

UNIROYAL
U.S. RUBBER

7/18

JEC
We need to have
a discussion on
the entire project.
JMP

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UNIROYAL, Inc.

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(Location)

May 28, 1969

Mr. J. M. Poynter
Painesville Plant

Enclosed is the report on the Manufacturing Chemists' Association meeting held May 6, 1969 in Washington, D.C. regarding the Epidemiologic Investigation conducted at the University of Michigan under special contract for PVC Resin Producers.

enc:

J. H. Wolfie
J. H. Wolfie, M.D.

cc: Mr. G. A. Anderson
Naugatuck Chemical Plant

INTERCOMPANY CORRESPONDENCE

UNIRO002194



MANUFACTURING CHEMISTS ASSOCIATION

1825 CONNECTICUT AVENUE, N. W. • WASHINGTON, D. C. 20009 • (202) 483-6128

Report of

Meeting - May 6, 1969

PVC Resin Producers Representatives
University of Michigan Epidemiologic Study
Washington, D. C.

This meeting under the auspices of the Association's Occupational Health Committee was held at the University Club. A list of representatives from sponsoring companies and the University of Michigan Institute of Industrial Health is attached.

Committee Chairman, Dr. C. U. Dernehl opened the meeting with a brief outline of the project program to date, the general objectives, a short discussion of the complexity of the problem, and interpretation of the findings. He then presented recommendations of the Occupation Health Committee (OHC) which had considered the report in a meeting April 30.

The Committee recommended the following changes in the "recommendations" which appear on page 104 of the report supplied to all producer representatives:

(a) RECOMMENDATION 1

Eliminate the last sentence "Where it is necessary for workers to enter the reactor tanks, sufficient ventilation should be provided to reduce the vinyl chloride concentration below 50 ppm." Insert in its place "Where it is necessary for workers to enter the reactor tanks adequate ventilation should be provided. Inasmuch as the etiologic agent of the disease is unknown, a level of vinyl chloride below 50 ppm should be used as an index of adequate ventilation."

(b) RECOMMENDATION 3

Change word "continued" to "supported"

The OHC also resolved to make additional recommendations to the vinyl chloride and PVC manufacturers:

- (a) There should be pre-assignment examinations of vinyl chloride and polyvinyl chloride production workers. These examinations should include:
 - I. Hand X-ray
 - II. History - including that of Raynaud's disease, scleroderma and abnormal cold response.
- (b) There should be periodic surveillance examinations. These examinations should be given at least once a year and should include:
 - I. Hand X-ray
 - II. History - as above

The committee recommended that manufacturers of PVC should sponsor further studies of the disease and its causes and that such studies be under the supervision of the OHC.

It was further recommended that the committee chairman write to Dr. Magnuson at the University of Michigan and congratulate him on the successful conclusion of the project and on the excellence of the report.

* * * * *

Drs. Magnuson and Dinman and Professor Cook of the Institute then reported at length on this study. They included a review and explanation of many of the charts contained in the report as distributed. Errors noted in several of the charts and figures were listed and it was subsequently agreed that an errata sheet taking care of all of these changes would be forwarded to all recipients of the original draft.

The afternoon meeting was devoted to open discussions of the findings by the Institute and the recommendations of both the Institute staff and the OHC. Some pertinent points brought out in the discussion were:

- 1. On the matter of hand cleaning in the recommendations, the Committee considered this point and had the general understanding that it was the intent to get away from hand cleaning of reactors.

2. On questions regarding catalysts by groups vs. cases, Prof. Cook reported that they did not find any combination of materials causing difficulty.
3. There was a further discussion of the threshold limits and the recommendations regarding monomer limits, particularly in connection with monomer plants. Here it was made clear that there is a condition of acroosteolysis (AOL) related to poly manufacture of PVC which the evidence suggests at this time. There was no evidence that this is related to monomer content that remained in the poly reaction. It is difficult to say that any one item is responsible although admittedly the monomer may be the causative agent, or this may not be so.
4. For future protection of the workers it was suggested that they be kept from coming in contact with the reactor chemicals a short time after the reaction is completed.
5. At this time there appears to be no evidence of AOL prevalent in operations subsequent to the reactor stage.
6. AOL is a destruction of tufts of the fingers. This may be a general systemic disease in some people.
7. Several pointed out that the suggested monomer level of 50 ppm recommended by the Committee may be misunderstood. This was explained by the chairman.

* * * * *

A paper on this study was presented by Dr. Dinman in a medical association meeting during the latter part of April. A second paper will be presented in the coming meeting of the Industrial Hygiene Association in Colorado. Following a discussion on the publication of the report a motion was made,

that the University of Michigan be permitted to publish the scientific facts developed from this study but that the complete document now available to the OHC and the sponsoring companies not be

released but held confidential for the sponsors only.

On being duly seconded this was passed unanimously. At this point the secretary stated that it was the general policy of the Association to make the results of such research freely available and that the details of the contract with the Institute would be followed in this respect.

The meeting was then concerned with further studies that might be desirable. Dr. Magnuson pointed out that patients having AOL may have bones other than the fingers involved and posed a number of questions regarding systemic manifestation. He stressed the need for continued and a more thorough follow up on X-rays, clinical history and the study of the cumulative action through X-rays.

He also recommended further etiology study:

- (a) To obtain a clear definition of products in the kettle including time of flight by mass spectrometer ($t_1 - t_n$). Also, on animal experiments better characterization is needed.
- (b) On this it was pointed out that current data may give additional leads.

Chairman Dernehl then proposed that the question of future work be referred back to the OHC for recommendations on what should be done. It was also suggested that the Committee issue guidelines or instructions for the taking of history, physical examinations involved and frequency of follow-up on surveillance. During this part of the discussion it was pointed out that the recommendation regarding x-rays had already been made to the companies in the questionnaire form which is included in the subject report.

F. H. Carman
F. H. Carman

FHC:er
Enclosure

May 15, 1969

ATTENDANCE - MAY 6, 1969

Producer Representatives

Laurence H. Ballou
John T. Barr
Edwin T. Biehl

Harold E. Birr

Frank A. Cox
C. U. Dernehl, M.D.
E. M. Dixon
John E. Ertel
J. A. Fehrenbach

Albert W. Fuhrman

M. G. Glenn
N. V. Hendricks
George W. Ingle
M. N. Johnson, M.D.
Robert W. Laundrie

Sydney Lipton
William E. McCormick
John L. Nelson
Cal Rehfuss
Howard E. Runion
Harry A. Russell
Arthur C. Siegel
William J. Wetzel
R. N. Wheeler, Jr.
J. H. Wolfsie, M.D.

Firestone Tire and Rubber Co.
Airco Chemicals & Plastics
The Pantasote Co. (Mgr. Resin
Operations)

Diamond Shamrock Corporation
(Mgr. Delaware City Plant)
Goodyear Tire & Rubber Co.
Union Carbide Corporation
Celanese Corporation
The Pantasote Co. (V.P. Production)
Shawinigan Chemicals Div.
Gulf Oil Canada

Great American Plastics,
Chemical Division
General Tire & Rubber Co.
Standard Oil Company (N. J.)
Monsanto Company
Monsanto Company
General Tire & Rubber Co.
Chemical Division

Esso Research & Engineering Co.
B. F. Goodrich Company
B. F. Goodrich Chemical Company
Allied Chemical Corporation
Gulf Oil Corporation
The Pantasote Co. (Exec. V.P.)
Tenneco Plastics Division
RUCO Div., Hooker Chemical Corp.
Union Carbide Corporation
Uniroyal, Inc.

University of Michigan

Professor W. D. Cook
Bertram D. Dinman, M.D.
Harold J. Magnuson, M.D.

Manufacturing Chemists Association

George E. Best, Technical Director
F. H. Carman

J. M. POYNTER

TELEPHONE HUDSON 3-6126

Manufacturing Chemists' Association, Inc.

(FOUNDED 1874)

1825 CONNECTICUT AVENUE, N. W.
WASHINGTON, D. C. 20009

RECEIVED

SEP 20 1966

E. S. EBERS

September 19, 1966

TO: PVC Resin Producers

For Earle S. Ebers

A meeting will be held on October 6 in Cleveland, Ohio, for the purpose of discussing a medical matter with appropriate representatives of management and medical staffs of producers of polyvinyl chloride resin. This will convene at 9 a.m. at the Cleveland Engineering Society, 3100 Chester Avenue.

