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CONFIDENTIAL

REC'D. MAY 21 1969

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1. Deterioration of bones is not limited to the fingers. Indications are that other bones may be involved.
2. The disease may result from sensitivity of particular individuals to materials present in PVC reactors.
3. Work by Dow Chemical Company is showing that vinyl chloride monomer is considerably more hazardous than previously believed; i.e., the present threshold limit of 500 ppm may be reduced to 50 ppm when their work is made known.

1. Early Phase—Raynaud's phenomena; i. e., blanching of fingers. Usually, no changes are detectable by X-ray.
2. Active Disease—The hands show Raynaud's phenomena along with whitish pimples, shiny white patches, and thickening of the skin. X-ray changes are detectable in the fingers, usually in the form of radiolucent lesions in the finger tips.
3. Recovery—The radiolucent lesions heal though there may be some disfiguration of the finger bones. The Raynaud's phenomena tends to remain for many years.

UCC 100833

MEETING OF PVC RESIN PRODUCERS-PARTICIPANTS
IN EPIDEMIOLOGIC STUDY

WASHINGTON, D. C. - MAY 6, 1969

The disease, acroosteolysis, appears to be more widespread in the PVC industry than previously realized though it appears to be related to a specific job - reactor cleaning. Employees with reactor cleaning experience had one case per 140 employees, while other industry employees had one case per 679 employees. The specific cause of the disease is still unknown except that it is related to vinyl chloride polymerization and more specifically to reactor cleaners. Other hypothetical aspects are:

1. Deterioration of bones is not limited to the fingers. Indications are that other bones may be involved.
2. The disease may result from sensitivity of particular individuals to materials present in PVC reactors.
3. Work by Dow Chemical Company is showing that vinyl chloride monomer is considerably more hazardous than previously believed; i. e., the present threshold limit of 500 ppm may be reduced to 50 ppm when their work is made known.

As a result of the University of Michigan study and other data, the disease appears to exhibit the following characteristics:

1. Early Phase— Raynaud's phenomena; i. e., blanching of fingers. Usually, no changes are detectable by X-ray.
2. Active Disease— The hands show Raynaud's phenomena along with whitish pimples, shiny white patches, and thickening of the skin. X-ray changes are detectable in the fingers, usually in the form of radiolucent lesions in the finger tips.
3. Recovery — The radiolucent lesions heal though there may be some disfiguration of the finger bones. The Raynaud's phenomena tends to remain for many years.

✓ The Occupational Health Committee of the MCA will make the following recommendations to the industry:

UCC 100834

1. The association between reactor cleaning and the occurrence of AOL is sufficiently clear, cut that steps should be taken to minimize the exposure of workers responsible for this operation. These steps may take the form of substituting water-jet or solvent cleaning to eliminate the present hand-scraping operations. Where it is necessary for workers to enter tanks, adequate ventilation is required. Inasmuch as the etiological agent of the disease is not known, a level of vinyl chloride below 50 ppm should be used as an index of adequate ventilation.
2. Because of evidence that the disease AOL affects bony structures other than the phalanges, and because of information made available by other investigators that there may be other connective tissue involvement, recognized cases should be removed from further exposure and should be examined at intervals to determine whether there is any progression of the disease.
3. Attempts to produce the disease in experimental animals should be supported to isolate the agents responsible for the disease.
4. Plants that had no cases of the disease in the present survey should not assume that they are immune. In many instances failure to demonstrate cases may have been the result of the small number of employees exposed or limited experience rather than due to a difference in practices. Because of these factors, plants that do not now appear to have cases of AOL should perform regular periodic medical surveillances since this study cannot predict unequivocally that cases of AOL will not occur in the future. For the same reasons, it is recommended that all plants, whether or not they have had cases, adopt the practices outlined in item 1 above.
5. Preassignment examinations of vinyl chloride monomer and vinyl chloride resin workers should be made. These examinations should include hand X-rays and a medical history to determine Raynaud's disease, scleroderma, and abnormal cold response.
6. Periodic examinations of vinyl chloride monomer and resin workers should be conducted at least once a year, including hand X-rays and other history as noted for the preassignment examination.
7. Manufacturers of vinyl chloride monomer and resin should give serious consideration to financing animal studies to determine the cause of the disease.

MISCELLANY

1. There was a fair amount of discussion of the first recommendation because no data was presented to support the use of 50 ppm maximum vinyl chloride concentration as an index of ventilation. There was also concern that the number would be arbitrarily set as a limit for exposure. Discussion was cut off by the Chairman, Doctor Dernehl, on the grounds that this could take all day and not change anything.
2. The contract for the study has been completed by the University of Michigan and no further work is planned. The University of Michigan was instructed to not publish the report but they may publish data extracted from the study.
3. AOL does not occur in the fabrication plants in any significant number of cases.
4. Doctor Dernehl pointed out that this study and its results showed only what was to be seen on the date of the study. A plant or company that had no cases of AOL in the study could now have cases or vice versa.
5. The USPHS is fully aware of the study and its results. Actions under consideration by that group are not known. Opportunistic crusades by politicians and newsmen are possible when the knowledge of AOL becomes generally available.

From a resin and monomer production viewpoint, the following steps should be taken to implement the recommendations of the Occupational Health Committee:

1. Portable equipment should be obtained to determine vinyl chloride concentrations in the range of 0-100 ppm in air. The presence of vinyl acetate, acetone, lauryl alcohol, isopropanol, hydrogen chloride, and other such materials that are common in our plant may interfere with the test and their presence should be considered in obtaining the analytical equipment.
2. The normal levels of vinyl chloride gas in work areas should be determined and monitored on a periodic basis. In areas where concentrations routinely exceed 50 ppm, specific action should be taken to reduce this concentration.

4.

3. Autoclaves and reactors in vinyl chloride resin service that are entered for cleaning on a routine basis should have clearly defined purging and ventilation procedures. A series of reactors that have been prepared for entry should be checked for vinyl chloride concentration. If the vinyl chloride concentration is below 50 ppm, then only monitoring spot checks should be performed on a regular basis. If the vinyl chloride concentration is not below the prescribed 50 ppm, then the preparation procedure should be revised and the testing resumed.

4. Autoclave cleaners and other workers who regularly have skin contact with autoclave slurry or latex should be required to wear nonporous gloves.

5. Employees in the vinyl resins areas should be informed concerning AOL, the potential hazard, the fact that the cause is unknown, and that every effort is being made to protect them. The measurements of vinyl chloride concentration are being made to ensure adequate ventilation and not to protect against vinyl chloride itself. The study which was made by the University of Michigan showed only one questionable case at 514 and three at 515.

These recommendations are intended to supplement a medical program that will be forthcoming and should not be considered the whole program for control of AOL.

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May 8, 1969

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UCC 100837