

Feedback

R. N. WHEELER, JR.

PVC dust fells factory mice suggesting new work hazard

Guinea-pigs and rats kept in dusty areas of PVC factories next to regular workers developed pneumoconiosis—the lung disease caused by asbestos, silica, and coal dust. Additional tests show PVC dust to be as biologically active as chrysotile asbestos.

This means that PVC powder—the product of polymerisation of vinyl chloride monomer (VCM)—must be treated as a health hazard potentially more widespread than VCM itself. VCM was discovered last year to be carcinogenic and the chemical industry has made considerable efforts to control this gas. Efforts may now be needed to control PVC powder as well.

Following a report that a 31-year-old worker who had inhaled PVC powder at work for a year developed a new type of pneumoconiosis, Professors N. Frongia, D. Casula, and R. Camba at Cagliari (Italy) University began a long-term investigation of the possible harmful effects of PVC powder. They put rats and guinea-pigs in cages with large windows in the bagging section of a PVC plant in Sardinia. Because PVC manufac-

ture is largely automated, the bagging section is usually the dustiest. The fact that the animals were exposed to the same atmosphere as workers in the plant is an unusual procedure which partly overcomes objections to drawing conclusions from animal experiments about the biological effects of chemicals on man.

The animals were killed after two to seven months of exposure to PVC dust and their lungs examined microscopically.

Reporting their work (*Medicina del Lavoro*, Sept-Oct 1974) the three professors say: "we are dealing with an authentic pneumoconiosis, or at least with a PVC pneumopathy which suggests very strongly not a few of the significant aspects of pneumoconiosis". Although they admit that much more research has to be done before firm conclusions can be drawn, they say their results form a "highly consistent picture" and are "clearly correlated with the length of exposure to PVC powder".

The second piece of recent research which throws suspicion on PVC powder

had curious origins. Dr Fred Rose of the Biochemistry Department at University College Cardiff happens to live near a BP PVC plant. PVC dust often forms a fine film on the road outside the plant and also finds its way on to the roofs of cars parked nearby and on to washing hung out to dry. Rose's department carries out work on the biochemistry of asbestosis. Putting the two together, he decided that he ought to have at least a brief look at PVC dust.

Rose and Dr Roy Richards used a test that had been found to be a good indicator of the biological activity of other materials such as asbestos. The dust is incubated with red blood cells from rabbits and the amount of haemoglobin released by the dust breaking the cell walls (haemolysis) is measured.

So far only two samples have been tested and so the results are difficult to interpret. However one of the PVC dust samples was found to be as active in the haemolysis test as chrysotile asbestos. When the PVC particles were washed, this activity surprisingly disappeared. Rose and his colleagues tentatively concluded that the biological activity is due to a soluble surface-associated agent. Even more surprising is that the other PVC dust sample showed practically no activity at all.

One possibility is that the two samples were from different processes which produced different size particles, with different biological activities. Large dust particles do not reach the lung, which suggests they may be less dangerous than small ones. The particles in the Italian factory were very small—about 1 micrometre in diameter.

The significance of these two pieces of research, if their results are confirmed by further experimentation, could be immense. PVC powders are handled by a much larger number of workers than VCM. Workers in practically every plant making goods from PVC powder are potentially at risk. Further, the discharge of PVC dust from factories is by no means a rare event, so communities near PVC plants might also be at risk.

Lawrence McGinty

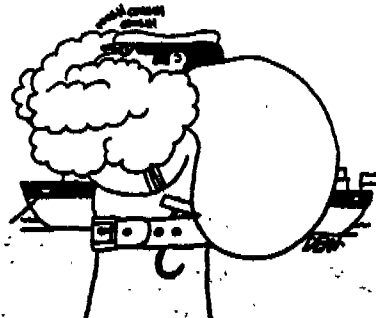
Will dockers black PVC powder?

London dockers are to reconsider a total ban on the handling of cargoes of PVC powder. The National Association of Stevedores and Dockworkers (NASD) originally refused to "black" PVC cargoes following the refusal of some dockers at the Royal group of docks to unload bagged PVC. But armed with the new evidence that is emerging about the hazards of PVC powder the issue will be raised again.

Last January one gang of dockers refused to unload about 80 tonnes of bagged PVC from two barges onto a Romanian ship. According to one of the dockers involved, the cargo had been lying in the barges for a year and many of the bags were rotten. The refusal was prompted by publicity, especially on TV, surrounding the discovery that vinyl chloride monomer—from which PVC is made—causes liver cancer. But the dockers were also suspicious that the PVC powder itself might be a health hazard.

