

VI Medical Subcommittee

For your information

R. Gottesman

With Compliments



Norsk Hydro

cc GOTTESMAN HOERUP BRN/SOK
RÖNNMARK CLAUS THOMAS
CLAERBOUT MSB/DR

Norsk Hydro Polymers Ltd.

H M CLAYTON
EXECUTIVE TECHNICAL DIRECTOR

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Aycliffe Industrial Estate
Newton Aycliffe
Co. Durham DL5 6EA

Registered
in England
No. 1631120

Telephone
National: Aycliffe (0325) 315122
Internat: +44 325 315122

Telex
58322

Fax
0325 319013

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DR. R. T. GOTTESMAN

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these men had first been exposed to VCM at times when occupational exposures were very high: the most recent date of first exposure in an ASL victim was 1966.

So what?

- (1) Vinyl chloride is a human carcinogen — a fact that is reflected by the low control limits now in force (3 ppm averaged over a shift, 7 ppm for shorter exposures).
- (2) All the men studied here were employed on a VCM/PVC process prior to 1975. Verification of the efficacy of control limits will be best achieved by using existing ASL registers to identify any cases occurring in individuals first employed after 1974.
- (3) The results of this study do not support a role for VCM in the production of cancers other than ASL.
- (4) While death from ASL occurred in one case only eight years after first exposure, the average time appears to be about 25 years after the first exposure.
- (5) Observation of present control limits and limitation of VCM levels to as low as is reasonably practicable should ensure the elimination of any cancer risk as a result of exposure to VCM in this industry.

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HSE STUDY OF VINYL CHLORIDE AND PVC WORKERS



Health and Safety Executive

Medical Division

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What's it all about?

In 1974 it was realised that exposure to vinyl chloride (VCM) could cause a very rare form of liver cancer known as angiosarcoma of the liver (ASL). The link between VCM and ASL was made by a works doctor in the United States because of cases of this rare tumour that occurred in the relatively small workforce at one of his chemical plants. The cases were only noticed by the doctor because of the rarity of ASL. Exposure levels in the industry were dramatically reduced over a short period of time, but the question remained as to whether exposure to VCM might also have caused an increase in cases of more common cancers — an effect which would have been much less noticeable.

Why was this study set up?

In addition to the question: 'Did VCM cause other cancers?' it was necessary to look at how different levels and types of exposure might affect the likelihood of VCM-induced tumours. It was also important to learn more about the course of the disease, how soon after exposure it might develop, and whether any non-cancerous diseases of the liver might be associated with exposure to the chemical.

What did the study do?

All chemical plants in Britain that had either made VCM or used VCM to produce polyvinyl chloride (PVC) were included in the study. Identification details were noted for everyone who had worked on these processes between 1940 and 1974. These workers were traced through the National Health Service Register and death certificates obtained for those who died. The number of workers dying from particular causes were then compared with the number that would have been expected if a sample of similar age, sex and size had been taken from the general population of England and Wales.

What were the results?

An analysis of over 7000 workers was carried out and a paper published in the British Journal of Industrial Medicine in 1977. At that time, although two cases of ASL were identified, no statistically significant excesses of mortality were found. Indeed, for diseases of the heart and lungs, significantly fewer deaths occurred — a finding we now recognise as the healthy worker effect and which, while variable in degree, is similar in most studies of working populations.

What is the latest situation?

For the present analysis, which updates that referred to above, we have included only men who had worked for at least a year and whose occupation was deemed to have exposed them to vinyl chloride/PVC for at least 25% of their working week. These criteria reduced the size of the population studied to 5498 males.

There was a highly significant excess of primary liver cancer due to the occurrence of seven angiosarcomas. All of these occurred in men who had at some time been autoclave workers.

No other evidence of cancers related to VCM exposure was discovered.

Exposure to PVC dust did not appear to increase the likelihood of dying from respiratory disease and the number of deaths from non-cancerous liver disease was not increased.

A historical review of occupational exposures suggested that up until the mid 1950s, autoclave workers were exposed to 500-800 ppm VCM and that even in the 1960s and early 70s, autoclave exposures were around 150-500 ppm. For the cases of ASL that occurred, the time from VCM exposure to death ranged from 8 to 33 years. Some of