In the September 13 meeting of the Executive Committee of the Manufacturing Chemists' Association, Mr. Harry B. Warner, Vice President of The B. F. Goodrich Company, described an interesting medical development of which they have become aware in some of their PVC manufacturing plants. The matter has been discussed with companies here and abroad, and it has been established that at least seven of them have had a similar experience. They have reason to believe that the medical condition, which may affect the hands of some, is related to PVC manufacture, but they do not know the specific cause. It was suggested that a meeting be arranged for all PVC producers to permit discussion of their observations.

This meeting is being arranged under the auspices of the Association's Medical Advisory Committee. We hope representatives of both your medical staff and top management closely concerned with PVC operations will attend. It is anticipated the discussion will continue through luncheon. A block of rooms has been set aside by the Sahara Inn located on Euclid Avenue at 32nd Street in Cleveland, a short walk from the Engineering Society building. It is suggested you make reservations directly with the hotel at your earliest convenience, stating that this is for a meeting arranged by the B. F. Goodrich Chemical Company.

Please complete and return the attached Reply Slip concerning your company's plans to participate in this important meeting. Also attached is a list of producers invited to participate.

F. H. Carman
F. H. Carman

FHC/bk
Enclosures (2)

UNIRO002200

R E P L Y S L I P

RETURN TO: F. H. Carman
Technical Director
~~Manufacturing Chemists' Association, Inc.~~
1825 Connecticut Avenue, N. W.
Washington, D. C. 20009

The following representing our top management and medical staffs will attend the meeting of PVC producers in Cleveland, Ohio, October 6.

<u>Name</u>	<u>Title</u>
<u>Mr. J. M. Poynter</u>	<u>Factory Manager, Painesville Plant</u> <u>Chemical Division</u>
<u>Dr. J. H. Wolfsie</u>	<u>Corporate Medical Director,</u> <u>Industrial Relations Dept.</u>

By

Company United States Rubber Company
Chemical Division
Date September 28, 1966

UNIROYAL, Inc.
Oxford Management
and Research Center

(Location)

TO: B. R. Leach
Painesville

FROM: W. D. Harris
Industrial Toxicologist

DATE: October 5, 1971

SUBJECT: Viola Report on VCM Toxicology

The report which you sent is an abbreviated summary of the paper which we have in our files. Because of the extensive use of medical terms and the numerous slides which did not reproduce well on the Xerox, I am not sending it unless you really want it.

I feel that it is probably necessary for the industry to run a dosage series to determine whether levels in the range of practical working conditions have any effect. A careful epidemiological study of workers exposed for 15 years or more should also be carried out.

Oncogenic response is typically not a straight line function when plotted against concentration. It is more nearly a logarithmic response. Thus one cannot say from present data that there would be no response at 1000 or 100 ppm. Frequency of response would certainly diminish, and time for development of symptoms would increase but there is no way to predict at what concentration (if any) and time the problem would disappear. Unfortunately, once the specter is raised, it is almost impossible to get enough data to remove all shadow of doubt. However, to make no attempt to develop better information would be inexcusable. A coordinated industry approach is essential.



W. D. Harris, Ph.D.
Industrial Toxicologist

WDH:ues

ccs: C. B. Westerhof
J. R. Little
D. E. Dudrow
L. F. Dieringer

INTERCOMPANY CORRESPONDENCE

UNIRO002202

September 27, 1971
cc: GAA - Naug.

Dr. W. D. Harris
Oxford

Laboratory Study of VCM Toxicology

I am enclosing a copy of the information on VCM toxicology which was sent to me by Bill Reiter of Allied Chemical as he promised. I will be most interested in whether the information which Dr. Wolfsie obtained is different from the attached. When you have made an assessment of the next step in evaluating this particular effect I would like to be informed.

B. R. Leach

BRL:nak
cc: NAM
Enc.

UNIRO002203

Plastics Division

ALLIED CHEMICAL CORPORATION

786 Hardy Road, Painesville, Ohio 44077

(216) 352-624

September 23, 1971

RECEIVED BY BRL

SEP 27 '71

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Mr. Benjamin Leach
Plant Manager
Uniroyal Inc.
720 Fairport Nursery Road
Painesville, Ohio 44077

Dear Ben:

Attached herewith is the documentation on VCM toxicology we discussed on September 21.

Sincerely yours

Bill Reiter
Bill Reiter

WMR:c1

Attach.

UNIRO002204

CANCEROGENIC EFFECT OF VINYL CHLORIDE

P. L. Viola

(Regina Elena Institute for Cancer Research)
Rome, Italy

Presented at the Tenth International Cancer Congress
Houston, Texas May 22-29, 1970

The demonstration of oncogenic activity of some chemical organic compounds employed for the preparation of "plastics" has been widely investigated and the limits and the effectiveness of their oncogenic power have been well defined. The present investigation demonstrates that it is possible to obtain for some experimental models a marked carcinogenic response to a monomeric precursor, i.e. vinyl chloride, of plastic polymers which follows a peculiar pattern for different tissues and organs of the rat.

Twenty-six Wistar (AR/IRE) male albino rats, of the average weight of 150 gr. were exposed to vapours of vinyl chloride 4 hours a day for 5 days a week during 12 months. The animals were kept in a plastic, air-tight container through which there was a constant flow of air containing 3% in weight equal to 30,000 p.p.m., of vinyl chloride. At the end of treatment the surviving animals were killed at twenty-day intervals, and the most important tissues and organs were histologically examined by conventional methods. Twenty-five rats of the same strain were kept aside as a control. During the period of exposure the animals were slightly soporific, but the first few months of treatment were well tolerated and the rats showed no change in body growth or behavior and no organic alterations visible macroscopically or by radiological means. 65% of the animals developed tumors of the skin and 26% of these showed tumors of the respiratory tract exclusively localized in the lungs. Very few animals developed tumors in the bone and in this case the tumors were localized in the metaphysical region of the femurs, and it is worthy to mention that the femurs of both posterior limbs showed the carcinogenic transformation.

Tumors of the skin

The skin transformation which developed more frequently in the para-aural region, has been the epidermoid carcinoma, but we have seen also papillomas and rarely mucoepidermoid carcinomas.

Cancerogenic Effect of Vinyl Chloride

P. L. Viola

Tumors of the respiratory tract

Even if as far as the percentage is concerned these occur in a smaller number, their morphologic appearance is mainly of an adenocarcinoma; only in one rat it has been observed a tumor of the epidermoid type. Sometimes the tumor showed an early developmental stage and consisted predominantly of cubic or columnar cells arranged as regular or irregular tubular and papillary elements supported by poorly developed fibrous stroma.

Tumors of the bones

In the metaphysical region of the four limbs a large proliferation of cartilaginous tissue arises outwardly to the periosteum and seems to derive directly out of the osseous cortical by the growth of its cells. The cartilaginous growth is dishomogeneous as it is shown by the extension of finger-like prolongations into the boundary of neoformed tissue. Beside the chondroblastic, chondrocytic and angiomatous areas, manifestation of noticeable growth power, there are cartilaginous zones with regressive features, as fibrosis and hyalinosis.

The results reported above indicated that vinyl chloride is an effective carcinogenic agent for the rat. As for many carcinogenesis studies, where multiple tumors arise at different sites, in different tissues and organs, the data obtained need to be evaluated considering a more prompt positive response according to the ideal concentration of the carcinogenic. It is noteworthy to emphasize that the cutaneous system represents an impressive pattern of susceptibility to the vinyl chloride. Another point to be considered is that all the cutaneous tumors developed in the same site, i.e., the region including the area in which submaxillary and parotid gland are located.

No implications to human pathology can be extrapolated from the experimental model reported in this paper.



Manufacturing Chemists' Association, Inc.

