

Diamond Alkali Company

INTER-OFFICE CORRESPONDENCE

DATE
March 30, 1965

TO

Mr. J. S. Cort, Jr. - Cleveland

FROM

Mr. F. R. Kennedy - Newark

SUBJECT:

CHLORACNE - DOW MEETING

I am including a rough draft of notes taken at Midland last Wednesday. I made no attempt to develop these, as Ed's report has covered all phases thoroughly and accurately. As mentioned in my notes, the color slides of their patients are not similar to our local condition. Our cases usually start with a number of blackheads around the outer area of the eyes. We have not had any complaints of fatigue or listlessness.

As Ed has pointed out, this material seems to have strange properties. A high vapor pressure would account for bi-lateral infection; however, this does not agree with lab procedures of concentrating in benzene or chloroform solutions by removal of the solvent by distillation. Dow's attempts at air sampling were inconclusive due to problems in collecting representative samples. I believe they said they were trying again. They are setting up tests in their Bio Lab for exposure of rabbits to air samples.

I have suggested to Dr. Bleiberg to contact Dr. Holder of Dow for the exchange of medical information. Dr. Bleiberg feels he might obtain more helpful clues on a medical level.

The program is being developed at the Plant to establish curves for this material on our chromatograph for different concentration levels. Once this has been accomplished, we will check every product and waste stream throughout the entire "T" production areas. Wipe samples of equipment, valve handles, tools, etc., will be taken in these areas also. Due to the nature of the high pressure reaction, it might be necessary to call on Research's high pressure lab to investigate the suppression of the dioxin formation in the caustic fusion step. If this is the solution and a removal process is necessary, some of this work might possibly be accomplished at Newark.

Work has not started in the Lab as yet, as I feel an exhaust system should be installed to handle the effluent gases from the chromatograph to minimize exposure of the Technicians. This will be accomplished by a temporary exhaust blower borrowed from the Maintenance Department. We should be able to start toward the latter part of this week.

F. R. KENNEDY

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cc: Dr. E. L. Chandler

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MEETING HELD ON WEDNESDAY MORNING, MARCH 24, 1965
AT DOW'S BIO-CHEMICAL RESEARCH LABORATORIES, MIDLAND, MICHIGAN

Other visitors to the meeting included Mr. Dodds, who accompanied Dr. Frawley from Hercules Powder. Dr. Kelly from Monsanto did not attend, but had visited with Dow the previous week. The Dow people at the meeting were as follows: V. K. Rowe, Assistant Director - Bio-Chemical Research Lab; Dr. Holder, M.D., Physician responsible for treatment of patients; Dr. Sadek, Pathologist; K. Silverstein, Chemist; J. Peterson, Chemical Engineer handling statistics, and Howard (?), Chemist responsible for the development of the gas chromatograph method of analysis.

Dr. Holder opened the meeting with colored slides of Dow patients being treated as a result of exposure in 1963. The pictures showed a typical blackhead formation around the eyes and forehead. The eruptions pictured were much more intense than anything I personally have seen at our Plant.

V. K. Rowe had said they had 5 to 10 cases, but this statement was quickly corrected by Dr. Holder, to 70 to 75 cases. During a question and answer period, Dr. Holder described the presence of comedones and carbuncles across the shoulder blades, back and buttocks areas. Up until this point, I wondered if there were two separate types of chloracne we were discussing. He claims that 2-1/2 years out of the contact area is sufficient to clear a patient of symptoms. This does not seem possible, since 2-1/2 years have not elapsed. He claims to have noted fatigue as a symptom also.

Five of their more severe cases were submitted to extensive testing, which included open (?) liver biopsy; porphyrins; standard metabolic tests; kidney, thyroid, lung and heart functions. In all cases, all of these tests showed normal functioning of the organs involved. Skin biopsies taken did not show any abnormalities other than the characteristic increase in kerotins. They

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have not as yet ascertained whether exposure is through fumes or is systemic. They are reasonably positive that it is not caused by direct contact, as every case is bi-lateral.

Contrary to some of our feelings, they put little stock in natural immunity and experience no difference in skin types. Dr. Holder seems to be paralleling the treatment work done by Dr. Bleiberg, that of treating the symptoms by blackhead and comedone removal and the administration of vitamins, particularly Vitamin A.

The entire Dow group are completely convinced that the chloracne 2,3,6,8-dichloro-dibenzo-p-dioxin. This is the compound suggested by Cy Perkins in a report to Jack Borrer on June 27, 1960. There is an unsymmetrical isomer - 1,3,7,8 - this has some activity, but does not approach that of the symmetrical. In their studies, they looked for the dibenzene-furan, a known acneogen in naphthalene production. They did not find this compound, but had not eliminated its possibility. The dioxin solubility is less than 10 ppm in ethanol and about 400 ppm in benzene. Benzene was used to extract wipe samples in the Plant and as a carrier for their rabbit tests. One interesting note - the significantly short time of contact necessary that will cause chloracne. In one case, they washed off with dioxin 15 minutes after application. The rabbit's ear became affected in spite of continuous washings every one-half, up to 4 hours.

Dr. Sadek showed slides of cell structure which is in the skin of rabbit ears, with mild and severe cases of chloracne. Most of his presentation was beyond my comprehension. The rabbit sustained liver damage in almost all cases. This damage (necrosis?) occurred very close to the bile duct. Dr. Sadek stated that in cattle, hyper-kertosis correlated very closely with

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Vitamin A deficiency. The build-up of Vitamin A in the blood stream is a slow process. The amount of work done by the Bio-Chemical Section was thorough and extensive. Tests of a small dose of 20 ppm showed no response. 40 ppm developed a slight folliculitis in 11 days. A single dose of 100 ppm caused a severe reaction in 8 days. Dow uses a word scale of 6 terms, varying from "No Response" to "Very Severe", so that interpretation of results is confusing. On a multiple application of 1 ppm, a moderate response was detected after 9 applications, and a severe response after 11 applications. 25 applications each of 10, 20 and 100 ppb showed no effect.

As part of their program, they tested samples from all competitors and were kind enough to send the results of their findings personally to me at the Plant. Three of our T-acid samples produced in September of 1961 showed slight response after 13 days on the rabbits, and 2 of the samples showed 5 and 16 ppm analytically. Of two samples of trichlorophenate, one showed a slight to moderate response in 14 days, while the other showed no response in 26 days. Neither of these samples were analyzed by chromatograph. At this time, the origin of the phenate samples has not been determined.

White rats are not used for this type of skin test because they do not respond properly (?); do not develop chloracne (?).

V. K. Rowe stated that phenates as high as 20 ppm were found and T-acid as high as 10 ppm. This latter figure does not agree with the analytical results of 16 sent to me. When Dow was experiencing their problems in the Plant, they detected 20 ppm in their phenate. K. Silverstein spoke of cleaning up their plant area, tools, etc., with various solvents. Although benzene and acetone were good solvents for the material, they were impractical for plant use. He further stated that 1,1,1-trichloro-ethane worked

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From his presentation, I gathered that detection was the primary problem and that steps to eliminate its carry-over into the final product was well within the capabilities of all people involved. A small sample of the dioxin was given to each company attending the meeting.

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