

March 15, 1971

H. L. WATSON, CALVERT CITY

ACROOSTEOLYSIS (AOL)

J. T. BARR, CALVERT CITY

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The Airco Chemicals and Plastics Division participated in the Manufacturing Chemists Association sponsored study at the University of Michigan Institute for Industrial Health which was designed to determine the extent and cause of acroosteolysis.

In early 1967, all employees at Calvert City and Belleville had hand X-rays submitted to the University of Michigan. This was done so that no particular attention would be drawn to any work classification or area as a possible health hazard. Since that time, all discussions concerning AOL have been kept on a quite limited and confidential basis for the same reason. At the present time, I believe that only Russ Lund, Dick Harvey and Mrs. Coleman know of the problem, outside of ourselves.

The results of this study were presented to the participating companies at a meeting in Washington in 1969, and also through a report dated February 1969, a copy of which I have. This same information without the detailed breakdown by company and plant has recently been published in a series of articles in the January issue of Archives of Environmental Health, Volume 22, Pages 61-91, 1971. This information is, therefore, available to the public.

In the report issued by the University of Michigan, our plant was assigned Code #5, with the Calvert City plant being given Plant Code L and Belleville Plant Code M. A total of 532 X-rays were submitted, 349 from Calvert City and 183 from Belleville. There was also a medical questionnaire which was designed to determine possible associated phenomena and past physical damage to the hands which might confuse the radiologist. From this group, we had three men at Calvert City who were reported in diagnostic category 3. This category included all of those persons whose questionnaire reported a minimal indication of Raynaud's phenomena, but whose X-rays were negative or sufficiently indistinct that the radiologists could not agree that there was a positive indication of AOL. One of these men is still with us working in Maintenance, and has never had any significant exposure to the PVC plant. There was one man at Belleville in category 3 also. He is no longer with the company.

We had one man in Calvert City, a Warehouse material handler, who was also placed in diagnostic category 4, which the University described as "possible AOL". Among the reasons for assigning this category are the absence of primary indicators of Raynaud's phenomena and AOL, but possible signs in the X-rays of an undetermined abnormality in the fingers. This man has been followed

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in his medical history by the plant nurse and recent discreet inquiry indicated no difficulty with the hands.

We were recently solicited by the University of Michigan to submit followup X-rays on these men, and we declined on the grounds that since there had been no association with PVC and no medical history of hand difficulties, we feared that singling out these men for repeat X-rays would do more harm than good. The University is continuing to follow up known cases discovered through this study, and is using unexpended funds from the original appropriation for this work.

We have made no significant changes in our plant operating procedures as the result of the findings of this study. The study demonstrated with almost irrefutable statistical argument that only those persons with rather prolonged history of work as reactor cleaners developed this syndrome, and that there appeared to be necessary in addition an individual tendency for susceptibility to this disease. The original University report gave considerable detail as to the frequency and methods of cleaning reactors by all of the participating companies, and our history is such that we offer considerably less exposure to the men involved than do many of the companies, and particularly to those companies which had a high reported incidence of the disease. Further, our work rotation here is such that it is improbable that any man would receive long-term exposure as an Area 6 utility man.

This problem has not been discussed openly at the Vinyl Chloride Safety Association meetings because not all companies participated, and those who did felt it unfair to share their knowledge with those who did not contribute to the original study. However, now that this is public knowledge, it may be that we can obtain fuller discussion at future meetings.

Our reactor cleaners are instructed and encouraged to use what is considered adequate protective clothing. This includes gloves, boots and similar equipment. It is admittedly difficult to be assured that they do wear all of the equipment all of the time, particularly gloves, because these are awkward and the men have a habit of removing them once inside the reactor. We do not scrape reactor walls in the homopolymer and 400 series nearly as frequently as do many manufacturers, particularly those who have steel equipment. The frequency of cleaning and the degree of hand labor employed in cleaning copolymer reactors is far below industry standard because of our boil-out procedure.

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It has been suggested that the complete elimination of hand cleaning is desirable to avoid possible occurrence of this disease. I do not believe that this will ever be completely obtainable even with the more advanced reactor cleaning methods, and there will always be occasions when persons must enter a reactor. I do agree fully, however, that we should minimize the exposure of any personnel within a reactor for a number of safety reasons. AOL is only one of these and, perhaps, of lesser importance than several others that could be named. We have discussed various methods of reducing this exposure over the past two years, but during the past year in particular have been stymied in our efforts to take any significant action in this direction. Now we learn that Escambia has gone from a high pressure system to a solvent cleaning system, and I suggest that we delay a few more months until we have had a chance to receive an evaluation of this new system and then install either high pressure or solvent cleaning. This recommendation is based as much on the probable improvement in productivity and quality as it is on safety considerations.

Some method of protecting ourselves against possible future claims would be desirable, and it appears that taking an X-ray of each new employee's hands might be the best way of accomplishing this. We do not really have any one available to us for reading these X-rays, and the best that can be said for them is that they would be historical evidence in case that a claim developed in the future. In view of the high number of category 3 subjects produced by the University of Michigan study in which supposedly expert radiologists disagreed in reading the X-rays may discredit the legal value of any X-rays taken now or later, and an expert could undoubtedly be found who would interpret them whichever way that might be desired by the client. However, there doesn't seem to be any better method other than subjecting everyone in the exposure area to a complete physical and X-ray at stated intervals, and this would certainly cause greater attention to the problem than would seem desirable.

In summary, I don't think we have a problem, and I don't think we want to stir up a problem, so I recommend that we proceed slowly using the best technical knowledge as it is developed to continue toward our goal of minimum exposure.

Our standard cleaning procedure for homopolymer and 400 series reactors consists of opening the manway and removing the bottom

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valve, rinsing thoroughly and ventilating the reactor until no further vinyl chloride can be detected, scraping the walls by a man with the safety cart at his disposal, and further mechanical removal of large buildups around the baffle as necessary. This normally occurs every 4 to 5 reactor charges on the average. In copolymer reactors the frequency ranges from 8 to 20 odd batches, depending on the condition of the glass in the reactor, with an average of perhaps 12 to 15 batches, and mechanical labor is reduced considerably by a boil-out procedure with sodium carbonate solution which flakes off much of the wall polymer before the man enters.

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