(FOUNDED 1872)

1825 CONNECTICUT AVENUE, N. W.
WASHINGTON, D. C. 20009

Meeting - October 6, 1966
PVC Resin Producers and
Occupational Health Committee
Cleveland Engineering Society
Cleveland, Ohio

CIRCULATION	
GEB	RWS
JTH	JIS
RWK	RAT
RAP	HGW
DER	LAW
HAS	CBW
JMS	
RETURN TO	
FILE	

PRESENT:

PVC Resin Producers

Allied Chemical Corporation	Dr. G. B. Linden, Dir. of Operations
	B. A. Hallam, Mgr. of Safety, Plastics Div.
*Atlantic Tubing & Rubber Co.	Dan Carberry, Asst. Mgr., Chemicals Div.
	Glenn D. Smith, Ex. Dir. of Engineering
Borden Chemical Company	Nathan Blackman, Tech. Supt., PVC. Dept.
Cumberland Chemical Corp.	Dr. P. W. Townsend, Asst. to Group V. P.
	J. A. Bourque, Jr., Asst. Dir., Safety Dept.
Diamond Alkali Company	J. R. Dogenfelder, Production Mgr.
Dow Chemical Company	Dr. H. L. Gordon, Corporate Med. Dir.
	Earl R. Smith, Mgr., PVC Mfg. Facilities
Ethyl Corporation	Dr. Sidney Lerner, Med. Dir. (?)
Firestone Plastics Company	C. J. Kleinert, Prod. & Tech. Mgr., Chem. Div.
General Tire & Rubber Co.	Phillip R. Sayre, Tech. Mgr., Strd. Products
	George Burkhardt, Corporate Safety Dir.
B. F. Goodrich Chemical Co.	Thomas B. Nantz, President
	A. Vittone, V. P., Mfg. Mgr.
B. F. Goodrich Company	Harry B. Warner, Group V. P.
	Wade Miller, V. P.
	Dr. Rex H. Wilson, Med. Dir.
	William McCormick, Toxicologist, Med. Dept.
Goodyear Tire & Rubber Co.	F. A. Cox, Mgr., Niagara Falls Plant
	Dr. C. A. Johnson, Med. Dir.
*Great Amer. Chemical Corp.	Albert W. Fuhrman, V. P., Chemical Div.
Hooker Chemical Corp.	Jerome Wilkenfeld, Mgr., Environmental Health
Pantasote Company	John E. Ertel, V. P., Production
Shawinigan Chemicals Ltd.	Dr. R. H. Stevenson, Medical Officer
	M. G. Lemire, Process Supervisor
Stauffer Chemical Company	Don Hunter, Tech. Service Mgr., Polymers
Tenneco Manufacturing Co.	Elwood W. Phares, Ex. V. P.
	Robert R. Bouffard, Mgr., Div. Quality Control
*Thompson-Apex Company	Gordon F. Ferguson, V. P., Carlon Products
	Div., Cont. Oil Co.
	H. Malin
Union Carbide Corporation	Dr. C. U. Dernehl, Assoc. Med. Dir.
	R. N. Wheeler, Jr., Production Mgr.
U. S. Rubber Company	C. B. Westerhoff, Tech. Supt.
	Dr. J. H. Wolfsie, Corp. Med. Dir., Industrial
	Relations Dept.

*non-member company

UNIRO002207

Occupational Health Committee

W. L. Sutton, M.D. (Chairman), Eastman Kodak Company
C. U. Dernehl, M.D., Union Carbide Corporation (also listed above)
E. M. Dixon, M.D., Celanese Corporation
L. C. Haslam, M.D., Canadian Industries Limited
Gordon J. Stopps, M.D., E. I. du Pont de Nemours & Company
J. H. Wolfsie, M.D., United States Rubber Company (also listed above)

MCA Staff

F. H. Carman, Technical Director
F. G. Stephenson, Secretary, Occupational Health Committee

* * * * *

The discussion was opened by Dr. W. L. Sutton, Chairman of the Occupational Health Committee, giving a brief explanation of the reason for the meeting and plans for the morning session. F. H. Carman, Technical Director, briefly covered the MCA General Principles Applicable to the Structure and Operations of Committees and the conduct of such meetings when concerned with single-class products, such as polyvinyl chloride resins (PVC).

Following introductions, Chairman Sutton invited Dr. Rex H. Wilson, Medical Director, The B. F. Goodrich Company, to report on the hand condition of some workers in PVC manufacture and the investigations of the problem within that organization. This included some X-ray slides of hands of workers in certain PVC manufacturing operations.

Dr. Wilson then introduced William McCormick, toxicologist in the medical department of The B. F. Goodrich Company, who gave a history of the symptoms and discussed steps taken to obtain further information on the cause, possible hazards in manufacturing operations, and their intensive investigation, including diagnosis of hand ailments by X-ray examinations.

Various questions were raised during the discussion period, which included a free exchange of ideas as to the incidents of this occurrence in manufacture and steps that may be appropriate for further investigation and elimination of any hazard. It was also stressed that expert examination of X-rays was the only real clue to the existence of the disease in the hands of workers which to date appears to be found mainly among "poly-cleaners" (persons engaged in internal cleaning of PVC polymerization vessels or autoclaves). Experts on The B. F. Goodrich Company staff are prepared to assist other PVC manufacturers by reading and reporting on X-rays that may be submitted. Chairman Sutton expressed appreciation for this offer of assistance, and in closing the meeting stated that the Occupational Health Committee would consider steps that might be possible on behalf of the industry in their meeting which was to follow that afternoon.

Subsequently, the Occupational Health Committee, following a full discussion of this medical problem, recommended certain steps to the Executive Committee of the Association as contained in the attached resolution dated October 7, 1966. The above-mentioned resolution was reported to the Executive Committee in its regular meeting October 11, 1966; and the problem was briefly discussed by Harry B. Warner, Vice President of the B. F. Goodrich Company. On his recommendation, the Executive Committee unanimously voted that the Occupational Health Committee should proceed with development of the program as set forth in parts 1, 2, and 3, of the resolution, including the procedures outlined in the explanatory paragraphs for these several items.

It is hoped this program can be developed in specific terms, including financial arrangement, and that these be reported to the Executive Committee in its meeting November 21 if possible.

F. H. Carman
F. H. Carman
Technical Director

FHC/bk

Attachment

October 13, 1966

RECEIVED
OCT 17 1966

ATTACHMENT A

TELEPHONE HUDSON 3-6126

Manufacturing Chemists' Association, Inc.

(FOUNDED 1872)

1825 CONNECTICUT AVENUE, N. W.
WASHINGTON, D. C. 20009

October 7, 1966

TO: MCA Executive Committee

FROM: Occupational Health Committee

SUBJECT: PVC Resin Manufacturing Health Hazard

On October 6, 1966, the Occupational Health Committee met with various manufacturers of polyvinyl chloride and discussed evidence made available by a member company indicating a possible occupational health problem associated with a step in the manufacture of polyvinyl chloride resins. While the evidence presented is highly correlated with a specific step in the manufacture of these resins, there is need for confirmation of this by other manufacturers.

Although the exact cause has not been determined and the proportion of exposed persons affected does not appear to be high, the nature of the effects are such that the Committee has concluded that the problem requires vigorous and wide investigation. The Committee finds that the condition may not be recognized unless special medical surveys are carried out. The clinical manifestations are such as to suggest the possibility of a disabling disease as a later development. Although there is no evidence to suggest that there is a risk associated with the use or handling of the finished polyvinyl chloride resin, it is of importance to the industry that this be documented and confirmed by studies of exposed groups within member companies.

Therefore, the Occupational Health Committee recommends to the Executive Committee that a program incorporating the following be undertaken promptly:

- (1) In-plant medical studies;
- (2) Industry-sponsored toxicological research;
- (3) MCA-sponsored symposium

In-Plant Medical Studies

Medical surveys similar to those carried out by one member company need to be extended to other manufacturers. The employee

UNIRO002210

groups to be studied should include persons engaged in (a) the manufacture of vinyl chloride monomer, (b) the manufacture of polyvinyl chloride resins, and (c) the fabrication of polyvinyl chloride consumer products within member companies producing these products.

Uniform medical observations are necessary so that the data may be combined and compared. In essence, the survey will include a brief medical history of the employee, and examinations and X-rays of the hands. The Committee will provide participating companies with detailed recommendations.

Industry-Sponsored Toxicological Research

The Committee concludes that a cooperatively sponsored toxicological research program should be initiated in order to determine the cause, mechanism of action, and preventive measures necessary. This research program and the in-plant study program should operate concurrently.

The Committee recommends that it be authorized to both contact a competent institution of its selection to establish this program and to maintain supervision of same. It is estimated that at least \$100,000 will be necessary.

MCA-Sponsored Symposium

Up to the present, full knowledge of this condition has been limited to three companies in the United States. It is not anticipated that this situation will continue in light of the wider dissemination resulting from the MCA-sponsored meeting of October 6 and the proposed program of investigation. Therefore, it is the conclusion of the Committee that precise information must be made available to the scientific community, and it is proposed that an MCA-sponsored symposium under the auspices of the Occupational Health Committee be held during the summer of 1967.

