E. : Type of Asbestos and Respiratory Cancer in the Asbestos Industry. Arch. Environ. Health, 27, 312-317 (1973)

7) Weill, H.; Rossiter, C.E.; Waggenspack, C.; Jones, E.N.; Ziskind, M.M. : Differences in Lung Effects resulting from Chrysotile and Crocidolite Exposure. Inhaled Particles IV, W.H. Walton, ed., Pergamon Press, New York, p.789 (1977).

8) Report of the Advisory Committee on Asbestos Cancers to the Director of the International Agency for Research on Cancer. Lyon, October 1972.

9) Wagner, J.D.; Gilson, J.C.; Berry, G.; and Timbrell, V. : Epidemiology of Asbestos Cancers. Brit. Med. Bull. 27: 71-96, (1971)

10) Harries, P.G. : A Comparison of Mass and Fiber Concentrations of Asbestos Dust in Shipyard Insulation Processes. Ann. Occup. Hyg. 14, 234 (1971)

11) Haider, N. : Comment in Discussion. Asbestos Symposium. Johannesburg 1977. Edited by H.W. Glen. pp. 89-90

12) Rüttner, J.R. Ibid. p.86

13) Robock, K. Ibid. p.91

14) Lepoutre, J. Ibid. p.104

15) Borow, M. ; Conston, A. ; Livornese, L.; Schalet, N. : Mesothelioma following exposure to Asbestos : A Review of 72 Cases. Chest. 64, 641-646 (1973)

16) Wright, G.W. Private communication

17) Selikoff, I. J.; Lee, D.H.K.: "Asbestos & Disease". Academic Press p.315

18) Webster, I. : Comment in discussion. Asbestos Symposium. Johannesburg 1977. Edited by H.W. Glen. p.79

19) McDonald, J.C.; Gibbs, G.W.; Liddell, F.D.K. and McDonald, A.D. : Mortality after long exposure to Cummingtonite - grunerite. Am. Rev. Resp. Dis., 118, 271-277 (1978)

20) Davies, J.M.G.; Beckett, S.T.; Bolton, R.E.; Collins, P. and Middleton, A.P. : Mass and Number of Fibres in the Pathogenesis of Asbestos-related Lung Disease in Rats. Br.J.Cancer 37, 673 (1978)