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Insidious Disease

Chemical Workers threatened by Hideous Disease due to
PVC Gas Poisoning

Bonn Ministry sets up Special Committee of Enquiry

Bonn (our own correspondent). Chemical workers directly engaged in PVC autoclave production in large chemical factories are threatened by a new and serious disease. At least 40 employees of a Troisdorf factory are reported to be poisoned by dangerous vinyl chloride gas. "A serious prognosis" for the victims, according to the Bonn skin specialist Professor Gunther Veltmann. Mortality from PVC gas poisoning is reported to be "relatively high" and particularly serious in young male workers.

According to the medical specialists the frightening consequences of the gas poisoning are reflected in the softening of the bones in hands and feet, enlargement of liver and spleen, severe effects to blood formation and coagulation, and associated grave lung disorders. The victims have increasing difficulty with breathing, and varicose veins can form in the esophagus.

This previously unknown disease, according to Professor Veltmann, is "irreversible," i.e. incurable. No remedy has so far been discovered, and the only thing that can be treated is the defective organ. The victim can only look forward to increasing disablement and insidious encroachment of the disease.

Experiments on animals are now being commenced to study the causes and course of the illness and to find antidotes. This evil disease is not even recognized yet as an occupational illness. As a result of the alarming medical reports, Federal Labour Minister Arendt has set up a special committee to investigate and report back. The more seriously affected victims are now claiming disablement pensions. However, they have as yet no entitlement to a pension, since this particular illness is not yet officially recognized as an occupational disease by the health authorities.

The Committee for Dangerous Raw Materials of the Federal Labour Ministry considers that regular medical inspection of workers engaged in plastics production is essential. Guidelines

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for technical countermeasures in respect of health hazards are also being drawn up. Local factory inspectors have already ordered individual firms to introduce appropriate safeguards.

Meanwhile, the Troisdorf workers have levelled the serious accusation that they were used as guinea-pigs. One employee, aged 39, a sufferer for some 18 months, is reported to have swollen hands and feet with no more feeling left in them, and is afraid to venture on the street because of dizziness. He first became aware of the unusual symptoms when cleaning out a PVC autoclave three years ago.

Another 47-year-old chemical worker attributes his chronic liver trouble to the poison. According to Professor Veltmann, the effects of the gas on the liver resemble the liver complaints suffered by chronic alcoholics.

The 160 workers on the Troisdorf autoclaves have become particularly uneasy about the situation. However, both management and works council have emphasized that the employees directly involved are not really worried, in view of the fact that none has accepted the offer of transfer to other work on the site. A different explanation, on the other hand, is that these same workers are the top earners in the industry. It is they who are responsible for producing the material which is subsequently processed by their other 2,500 colleagues.

PVC is one of the most widely used plastics, with countless applications in the home and in industry. However, medical specialists emphasize that nobody can suffer ill effects due to contact with PVC products. The only people at risk are the workers directly engaged on the plants in which the colorless vinyl chloride gas obtained from petroleum is liquefied under pressure and converted into powder in large reactor. The danger arises from the gas, which can escape during the process either as a result of leaks, carelessness, or during the cleaning of the reactors. The maximum permissible concentrations of such leakage gases have repeatedly been reduced by the responsible authorities.

According to the Troisdorf works, "nobody has yet died and production has not been irresponsibly pursued at the expense of workers' health or safety; moreover, no efforts have been spared to safeguard the interests of their employees."

Hans Wüllenweber

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PVC DISEASE TO BE INVESTIGATED

Reference: Frankfurter Allgemeine Zeitung, 20.12.73

Bonn/Troisdorf 19 December

Many cases of illness among persons employed in the PVC plant at Dynamit Nobel AG in Troisdorf have caused concern among the local population. As Dynamit Nobel AG confirmed on Wednesday, 43 workers so far have shown symptoms of the mystery illness, which is known only as "PVC disease" at present. Two foreign workers are said to have become completely incapable of working already. PVC (polyvinyl chloride) is a widely used plastic that is produced by a number of other chemical companies apart from Dynamit Nobel AG.