FGS:cm

UNIRO002211

Tentative List of Attendees
of Meeting October 6, 1966
PVC Resin Producers
Cleveland Engineering Society
Cleveland, Ohio

<u>Company</u>	<u>Attendees</u>	<u>Titles</u>
Allied Chemical Corp.	Dr. R. D. Williams	Vice President and Gen. Mgr., Plastics & Resins
American Chemical Corp.	(NON-MEMBER - NO RESPONSE)	
Atlantic Tubing & Rubber Co.	Dan Carberry Glenn D. Smith	Asst. Div. Mgr.-Chemicals Ex. Dir. of Engineering
Borden Chemical Co.	Nathan Blackman	Tech. Superintendent, PVC Dept.
Cumberland Chemical Corp.	Dr. P. W. Townsend J. A. Bourque, Jr.	Asst. to Group V. P. Asst. Dir., Safety Dept.
Diamond Alkali Company	Dr. Richard W. McBurney L. E. Ice	Medical Director Plant Manager
Dow Chemical Company	Dr. H. L. Gordon Earl R. Smith	Corporate Medical Director Mgr., PVC Mfg. Facilities
Escambia Chemical Corp.	(no representative will participate)	
Ethyl Corporation	Dr. George Roush	Medical Director
Firestone Plastics Co.	C. J. Kleinert	Production & Tech. Mgr., Chemicals Div.
General Tire & Rubber Co.	Phillip R. Sayre George Burkhardt	Tech. Mgr.-Standard Products Corporate Safety Director
B. F. Goodrich Chemical Co.	Thomas B. Nantz A. Vittone	President Vice President, Manufacturing
B. F. Goodrich Company	Wade Miller Dr. Rex Wilson William McCormick	Vice President Medical Director Toxicologist-Medical Dept.

<u>Company</u>	<u>Attendees</u>	<u>Titles</u>
Goodyear Tire & Rubber Co.	F. A. Cox Dr. C. A. Johnson	Manager, Niagara Falls Plant Medical Director
Great American Chemical Corp.	Albert W. Fuhrman	V. P. - Chemical Div.
Hooker Chemical Corp.	Jerome Wilkenfeld	Head, Water Pollution Abatement Dept.
Keysor Chemical Co.	(NON-MEMBER - NO RESPONSE)	
Monsanto Company	Maurice N. Johnson, M.D.	Asst. Dir., Med. Dept.
Pantasote Company	John E. Ertel	Vice President, Production
Shawinigan Chemicals Ltd.	Dr. R. H. Stevenson	Medical Officer
Stauffer Chemical Co.	H. R. Jepson Don Hunter	Plant Manager - PVC Tech. Serv. Mgr.-Polymers
Tenneco Manufacturing Co.	Elwood W. Phares Robert R. Bouffard	Executive V. P. Division Quality Control Manager
Thompson Chemical Co.		
Union Carbide Corp.	Dr. C. U. Dernehl R. N. Wheeler, Jr.	Assoc. Med. Dir. Production Manager
U. S. Rubber Company	C. B. Westerhoff Dr. J. H. Wolfsie	Tech. Superintendent Corp. Med. Dir. - Industrial Relations Dept.

Occupational Health Committee (indicated attendance)

W. L. Sutton, M.D., (Chairman), Eastman Kodak Company
 C. U. Dernehl, M. D., Union Carbide Corporation (also listed above)
 E. M. Dixon, M. D., Celanese Corporation
 L. C. Haslam, M. D., Canadian Industries Limited
 Gordon J. Stopps, M. D., E. I. du Pont de Nemours & Company
 J. H. Wolfsie, M. D., United States Rubber Company (also listed above)
 M. R. Clapp (Board Liaison), The Lubrizol Corporation

MCA Staff

F. H. Carman *Tech. Dir. MCA*
 F. G. Stephenson

Manufacturing Chemists' Association, Inc.

(FOUNDED 1872)

1825 CONNECTICUT AVENUE, N. W.
WASHINGTON, D. C. 20009

F. H. CARMAN
TECHNICAL DIRECTOR

January 4, 1967

TO: PVC Resin Producers
For *Mr. J. N. Wolfson (N.Y.C.)*
Mr. E. B. Wentzloff (Painesville, O.)

We are writing you to outline plans for a cooperative study of an occupational health hazard in polyvinyl chloride manufacturing, to solicit response on participation in an epidemiological study to be conducted by the University of Michigan's Institute of Industrial Health under the auspices of the Association's Occupational Health Committee, and to advise of a meeting of all interested participants on January 24, 1967.

* In the attached you will find a discussion of the background of the problem, the proposed epidemiological study, the cost and conduct of the study, and a reply form regarding the January 24 meeting.

It is desirable that participating companies send individuals who will be responsible for the medical portion of the study since clinical information will be discussed. Also, detailed planning would be facilitated if company representatives familiar with the processes could attend. In the case of those companies planning to be represented in the meeting but wishing to withhold decision about participation until that time, it is highly desirable that their representatives be able to indicate at the conclusion whether or not the company will participate.

In the reply form certain information is desired to refine the cost estimates for the study (and to complete the research contract) and for maximum planning efficiency at the meeting later this month. Please return this reply form and also advise me on the appropriate assessment classification for your company (page 3 of attachment). Any questions about the study and the plans may be directed to the writer or to Dr. William L. Sutton, Chairman, Occupational Health Committee (Assistant Medical Director, Eastman Kodak Company, Rochester, New York - Area Code 716, telephone 325-2000, ext. 2868).

The meeting will be held in the Institute of Industrial Health, University of Michigan, Ann Arbor, Michigan, beginning at 9:30 a.m. A block of rooms has been set aside at the Michigan

UNIRO002214

Union, 530 South State Street, Ann Arbor, Michigan 48104, for the evening of January 23. Those requiring sleeping rooms are requested to write the Michigan Union direct identifying themselves with the meeting arranged by Dr. Magnuson of the Institute.

Sincerely,



F. H. Carman

FHC/bk

* Enclosures

Background

Polyvinyl chloride (PVC) resin producers were invited to a meeting October 6 in Cleveland which was held under the auspices of the MCA's Occupational Health Committee to discuss an occupational health problem that had been recognized by a segment of the industry. This established that:

- (1) There is a distinctive condition that has been associated primarily with specific operations;
- (2) The condition had not been recognized by many producers, but could be present without being noticed since appropriate examinations had not been done;
- (3) There was inadequate information about the presence or absence of the condition among those exposed only to fabrication operations with the finished resin; and
- (4) The cause of the condition is unknown.

As a result, the Occupational Health Committee advised a three-point program which included as the first order of business an epidemiological study to determine the extent of the problem in other segments of the industry and to obtain information which might identify the possible cause.

The Epidemiological Study

In conjunction with the Occupational Health Committee, the Institute of Industrial Health of the University of Michigan has developed an epidemiological plan and the MCA Executive Committee has authorized the Committee to proceed with the project. In broad outline, it will be conducted as follows:

- (1) Populations to be studied will be drawn from member *& non-member* company PVC manufacturers and will consist of two main groups:
 - (a) persons working in PVC resin production and,
 - (b) persons engaged in fabrication of PVC articles (exposed to finished resins only);
- (2) The participating companies will obtain hand x-rays and completion of a self-administered health and vocational questionnaire;

- (3) The x-rays and questionnaires will be sent to the :
Institute of Industrial Health for interpretation
and tabulation;
- (4) A team of physicians and industrial hygienists from
the Institute will visit the participating plants to
observe the operations, especially polymerization and
polycleaning, and will receive confidential information
on the processes and chemistry; this is essential to
achieve the objectives of the study. The presence or
absence of abnormalities will be correlated with process
information in order to identify possible causes and deter-
mine whether or not there is a risk from exposure to the
finished resin. Safeguards will be developed to insure
that no results are identified with any company, and that
no confidential process information is divulged to other
participants;
- (5) Hand x-rays on an adult population of a small Michigan com-
munity (approximately 4,000 persons) will be studied as a
control population.

It is hoped that this study can be completed and reported to the Occupational Health Committee and participating companies by June, 1967. The Committee tentatively plans to arrange an open scientific meeting in the summer of 1967, at which time the report of the study and reports by others who have studied this problem can be presented in an open meeting and, therefore, be made available to the occupational health profession. It is to be emphasized that neither the clinical information nor the confidential process information nor correlations between the two will be associated with specific industries or plants. The plants and participating companies will be identified only by code letters known only to the Institute of Industrial Health.