A Factory Inspector had the cargo analysed and he assured the dockers that there was no measurable vinyl chloride monomer in the PVC and that "PVC powder itself is harmless". (Evidence that PVC powder could cause pneumoconiosis had been published three months earlier.) Similar assurances came from Robert Murray, the TUC's medical advisor.

After eight days the cargo was unloaded from the barges by other dockers. "The dust was just every-



where; people were smothered in it," says one dockers.

This was the first cargo of PVC to pass through the Royal docks, but employer's assurances that any future cargoes would be inessian, not paper, bags indicates the possibility of future cargoes.

Now the dockers who originally refused to handle the cargo are raising the question again. This time they have the admittedly preliminary findings of the Italian and Cardiff research to back up their claim that PVC dust could be a health hazard. Their intuitive feelings about PVC powder, which must be seen against a long history of "unscientific" bans on dangerous cargoes (asbestos for example) long before medical evidence of ill-effects appeared, could well be a better guide to action than the Factory Inspector's reassurances. L.M.

French court backs breeder

Two environmental groups were refused an injunction to stop *Électricité de France* from building a fast breeder reactor at Bugey. The court ruled that there had been no infringement of property or of a fundamental right.

The environmentalists had argued that clean air and lack of pollution is a legal right. *Électricité de France*, on the other hand, argued that "quality of life" is neither a public right nor an essential liberty, but rather an aspiration.

Testing technology

"The Police Department yesterday transmitted the following message on its press teletype machine: 'This is a test message for L.I. press only. If you do not receive this message, you need a repair'."

—New York Times, 6 May

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To (Name) **Mr. S. W. Mortimer**
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 Location

Date **July 26, 1976**

Originating Dept.

Answering letter date

Copy to **Dr. T. T. Szabo**
Mr. J. B. Hollingsworth
Mr. G. T. Scott
Mr. A. E. Montagna

Subject **New Scientist June 26, 1975**
Feedback PVC Dust Falls
Factory Mice

Per our recent discussion on health effects of PVC, the attached article appeared in the New Scientist. This does a good job of mixing data and conclusions for maximum effect. The article should be considered as two separate items as marked.

Item 1. Professors Frongia, Casula and Camba at Cagliari (Italy) University report that rats exposed to PVC dust (<5 microns) for two to seven months developed pneumoconiosis. This effect had already been noted by Jerzy Popow, Influence of Polyvinyl Chloride Dust on the Rat Respiratory System (Roczniki Akademii Medycznej Supplement 24, 1969) and B. Azende, et. al. Pneumoconiosis Developing After Inhalation of Polyvinyl Chloride (Orv. Hetil. 112:85-6 January 10, 1971). Since pneumoconiosis appears to be caused by many kinds of dust, there appears to be no alternative but to use respiratory protection in dusty locations. MCA is trying to get more information on Dr. Frongia's work, however.

The big problem with the inhalation of asbestos fiber is that it leads to lung cancer (mesothelioma). The fact that it causes pneumoconiosis is separate and unrelated to the lung cancer problem.

Item 2. The second portion of the article relates the haemolysis testing of PVC powder and chrysotile asbestos. The ultimate meaning of this experiment is hard to fathom. Haemolysis is release of haemoglobin from the breakdown of red blood cells as a result of some foreign material presumably introduced into the blood stream, i. e. it could be a measure of the tendency for a particular material to cause anemia or similar blood

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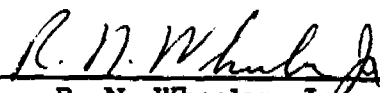
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disorders. In the first experiment PVC dust as received showed haemolytic activity equivalent roughly to a like amount of chrysotile asbestos, though the asbestos displayed faster action. In a second series of experiments the PVC dust was water washed prior to test. One wash reduced haemolytic activity by 60% and additional washes further reduced the activity. The conclusion of the testing was that certain forms of PVC dust exhibit a high haemolytic potential because of the presence of a readily soluble surface associated agent (surfactant or suspending aid). The present study indicates that the introduction of a washing procedure after the processing of the dust tested would reduce or abolish the haemolytic activity of this material.

Union Carbide Corporation solvent and non-solvent resins could certainly be said to be well washed and deficient in haemolytic activity.

The unanswered question with regard to the significance of the study is how is PVC dust introduced into the blood stream in normal situations.

I hope this explanation is clear though I am not sure it is helpful.


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RNWJr./pm
Attachment

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