How seriously the situation is regarded is apparent from a statement issued by the West German Minister of Labour on Wednesday to the effect that the government had instructed investigations to be carried out into the hitherto unknown causes of the disease. Details are to be laid down in January by a panel of experts. According to the Ministry of Labour, the relevant employers' association is working on the assumption that the disease is caused by vinyl chloride.

It was stated that the Ministry of Labour Committee considers that operatives working in the neighbourhood of PVC autoclaves must be medically examined. When the various cases of illness became known local factory inspectorates ordered steps to be taken to provide increased health safeguards on the plant.

The symptoms of the condition are unconsciousness, attacks of dizziness, changes in the hands and feet, headache and nausea. According to a report from the works in question, the first cases of physical damage to workers in the PVC plants were observed in Germany in the Spring of 1972. Dynamit Nobel have been producing PVC since 1951.

The Press Section at the Troisdorf works stated that: The government industrial medical officer, in agreement with the Chemical Industry Employers' Association, has instructed Professor Rudolf Gross, who holds the chair of Medecine at the University of Cologne to examine some of the affected persons and to produce a report.

6 patients from the PVC plant have now been examined by Professor Gross at the university teaching hospital. A report on some of his findings will be issued in December.

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MEDICINE

Dangerous Plastic

A new and deadly occupational disease has been discovered by Medical Specialists in Bonn: workers engaged in the production of PVC risk incurable diseases of the liver.

Pipes and venetian blinds, curtains and films and whole host of articles in common use are made from PVC, a hard, durable plastic which can be moulded into almost any product. German producers alone have distributed almost a million tonnes of polyvinyl chloride over the country in the last year.

PVC has so far been responsible for the death of as yet unknown numbers of chemical workers. For the production of this much desired material, which can be combined in so many different ways with plasticisers, fillers and pigments that it has become one of the leading products of the plastics age within the last twenty years, is apparently very much more dangerous than had been previously been assumed.

Medical specialists of the Bonn University Clinics have this year diagnosed a "vinyl chloride disease" in at least 40 of the 120 PVC workers in a labouring chemical factory. However, the number of cases is probably considerably higher than this. According to preliminary comments made by the doctors this newly discovered "occupational illness" is characterised by a "serious prognosis and a relatively high mortality rate in men of predominantly younger age groups". According to Prof. Günther Veltman writing in the "Deutsche Medizinische Wochenschrift": "Certainly more than 10% as revealed by our enquiries".

This occupational disease first came to the notice of dermatologist Veltman and his team in the form of characteristic changes to the skin, particularly in the fingers. However, they were soon forced to the conclusion that still worse was to be revealed by this already well-known PVC symptom: vinyl chloride harms blood and blood vessels, bones, nerves, liver and lungs. As summed up by Veltman: "A disease of the system".

This plastics material apparently places at risk only those individuals actually present when the colourless vinyl chloride gas, obtained from mineral oils, is liquefied under pressure and compressed to form powder in the large reactors known as "autoclaves". This "polymerisation process" is necessary to produce the PVC which is then sold as "Hostalit" (Farbwerke Hoechst) or "Vinoflex" (BASF): Products which are not toxic as far as the end consumer is concerned, unless, in the words of plastics experts, "Plasticisers migrate from them". Those cases in which these toxic substances have been liberated from such materials have indeed been reported for a considerable period of time.

On the other hand, the "closed system" of the autoclaves gives rise to dangerous leakages. The Bonn Medical Specialists have been investigating "possibilities of gas leakages and associated inhalation risks" at numerous points in the production process. VC-gas escapes when the reactors are discharged and opened as well as through "leaks in the autoclaves". For many years doctors have been aware of the toxic nature of the gas and its narcotic effect. Almost without exception personnel engaged on the cleaning of autoclaves complain of feeling "dopey", giddiness and headaches. For this reason the "maximum allowable concentration" ("MAK") of the VC gas has been repeatedly reduced. According to Veltman, however, "we have so far not been aware of regular gas concentration

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Personnel responsible for cleaning the autoclaves - such as the majority of the diseased chemical workers - apparently inhale many times the quantity of the acceptable tolerable dose of the toxic substances. Industrial doctors in America have repeatedly measured gas concentrations of 1,000 ppm * in the neighbourhood of PVC autoclave walls, which is ten times the MAK value.