Conduct of Study and Cost

The University of Michigan's Institute of Industrial Health has prepared a rough estimate of the cost of the study based on the plan outlined above plus the assumption that there will be approximately twenty participating companies with 35 participating plants, and a total study population of some 20,000 individuals. The cost is estimated at \$75,000. This will cover the following services by the Institute:

- (1) Planning and designing the study;
- (2) Conduct of a planning and instruction meeting for participating company representatives;

- (3) Interpretation of hand x-rays submitted by participating companies (two independent radiologists);
- (4) Design, preparation, printing, tabulation and analysis of the health and vocational questionnaires;
- (5) Inspection of participating plants by a team of physicians and industrial hygienists;
- (6) Analysis and correlation of the data; and
- (7) Report of the study.

The participating companies will be responsible for identifying the exposed populations in their plants, obtaining hand x-rays and sending them to the University of Michigan along with identifying data, obtaining completed self-questionnaires from the individuals in their exposed population study group, assigning contacts to work with the Institute study personnel, and arranging with the Institute for the plant visits and for assisting the study team therein.

It is difficult to estimate the cost to a participating company. A suggested schedule of capacity classifications for suspension resin and fees that would seem appropriate is shown in the following as a probable maximum and minimum required in each group:

	<u>Plan 1</u>	<u>Plan 2</u>
Over 200 million lbs./yr.	\$10,500 each	\$8,850
100-200 million lbs./yr.	6,300	5,300
50-99 million lbs./yr.	3,200	2,650
Under 50 million lbs./yr.	2,100	1,750

Under Plan 2 we are assuming participation by 21 resin producers with estimates based on published information of probable resin capacity, while Plan 1 is based on 18 participating. It is suggested that each participating company select the appropriate classification in arriving at the probable assessment required to make up the total for the Michigan project. In a confidential letter, will you please advise F. H. Carman in the Washington office of the classification that would be applicable in your case, and this will be used in arriving at final assessments required to fund this program.

The additional direct cost will be least for those companies and plant locations where there is an in-plant medical service with radiographic facilities, in which case the time away from work will be short and there may not be a direct cost for radiographic interpretation. In some cases there may be a sizable number of the population to be studied who have had recent hand x-rays, in which case the cost will be further reduced. In those plant situations where there are no in-plant radiographic services and where the exposed individuals must be sent to local radiologists for hand x-rays, the direct cost of the x-rays and the time away from the job will be higher. In some locations it is estimated that the charges for radiographic examination of the hand may be as high as \$10 per individual.

R E P L Y F O R M

RETURN TO: F. H. Carman
Technical Director
Manufacturing Chemists' Association, Inc.
1825 Connecticut Avenue, N. W.
Washington, D. C. 20009

- (1) In addition to specific information requested (items 2, 3, and 4), the following will attend the meeting of PVC Resin Producers on January 24, 1967, in Ann Arbor, Michigan:

<u>Name</u>	<u>Title</u>	<u>Location</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

- (2) Company contact with whom the Institute of Industrial Health will work:

<u>Name</u>	<u>Title</u>	<u>Location</u>
-------------	--------------	-----------------

- (3) Approximate number of employees to be studied (population) in:

(a) Polyvinyl chloride resin production _____

(b) Polyvinyl chloride product
fabrication _____

- (4) Number of plant locations _____

By _____

Company _____

Date _____

✓ = participation

MANUFACTURING CHEMISTS ASSOCIATION

Meeting

University of Michigan

January 24, 1967

Attendance List

AIR REDUCTION CO., INC.

✓ Dr. Palmer W. Townsend
Asst. to Group Vice President
Belleville, N. J.

J. A. Bourque, Jr.
Asst. Safety Director
New York City

ALLIED CHEMICAL CORPORATION

William M. Reiter
Asst. Works Manager
Painesville, Ohio

Elmer V. Demeter, M.D.
Painesville, Ohio

ATLANTIC TUBING & RUBBER CO.

✓ Glenn P. Smith
Executive Director of Engineering
Cranston, R. I.

BORDEN CHEMICAL COMPANY

✓ Nathan Blackman
Technical Superintendent
PVC Department
Leominster, Mass.

THE DOW CHEMICAL COMPANY

✓ Dr. H. L. Gordon
Corporate Medical Director
607 Bldg. (Midland)

Earl R. Smith
Manager PVC Production
564 Bldg. (Midland)

Mr. Pancratz
Production Superintendent

EASTMAN KODAK COMPANY

W. L. Sutton, M. D.
Chairman, MCA Occupational
Health Committee

ESSO CHEMICAL COMPANY, INC.

✓ Dr. Robert E. Eckardt
Director, Medical Research Section
Esso Research & Eng. Co.
Linden, N. J.

Dr. N. J. Roberts
Associate Medical Director
Standard Oil Co. (N.J.)
New York City

J. F. Haring
General Manager, Project
Administration Div.
Esso Chemical Co.
New York City

J. H. Johnson
Industrial Hygiene
Imperial Oil Ltd.
Toronto, Canada

FIRESTONE TIRE & RUBBER COMPANY

✓ Laurence H. Ballou, M.D.
Medical Director
Firestone T&R (Akron)

George L. Wilson
Industrial Hygienist
Firestone T&R (Akron)

R. E. Noble
Product Engineer
Firestone T&R (Pottstown, Pa.)

B. F. GOODRICH CHEMICAL CO.

✓ John L. Nelson
Gen. Production Mgr.
B. F. Goodrich Chemical Co.
Cleveland, Ohio

William E. McCormick
Mgr. Industrial Hygiene &
Technology
B. F. Goodrich Company
Akron, Ohio

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MANUFACTURING CHEMISTS ASSOCIATION

Meeting

University of Michigan

January 24, 1967

Attendance List (page 2)

B. F. GOODRICH CHEMICAL CO. (cont.)

Dr. Rex Wilson
Medical Director
B. F. Goodrich Company
Akron, Ohio

GOODYEAR TIRE & RUBBER COMPANY

C. A. Johnson, M. D.
Medical Director
Akron, Ohio

Frank Cox
Plant Manager
Niagara Falls, N. Y.

MONSANTO COMPANY

Dr. William E. Nessell
Plant Physician
Springfield, Mass.

THE PANTASOTE COMPANY OF
NEW YORK, INC.

John E. Eitel
Vice President-Production
Passaic, N. J.

SHAWINIGAN CHEMICALS LIMITED

R. H. Stevenson, M.D.
Medical Officer
Montreal

STAUFFER CHEMICAL COMPANY

Hans R. Jepsen, Jr.
Manager
Delaware City P.V.C. Plant
Delaware City, Delaware

THOMPSON APEX COMPANY

DIV. CONTINENTAL OIL CO.

H. Malin
Vice President
Pawtucket, R. I.

R. D. Dugan, M.D.
Medical Director
Continental Oil Co.
Houston, Texas

UNION CARBIDE CORPORATION

Dr. E. Q. Hull
Medical Director
South Charleston Plant
South Charleston, W. Va.

Dr. C. U. Dernehl
Assoc. Medical Director
New York, N.Y.

R. N. Wheeler
Technical Manager
South Charleston, W. Va.

UNITED STATES RUBBER COMPANY

J.H. Wolfsie, M. D.
Corporate Medical Director
New York, N. Y.

C. B. Westerhoff
Technical Superintendent
Painesville, Ohio

MANUFACTURING CHEMISTS ASSOCIATION

Frank H. Carman

F. G. Stephenson

Great Amer. Chem

Furman

want to know all employees who have had exposure

want complete process information - to be treated very confidentially
" have X-rays on all employees.

went occupational & clinical history on each employee - identify by SS no.
 I of M have hand x-rays of all adults in Tacoma .. as a control.
 Each company to handle their own union contact.

Servia.

Operating

Maintenance: Exposed to PVC

Lieb.

Mexauto

operating

Maintenance
Personal

research.

Goodrich

Case no. 2

Carbide

South Charles 3000-200

Texas City 26000 10.104800

can't go back & pick 1702 1954

up switching of jobs

Can I violate maintenance by air
149079. 149079. 149079

want to pick only those who now are

REF ID: A6232741

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DETROIT ASSOCIATED PRESS WIRE

W. L. R. 12-13-14

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John Wilson

STANBURY CHEMICAL COMPANY

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UNITED STATES RUBBER COMPANY

"1230"

(Location)

October 11, 1966

C O N F I D E N T I A L

TO: F. A. Hopkins
FROM: J. H. Wolfsie, M.D.
SUBJECT: Possible Health ^{PROBLEM} Program in PVC Manufacture

Mr. Harry B. Warner, Vice President of the B. F. Goodrich Company, called to the attention of the Manufacturing Chemists' Association "an interesting medical development" noticed by them in some of their PVC manufacturing plants. MCA referred this matter to its Occupational Health Committee. Accordingly, a meeting of this committee was held with PVC manufacturers on the morning of October 6, 1966, in Cleveland.

It was agreed that all discussions would be treated as confidential, and there would be no written minutes of this meeting.

The United States Rubber Company was represented by C. B. Westerhoff, Technical Superintendent, Painesville Plant, and myself. I was also present in the capacity of a member of the MCA Occupational Health Committee.

The findings of the B. F. Goodrich Company were presented by Dr. Rex Wilson, their Medical Director, and by Mr. W. McCormick, their Chief of Industrial Hygiene and Toxicology.

This condition was first called to the attention of the B. F. Goodrich Company several years ago by a part-time physician at one of their plants which manufactures PVC resins. It involved one or more, or all, of the fingers of both hands. There was noticed blanching of the fingers when exposed to cold and numbness, a phenomenon resembling Raynaud's Syndrome, a neurocirculatory disturbance of unknown cause. Some had nodules (bumps) in the skin of the hands and forearms, about 5mm. in diameter, with a tendency to coalesce and noticed particularly over bony prominences, mostly over the proximal interphalangeal joints. Three cases had a thickening of the skin of the hands and fingers, resembling a condition known as scleroderma, with nodules along the extensor tendons of the hand. Skin biopsy, including the nodules, showed an increase in fibrous tissue (collagen) and non-inflammatory thickening but no specific findings. Biopsy of the skin of those cases without the scleroderma-like appearance did not have this fibrous thickening. Some had tenderness in the fingertips elicited on squeezing and which was mild in some.

INTERCOMPANY CORRESPONDENCE

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X rays were taken of the hands of these people and then showed bone damage in the distal portion of the terminal phalanx of one or more, or most, or all of the fingers of both hands. Dr. Wilson showed a number of X rays to demonstrate this. There was a dissolution of bone, manifested by notching, irregularity of outline, loss of bone at the tip or in a line across the shaft somewhat resembling a fracture. Some of these bones have healed with no evidence of previous abnormality, some with varying degrees of remaining irregularity in the end of the bone and some with a flattened collar-button effect at the end of the bone. The fingertips of the latter appear shortened and blunt (photographs were shown of this.)

Goodrich ultimately X-rayed the hands of all personnel working in all their United States and Canadian PVC plants. Of their five U. S. plants making PVC resins, in three of them they found these X ray changes in 1% of the plant personnel (or 6% of those working in poly cleaning). One of the two plants with no cases is a new plant, and the other one has no poly cleaning. There were a total of 30 cases, twenty of whom were severe. All cases except three were in poly cleaning. One of these three was a plant guard, another a laboratory technician, and the third in PVC manufacturing but not a poly cleaner.

Not all cases with blanching and numbness showed X ray changes.

It was emphasized that since these X ray changes might be subtle or, when not extensive and particularly in recovered cases, may resemble changes from previous finger trauma, it is important that the X rays be examined by a competent radiologist who has had the benefit of studying radiograms in these cases.

The term for the bone changes found on X ray is acro-osteolysis. There is nothing in the literature on this specific disease which appears to be unique in the PVC manufacturing industry. There have been 60 cases of acro-osteolysis reported in the world literature, representing familial acro-osteolysis or idiopathic acro-osteolysis, in both of which these bone changes occurred in other bones in addition to those of the fingers, e.g., toes, skull, jaw. The most recent articles on acro-osteolysis are:

Cordier et al. Cahiers-de-Medicin
Du Travail (Jan. 1966)

Sucin et al. Medicina Interna
(Bucharest) 15:967-78 (Aug. 1963)

Of the 1% of the Goodrich population in PVC manufacturing who showed acro-osteolysis on X ray of the hands, the majority had numbness and blanching of the fingers, but some had no symptoms or signs of any hand disorder. On subsequent X rays (all have been X-rayed at least twice), some showed recovery or improvement and additional cases were picked up. No cases thus far (even those with blunting of the fingers and apparent healing of the bones) have had any permanent impairment of function. Of those with bone complaints some have cleared up, and others have gotten worse.

United States Rubber Company

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Goodrich X-rayed the hands of all people in a monomer plant (no PVC), which included a number of people who had had intoxications with vinyl chloride, and they found no cases of acro-osteolysis or people who had had the hand complaints described above. Although they have not found cases in monomer people, they suspect that exposure to monomer has been generally very low.

Goodrich spoke with a number of other companies about this problem, two in the United States and three in foreign countries. One foreign company, which has a number of cases, feels that there is a relationship to vinyl chloride intoxication, but Goodrich has not been able to demonstrate this. One approached foreign company claimed they had no cases but, when their X rays were examined by the radiology consultants of Goodrich, three cases were found (an incidence of 1% of the population).

Goodrich obtained an outside consultant and hospitalized twenty severe cases at a university hospital. They were investigated thoroughly, including X rays of all bones, all known tests and examinations by many consultants. No bone changes were found anywhere except in the fingers, although one company claimed they have X ray changes in toes. There were no consistent additional findings except a lag in temperature recovery of the hands after immersion in cold water and a lag in the esophageal reflex in some. The latter occurs in scleroderma. A few of the severe cases had arteriograms performed, and they showed a restriction of the lumen of the finger arteries at the level of the distal crease. Four of the twenty cases had a slight elevation of blood uric acid which is not considered significant.

All such cases were taken out of poly cleaning but remained in PVC manufacturing. They have all shown improvement which may be quick or slow, but in some, another finger subsequently became affected before full recovery. Some still have blanching and numbness on exposure to cold, but of a lesser degree. Some have blunting of the fingers, but it does not appear to be disabling.

There has been a large variation in length of exposure, more cases appearing in the older operations, although it has been found after as little as six months in poly cleaning.

All the severe cases were bilateral although not necessarily involving all fingers.

The youngest case was 24 or 26 years of age, but no age correlation was noted.

All the Goodrich X rays were viewed by expert radiologists; others have missed cases. Dr. Wilson thinks these cases exist in all companies manufacturing PVC.

He also thinks they may have had remissions in some affected (but not realized) cases who continued to work at poly cleaning. It cannot be proved. There are no previous X rays; they may recover with normal appearing bone; X ray findings in recovered cases are not specific and can resemble the changes from previous trauma.

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United States Rubber Company

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B. F. Goodrich Company starts PVC employees as poly cleaners and they later move up to operators, etc. Poly cleaners may be assigned to other jobs, but they are mainly in poly cleaning in which they may devote up to 40 hours per week.

On questioning, they stated that there may be up to 1% monomer content in the polymer on the walls of reactors and that, in poly cleaning, the concentration of monomer in the vessel air would rarely exceed 50 ppm.

A statistician in Goodrich has been working on this problem, but it has been very difficult to get accurate work histories.

An experiment was performed in which a monkey was placed in a chamber with his head excluded. Vinyl chloride was introduced in the chamber, in concentrations from 200 ppm to 5,000 ppm. Vinyl chloride was present in the monkey's expired air at all chamber concentrations, proving that it can be readily absorbed through intact skin. This hand condition was originally thought due to local hand contact in poly cleaning (realizing that many other chemicals are present in addition to monomer), but the results of this experiment suggested that this may be a systemic disease.

It is the impression of Goodrich that more cases have appeared from the pearl type than from the emulsion type polymerization. One would expect a larger percent of monomer in the former. One foreign company, however, believes they have equal involvement from each type of polymerization.

Dr. Wilson privately showed two sets of X rays. These were of the hands of two men who showed involvement of most of their fingers in 1964, at which time they were removed from poly cleaning. 1965 and 1966 X rays in each show improvement in most fingers, some remaining about the same, and subsequent and progressive involvement of an additional finger in each of these two men.

In one case with cold hands, an unilateral sympathectomy resulted in a warm hand on that side, but both hands improved on X ray.

In one plant in which poly cleaning is done with the man completely protected, including supplied air, they had a case.

B. F. Goodrich's Present Program in Plants:

1. Pre-employment X ray of hands of everyone hired for PVC manufacturing plant.
2. X ray of hands every 6 months of everyone working in PVC manufacturing plants.
3. In the first plant reporting this problem, they require gloves on those cleaning poly vessels (cotton glove, covered with a PVC-covered glove). Will extend this to all their PVC plants. Currently investigating imperviousness of different gloves.