The symptoms suffered by the diseased Bonn workers show that the air in German chemical factories is not very much better. The following changes in bodily organs has frequently been observed after only 18 months employment :

Enlargement of liver and spleen with lasting destruction to the structure and function of their cells - collective tissues proliferate in the organs.

Reduced circulation in the hands due to diseased narrowing of the arterial vessels.

Finger bones gradually deteriorate, and were almost completely destroyed in cases of advanced disease.

Blood formation and coagulation were affected and breathing was found to become increasingly difficult.

The majority of these illness-induced changes are considered non-curable by reason of the fact that the increase in connective tissues in all vital organs is "irreversible". Specialists in internal diseases accordingly hope at the most for a "defective healing" in diseased livers. The chemical workers are left with a thick-skinned and deformed organ such as that found in chronic alcoholics after many years over-indulgence in alcohol.

According to Prof. Veltman, the necessary "consequence" is "compensation for all diseased workers" and the recognition of the illness as an occupational disease. Neither he nor his colleagues have so far ventured to estimate the numbers of the victims of the PVC disease.

Basic research into the medical problems of VC is also badly lagging. In the 100 year after the ability of vinyl chloride to polymerise was first discovered - in 1878 - the doctors in Bonn are now demanding "experimental investigations in animals on the effects of the vinyl chloride with particular reference to skin, bone, lungs, liver and spleen".

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- PPM : abbreviation for parts per million = parts (by volume) per million : a measurement unit used to indicate the quantity of trace substances eg in a gas mixture.

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LIVER DAMAGE IN PVC PRODUCTION

In spite of abundant warning signs no adequate supervision

Like many other occupational diseases, the damage incurred during the production of polyvinyl chloride, or PVC, is only now, more than 30 years after the start of industrial PVC production, being fully realised. The scale of the health hazard involved in PVC production was first exposed in a publication by doctors of Bonn University Teaching Hospital (Universitätsklinik Bonn), who found skin damage, changes in the ends of fingers and toes, as well as liver and spleen damage, in 45 workers at Dynamit Nobel AG's PVC plant in Troisdorf.

According to reports by H J Marsteller of the Medical Klinik and Susanne Juhe of the Skin Klinik in the "Deutschen Medizinischen Wochenschrift" (Vol. 98, p 2311), 45 of the 120 workers in this plant have so far been exhaustively examined in Bonn. Some of these patients were suffering from skin changes, in others the examination was carried out on prophylactic grounds. Most of these workers were found to be suffering from various types of liver damage of obscure origin. In addition to enlargement of the liver, biochemical malfunctions of the liver were detected. Histological tissue changes were finally established.

Since, in spite of the diversity of the liver changes all the patients had been engaged in PVC production for 1.5 to 21 years. This can only be an occupational disease involving PVC. In 1963 circulatory disorders, inflammation and hardening of the skin, thyroid deficiency and enlargement of the liver in PVC workers were reported for the first time in Roumania. It was only after re-publication of this work in 1967 that similar observations were reported in Germany, France, England and the United States. But here the emphasis was on changes to fingers and toes. This led, according to the Marsteller and Juhe report, to "attention being directed to the liver damage first noted in PVC production in the Soviet Union in 1949".

The scientists are making no statements about the prognosis of the PVC liver damage. Even the frequency of this illness among other PVC producers is unknown. Possibly the threat to personnel is heavily dependent on local working conditions. Since the morphological picture of these liver changes corresponds to chronic toxemia, such as also occurs from contact with chlorinated hydrocarbons, eg chloroform, the health risk could be determined by the concentration of the gaseous initial product, vinyl chloride, in the atmosphere. Since such a hazard was certainly not unforeseeable, and must indeed have been expected in view of the existing publications, the question arises as to whether either the vinyl chloride concentration or the health of the workers were properly supervised in these plants.

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