United States Rubber Company

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4. All discovered cases are permanently removed from poly cleaning but not from PVC manufacture.
5. Everyone with a positive change has been told so. None were apprehensive and there were no Union difficulties. The company accepted all cases, and the employees were told that they were considered as workmen's compensation cases. The employees were told that a hand problem seems to exist in a few people, the cause is not known, and they are assisting management in attempting to find the cause. The employees in all five Goodrich PVC plants know this is associated with poly cleaning. In the twenty cases that were examined extensively, a copy of the medical report was sent to their family physicians.

In summary, the B. F. Goodrich Company presented a health program in PVC manufacture involving a disease of the hands of unknown cause, principally associated with poly (reactor) cleaners, manifested in about 6% of these poly cleaners (or 1% of all engaged in PVC manufacture). The diagnostic tool (X ray) is poor. There have been many suggestions, including Raynaud's phenomenon, a disturbance of collagen, and polymerization of vinyl chloride in the tissues. The possibility of damage to collagen tissue with the creation of a systemic disease which will become apparent later on is rather disconcerting and is probably of the most concern. Consultants have advised Goodrich to conduct studies on the effects of various chemicals on collagen tissue.

Dr. C. U. Dernehl, Associate Medical Director, Union Carbide Corporation, reported that they were approached by Goodrich's consultant and asked if they had any cases of Raynaud's syndrome among their PVC autoclave cleaners. Their autoclave cleaners do other jobs too, being mostly laborers, which also exposes them to considerable finger trauma. They reviewed the medical records of 26 men at Texas City and 18 men at South Charleston who have been regularly cleaning PVC autoclaves, up to 15 years at the latter location. They found no cases of neurovascular abnormalities of the hands (they pride themselves in having very good medical records.) They then X-rayed the hands of these employees. Among the 26 employees at Texas City, they found X ray changes in one finger of four men, each with a history of finger trauma within the past six months, and the X ray changes were characteristic of previous injury. However, one man, who has been cleaning autoclaves for ten years, has suspicious bone changes, but has no symptoms. Of the X rays of the 18 autoclave cleaners at South Charleston, there may be three cases. One shows a sharp line across the bone and has a very nebulous history of recent injury. One has a tiny notch in the terminal tuft, but a roentgenologist has stated that this is not uncommonly seen in fingers. (However, Goodrich has serial X rays to show this finding as an early lesion which may progress). These cases will be re-X rayed to see what may further occur. None of these have stubby fingers or the collar-button configuration on X ray.

Dr. H. L. Gordon, Corporate Medical Director, Dow Chemical Company, stated that they have no reported cases but have not looked for this condition. They have checked previous X rays of hands that were taken for

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United States Rubber Company

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trauma and did not find any cases, but he admitted that some could have been missed. He further reported that Dow did toxicological work on vinyl chloride, that it is readily identifiable in expired air and that the concentration is proportional to the degree of exposure.

I was called upon to report and stated that we were not aware of any problem but had not specifically looked for it.

Mr. Dan Carberry, Assistant Divisional Manager - Chemicals, Atlantic Tubing and Rubber Company, reported that they had a Workmen's Compensation case about 1 to 1½ years ago, which was diagnosed as Raynaud's disease of the hands. This man started as a poly cleaner and is now a foreman. He lost no time from work and seems to have recovered except his fingers still look whiter than normal. He had been working for them for 7 to 8 years.

Dr. C. A. Johnson, Medical Director, Goodyear Tire and Rubber Company, reported that they selected for hand X rays 40 people at their Niagara Falls plant who should have had the most exposure. Some had 15 to 20 years service. They were mostly poly cleaners but also include some laboratory personnel. Their workers are not on poly cleaning continuously. They rotate so that they have a total of one to two months per year of poly cleaning. Dr. Johnson stated that their X ray study found nothing (1 finger showed a notch). Histories were negative.

Mr. Robert R. Bouffard, Division Quality Control Manager, Tenneco Manufacturing Company, reported that about 15 to 20 years ago, when he was with Shawinigan Chemicals Ltd., he knew of one or two cases of blanching of the fingers in the cold but doesn't know how many cases there were in all. These worked in a vinyl chloride unit but doesn't know whether they were involved with reactor cleaning. No X rays were taken.

On the afternoon of October 6, 1966, Dr. Wilson and Mr. McCormick, of Goodrich, met with the Occupational Health Committee to discuss the matter in more detail.

On October 7, 1966, the Occupational Health Committee formulated recommendations to the Board of Directors of MCA, which read essentially as follows:

The Occupational Health Committee met with various manufacturers of PVC on October 6, 1966, and discussed evidence by a member company indicating a possible occupational health problem associated with a specific step in the manufacture of PVC resins. While the evidence presented is highly correlated with a specific step in the manufacture of PVC resins, there is need for confirmation of this by other manufacturers. Although the exact cause has not been determined and the proportion of exposed persons effected does not appear to be high, the nature of the effect is such that the committee had concluded that the problem requires vigorous industry-wide investigation.

The committee finds that the condition may not be recognized unless special medical surveys are carried out.

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The chemical manifestations are such as to suggest the possibility of a disabling disease as a later development.

Although there is no evidence to suggest that there is a risk associated with the use or handling of the finished PVC resins, it is important to the industry that this be documented and confirmed.

Therefore, the Occupational Health Committee recommends to the Board of Directors a program incorporating the following be undertaken promptly.

1. In-Plant Medical Studies
2. Industry-Sponsored Toxicological Research
3. MCA Sponsored Symposium

In-Plant Medical Studies

Medical surveys similar to those carried out by one member company, need to be extended to other manufacturers. The groups to be studied should include persons engaged in a.) the manufacture of vinyl chloride monomer, b.) the manufacture of PVC resins, c.) the fabrication of PVC consumer products. Uniform medical observations are necessary so that the data may be combined and compared. In essence, the survey will include a brief medical history and an examination and X ray of the hands. The Occupational Health Committee will provide the companies with detailed recommendations.

Industry-Sponsored Toxicological Research

The committee concludes that a cooperative sponsored toxicological research program should be initiated concurrently with the in-plant medical studies. In order to determine the course, mechanism of action, and the preventive measures necessary, the committee recommends that it be authorized to contact an institution of its selection to establish this program. One hundred thousand dollars (\$100,000) will be needed to initiate the program. The Occupational Health Committee will maintain supervision of this program.

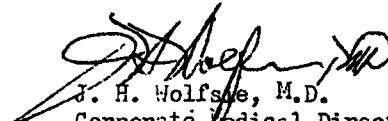
MCA Sponsored Symposium

Up to now, full knowledge of this problem has been limited to three companies in the United States. It is not anticipated that this situation will continue in light of the wider dissemination resulting from the MCA sponsored meeting of October 6 and the proposed program of investigation. Therefore, it is the conclusion of the committee that precise information shall be made available to the scientific community. It is proposed that an MCA sponsored symposium, under the

United States Rubber Company

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auspices of the Occupational Health Committee, be held in the summer of 1967.


J. H. Wolfson, M.D.
Corporate Medical Director

JHW:dcw

cc's: F. D. Chittenden
D. E. Dudrow
E. S. Ebers
J. M. Poynter ✓
L. M. White
E. H. Worcester

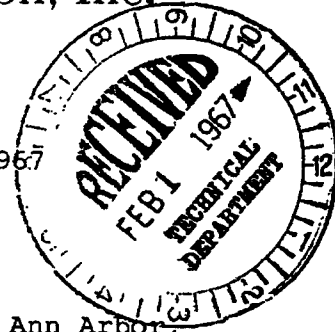
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Manufacturing Chemists' Association, Inc.

(FOUNDED 1872)

1825 CONNECTICUT AVENUE, N. W.
WASHINGTON, D. C. 20009

January 30, 1967



TO: PVC Resin Producers

In the meeting on January 24, 1967, at Ann Arbor, Michigan, the plans for handling the epidemiologic study on the occupational health hazard were discussed at length. An outline of the immediate program to be undertaken by the University of Michigan's Institute of Industrial Health will be sent you shortly.

For the information of both you and the Institute, the following listings are enclosed: (1) those present in the January 24 meeting; (2) company contacts with whom the Institute of Industrial Health will work; and (3) those producers who have indicated intention to participate in the program.

As indicated in the January 24 meeting, we are still awaiting information from certain members regarding approximate number of employees to be studied in vinyl chloride polymer production and in product fabrication, the number of plant locations, and the annual capacity classification that will assist the MCA in arriving at a proper assessment.

As a result of the discussion of the study, if any company desires to revise its figures on number of employees that should be covered in the study, we would like to hear from you at your earliest convenience.

Dr. Magnuson of the Institute indicated they would be getting the study under way and the designated company contacts will hear from him direct. The contract for this work has been sent to the Institute for final clearance, and the first phase of the program can be started shortly. It is hoped the aforementioned report to be supplied will include a statement from the University regarding the handling of confidential information on the processes and chemistry.

Sincerely,

A handwritten signature in cursive script, appearing to read 'F. H. Carman'.

F. H. Carman

Technical Director

FHC/bk

Enclosures (3)

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The following were present in the January 24, 1967,
meeting at the University of Michigan:

AIR REDUCTION COMPANY, INC.

Dr. Palmer W. Townsend
Asst. to Group Vice President
Belleville, New Jersey

Joseph A. Bourque, Jr.
Asst. Safety Director
New York City

ATLANTIC TUBING & RUBBER CO.

Glenn P. Smith
Executive Dir. of Engineering
Cranston, Rhode Island

BORDEN CHEMICAL COMPANY

Nathan M. Blackman
Technical Superintendent
PVC Department
Leominster, Massachusetts

THE DOW CHEMICAL COMPANY

Harold L. Gordon, M.D.
Corporate Medical Director
Midland, Michigan

Earl R. Smith
Manager PVC Production
Midland, Michigan

EASTMAN KODAK COMPANY

W. L. Sutton, M.D.
Rochester, New York
Chairman, MCA Occupational
Health Committee

ESSO CHEMICAL COMPANY, INC.

Robert E. Eckardt, M.D.
Director, Medical Research Sect.
Esso Research & Eng. Co.
Linden, New Jersey

James F. Haring
General Manager, Project
Administration Division
New York City

FIRESTONE TIRE & RUBBER COMPANY

Laurence H. Ballou, M.D.
Medical Director
Akron, Ohio

George L. Wilson
Industrial Hygienist
Akron, Ohio

R. E. Noble
Product Engineer
Pottstown, Pennsylvania

B. F. GOODRICH CHEMICAL COMPANY

John L. Nelson
General Production Manager
Cleveland, Ohio

William E. McCormick
Manager - Industrial
Hygiene & Technology
The B. F. Goodrich Company
Akron, Ohio

Rex H. Wilson, M.D.
Medical Director
The B. F. Goodrich Company
Akron, Ohio

GOODYEAR TIRE & RUBBER COMPANY

C. A. Johnson, M.D.
Medical Director
Akron, Ohio

Frank A. Cox
Plant Manager
Niagara Falls, New York

GREAT AMERICAN PLASTICS COMPANY

Albert W. Fuhrman
Vice President
Chemical Division
Fitchburg, Massachusetts

GULF OIL CORPORATION

Howard E. Runion
Director Industrial Hygiene
Pittsburgh, Pennsylvania

MONSANTO COMPANY

William E. Nessell, M.D.
Plant Physician
Springfield, Massachusetts

THE PANTASOTE COMPANY

John E. Ertel
Vice President - Production
Passaic, New Jersey

SHAWINIGAN CHEMICALS LIMITED

R. H. Stevenson, M.D.
Medical Officer
Shawinigan, Quebec, Canada

STAUFFER CHEMICAL COMPANY

Hans R. Jepsen, Jr., Mgr.
Delaware City P.V.C. Plant
Delaware City, Delaware

THOMPSON APEX COMPANY

DIV. CONTINENTAL OIL CO.
Herbert Malin
Vice President
Pawtucket, Rhode Island

Robert R. Dugan, M.D.
Medical Director
Continental Oil Company
Houston, Texas

UNION CARBIDE CORPORATION

C. U. Dernehl, M.D.
Associate Medical Director
New York City

E. Q. Hull, M.D.
Medical Director
South Charleston, West Virginia

R. N. Wheeler, Jr.
Technical Manager
South Charleston, West Virginia

UNITED STATES RUBBER COMPANY

J. H. Wolfsie, M.D.
Corporate Medical Director
New York City

C. B. Westerhoff
Tech. Supt. - Chemical Div.
Painesville, Ohio

UNIVERSITY OF MICHIGAN (Ann Arbor)

Harold J. Magnuson, M.D.
Director
Institute of Industrial Health

Dr. D. B. Dinman

Professor W. A. Cook

Professor F. Moor

MANUFACTURING CHEMISTS ASSOCIATION

F. H. Carman
Technical Director

F. G. Stephenson
Secretary, MCA Occupational
Health Committee

The following is a list of company contacts with whom the Institute of Industrial Health will work:

Allied Chemical Corporation
Plastics Division
Hardy Road
Painesville, Ohio 44077
William M. Reiter
Assistant Works Manager

Air Reduction Company, Inc.
Airco Chemicals and Plastics Div.
P.O. Box 217
Calvert City, Kentucky 42029
Edward J. Serwan
Plant Manager

Atlantic Tubing & Rubber Co.
Mill Street
Cranston, Rhode Island 02905
Glenn P. Smith
Executive Director of Eng.

Borden Chemical Company
60 Elm Hill Avenue
Leominster, Massachusetts 01453
Nathan M. Blackman
Technical Supt. - PVC Dept.

The Dow Chemical Company
607 Building
Midland, Michigan 48640
Dr. Harold L. Gordon
Corporate Medical Director

Standard Oil Company (N.J.)
(for Esso Chemical Co., Inc.)
30 Rockefeller Plaza
New York, New York 10020
Dr. N. V. Hendricks, Asst. Dir.
for Environmental Sciences,
Medical Department

Ethyl Corporation
P.O. Box 431
Baton Rouge, Louisiana 70821
Dr. R. C. A. Bock

Firestone Tire & Rubber Company
1200 Firestone Parkway
Akron, Ohio 44317
Laurence H. Ballou, M.D.
Medical Director

The B. F. Goodrich Company
500 South Main Street
Akron, Ohio 44311
Rex H. Wilson, M.D.
Medical Director
(Alternate - W. E. McCormick)

Goodyear Tire & Rubber Company
Box 460
Niagara Falls, New York 14304
Frank A. Cox, Plant Manager

Great American Plastics Company
Chemical Division
650 Water Street
Fitchburg, Massachusetts 21420
Albert W. Fuhrman, Vice President

Gulf Oil Corporation
Gulf Building
Pittsburgh, Pennsylvania 15219
Howard E. Runion (tentative)
Director - Industrial Hygiene

Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
M. N. Johnson, M.D.
Medical Director

The Pantasote Company of New York, Inc.
26 Jefferson Street
Passaic, New Jersey 07055
John E. Ertel
Vice President - Production

Shawinigan Chemicals Limited
P.O. Box 330
Shawinigan, Quebec, Canada
H. A. Norton
Works Manager

Stauffer Chemical Company
Delaware City P.V.C. Plant
P. O. Box 320
Delaware City, Delaware 19706
Hans R. Jepsen, Jr. (tentative)
Plant Manager

Manufacturing Chemists' Association, Inc.

Enclosure 2

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Tenneco Plastics Division
P.O. Box 2
Piscataway, New Jersey 08854
Elwood W. Phares
Executive Vice President

Thompson Apex Company
(Div. Continental Oil Co.)
505 Central Avenue
Pawtucket, Rhode Island 02861
Herbert Malin
Vice President

Union Carbide Corporation
270 Park Avenue
New York, New York 10017
C. U. Dernehl, M.D.
Associate Medical Director

United States Rubber Company
Industrial Relations Department
1230 Avenue of the Americas
New York, New York 10020
J. H. Wolfsie, M.D.
Corporate Medical Director

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At this writing, the following is the status of producers' intention to participate in the program as indicated informally during the January 24, 1967, meeting and/or in writing to the MCA office:

Allied Chemical Corporation	YES
Air Reduction Company, Inc.	YES
Atlantic Tubing & Rubber Co.	YES
Borden Chemical Company	YES
The Dow Chemical Company	YES
Esso Chemical Company, Inc.	YES
Ethyl Corporation	PROBABLY
Firestone Tire & Rubber Company	YES
B. F. Goodrich Chemical Company	YES
Goodyear Tire & Rubber Company	YES
Great American Chemical Corp.	PERHAPS
Gulf Oil Corporation	PROBABLY
Monsanto Company	YES
Pantasote Company	YES
Shawinigan Chemicals Limited	QUESTIONABLE
Stauffer Chemical Company	PROBABLY
Tenneco Plastics Division	PROBABLY
Thompson Apex Company (Div. Continental Oil Co.)	YES
Union Carbide Corporation	YES
United States Rubber Company	YES