

678

HARVARD SCHOOL OF PUBLIC HEALTH

OCCUPATIONAL HEALTH
PROGRAM



665 HUNTINGTON AVENUE
BOSTON, MASSACHUSETTS 02115
(617) 353-8000

732-1260

June 12, 1978

Mr. James Shriver
Plant Manager
70 Worcester Street
Indian Orchard, Mass. 01151

Dear Mr. Shriver:

The National Institute of Occupational Safety and Health (NIOSH) has contracted with Harvard University to provide physician services to provide medical evaluations of potential hazards in the workplace. These investigations are carried out under the authority of Section 20 of the Occupational Safety and Health Act.

Information submitted to NIOSH and forwarded to us alleges exposure to vinyl chloride, acrylonitrile and other chemicals. Digestive and genito-urinary tumors were also alleged.

To begin to pursue this matter under our contract, I would appreciate a meeting with you and/or your representatives. Mr. William Westendorf indicates to me that June 27, 1978 might be a suitable day. If so, we would like to meet at your plant at 10 am on that day.

We would be primarily interested in pursuing available data that could lead to a definitive answer as to whether this is or was a hazard. A plant tour could be helpful, certain company records could be helpful.

Accompanying me will be Dr. Richard Monson, Associate Professor of Epidemiology and a resident physician in our training program, yet to be determined.

I hope this date is suitable and I look forward to the visit.

Sincerely yours,

John M. Peters, MD
Professor of Occupational Medicine
Director, Occupational Health Program

JMP:DMI

CC: Dr. Richard Monson
Mr. W.H. Westendorf
Dr. Charles Xintaras
Dr. Tom Wilcox

RSV0024652



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

M. G. H. Fletcher
EDUCATION AND WELFARE

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
ROBERT A. TAFT LABORATORIES
4676 COLUMBIA PARKWAY, CINCINNATI, OHIO 45226

September 20, 1978

James Schriver
Monsanto Plant Manager
70 Worchester Street
Indian Orchard, Mass. 01157

Dear Mr. Schriver:

Enclosed please find a SHEFS I preliminary report on the status of HHE 78-83 at the Indian Orchard, MA, Monsanto Chemical Plant. NIOSH has not yet completed plans for the continued study of this Health Hazard Evaluation but I will keep you informed of NIOSH's progress.

Sincerely,

Thomas Wilcox M.D.

Thomas Wilcox, M.D.
Medical Officer
Medical Section, HETAB

Enclosure

Xerox copies: G. L. Smith
P. E. Bureau (2) —

9/25/78



RSV0024653

MEMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

TO : Director, DSHEFS
Thru: Acting Chief, HETAB _____
Thru: Acting Chief, MS _____

DATE: September 15, 1978

FROM : Medical Officer
Medical Section, HETAB

SUBJECT: SHEFS I: HHE 78-83
Monsanto Chemical Company
Indian Orchard, Ma.

Dr. Peter's report states that with the data currently available there is no demonstrable effect of employment at the Springfield Monsanto Plant on cause of death. He suggests however that a retrospective cohort mortality study would provide a more complete picture of the cancer mortality experienced to date and give the best data possible either to support or refute the existence of an increased carcinogenic risk being associated with employment at the plant in question. He also suggests that any such proposed study have a mechanism for a review of its progress and outcome by an impartial scientist acceptable to both the company and concerned union members. Reportedly the Monsanto Corporation is planning to fund such a mortality study to be performed by scientists from a university affiliated school of Public Health.

At the present time NIOSH feels that more information is required before we can decide how best to pursue the Health Hazard Evaluation. We are therefore requesting further information from the Monsanto Corporation about their proposed study. We are most interested in the cohort sample size, the proposed method of follow-up of former employees and the suitability of the available records for extraction of work histories and dates of employment etc. We also need to obtain more information about the work histories already obtained on workers who have developed Genito-Urinary or Gastro-Intestinal cancer. When this information has been received NIOSH can decide how best to proceed with the Health Hazard Evaluation.

Thomas Wilcox M.D.
Thomas Wilcox, M.D.

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665 HUNTINGTON AVENUE
BOSTON, MASSACHUSETTS 02115
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Professional Physicians Services 210-78-0015
Health Hazard Evaluation 78-83
Monsanto Chemical Corporation
Springfield, Massachusetts

I. Date of Visit

Visit conducted on June 27, 1978, by Drs. John M. Peters and Richard R. Monson.

II. Introduction

We were asked to determine whether further studies or medical evaluations are necessary to clarify the occupational health status in this plant. This determination was made on the basis of the following:

1. Review of NIOSH mortality study
2. Review of Monsanto mortality study
3. Visit to site of the Monsanto plant
4. Discussion with company and union representatives
5. Walk through survey of part of plant
6. Review of available personnel and medical records

Discussions with Company personnel included:

Mr. James Shriver - Plant manager
Mr. Paul Bureau - Personnel manager
Dr. Nessel - Plant physician
Mr. Gar Fletcher - Plant Safety and Industrial Hygiene
Dr. Ferd Myer - Corporate Medical Department
Ms. Judith Killeen Zack - Corporate Medical Department
plus unit managers and foremen

Discussions with Union personnel included:

Mr. Joe Bernardo - local president
Mr. Roger Soucy - local vice president
Mr. Ted Starczyk - local secretary

Manufacturing processes have been dynamic. Currently this plant employs about 700 hourly and 700 salaried workers. 400 of the salaried workers are involved in research and development on plastics. Current processing includes:

1. Saflex (polyvinyl butyral plastic) used for automobile windows. Began in 1938.
2. Urea-formaldehyde glues and adhesives. For more than 25 years.
3. Polystyrene-butadiene. Since 1945. Used to be batch processed, now continuous.
4. Melamine resins
5. Mineral reinforced nylon - new
6. Formaldehyde plant

Discontinued processes include:

1. Polyvinyl chloride - 1950-1974, intermittent
2. Styrene-acrylonitrile - 1974-1977, plastic coke bottles

III. Health Hazard Evaluation

A. Study Design and Analytic Methods - The NIOSH study is a proportional mortality study of 465 death certificates of 484 deaths occurring between 1950-1976. Monsanto's study involves 564 deceased employees who were also studied by proportional mortality.

B. Toxic Substance Medical Data

1. Vinyl Chloride

Vinyl Chloride enters the body by inhalation. It is a skin irritant and nervous system depressant. Light-headedness, nausea and dulling of the senses may occur with acute exposure. Chronic exposure of workers involved in cleaning reactor vessels has resulted in acro-osteolysis, Raynaud's phenomenon, sclerodermatous skin changes, and hepatic damage. Animal studies demonstrated hepatic toxicity at greater than 50 ppm. Later animal inhalation studies revealed cancer at multiple sites including liver, lung, brain, and kidney. Vinyl chloride has been found to be associated with angiosarcoma of the liver in humans. Excess cancer of the lung, the lymphatic and nervous systems has also been reported in exposed human populations. A time trend with increasing rates of all cancers in the exposed workers has been demonstrated. Vinyl chloride is regulated as a carcinogen. The acceptable level of exposure is as low as technologically feasible and is currently 1 ppm. Medical surveillance includes liver function studies and medical history of possible past exposure to other liver toxins. Long-term follow-up of exposed workers is essential.

2. Acrylonitrile

The chemical structure of acrylonitrile resembles that of vinyl chloride. It enters the body by inhalation or percutaneous absorption. Repeated or prolonged exposure may produce skin irritation. Exposure to concentrations above 20 ppm may produce nausea, vomiting, headache, sneezing, weakness, and light-headedness. Other acute toxic effects are similar to cyanide poisoning. An excess of lung and colon cancer has been

observed in workers exposed to acrylonitrile in a textile fibers plant after a latent period of 20 years. Animal ingestion and inhalation studies in rats revealed a wide variety of tumors, some of which were carcinomas. In view of its potential as a human carcinogen, the exposure level should be as low as feasible (< 2 ppm). Careful medical follow-up and epidemiological study of exposed workers should be obtained.

3. Styrene

Styrene resembles vinyl chloride (vinyl benzene). It enters the body by inhalation or percutaneous absorption. It may produce dry, scaly dermatitis. Acute exposure to 50-100 ppm may produce irritation of the mucous membranes of the eyes and upper respiratory tract. Nervous system depression may occur and includes prolonged reaction time and decreased manual dexterity. Very high exposures may produce narcosis, cramps, and death due to respiratory center paralysis. Chronic exposure may produce liver and kidney damage. Mandelic acid in urine has been used to measure the intensity of styrene exposure. Styrene oxide is a potent mutagenic agent. Workers in styrene-butadiene rubber plants have an excess mortality from leukemia and lymphoma. Inhalation studies in rats revealed an excess of tumors of the blood forming system in females. As a possible human carcinogen, exposure to styrene should be kept as low as possible.

4. Butadiene

Butadiene enters the body by inhalation. It is slightly irritating to the eyes, nose, and throat. In high concentrations it may act as a lower respiratory tract irritant and as a narcotic causing CNS depression. It has been associated with an excess of leukemia and lymphoma in styrene-butadiene manufacturing operations. However, the exposure has not been pure. The current TLV is 1000 ppm. Exposure should be kept as low as possible until its role as a possible human carcinogen is clarified.

5. Formaldehyde

Route of entry is by inhalation. Formaldehyde is very irritating to the mucous membranes of the respiratory tract and eyes at levels above 1-2 ppm. It is a skin irritant as well as sensitizer. Inhalation of high concentrations of formaldehyde may cause coughing, shortness of breath, and pulmonary edema. Formaldehyde has been shown to be a lower respiratory tract irritant at 1-5 ppm in animals, but no good epidemiological evidence exists in humans as yet. The TLV is 3 ppm as a TWA. NIOSH, however, recommends a ceiling of 1 ppm for any 30 minute sampling period.

6. Phenol

Phenol enters the body by inhalation or skin absorption. It is both a skin irritant and sensitizer. Systemic effects of acute poisoning are weakness, diaphoresis, headache, tinnitus, shock, cyanosis, dark urine, and death. Kidney damage may occur. Chronic phenol poisoning is rare, but is characterized by vomiting, difficulty in swallowing, diarrhea, lack of appetite, headache, fainting, dizziness, dark urine, mental disturbances, and skin rash. Liver and kidney damage and skin discoloration may occur. Phenol may be detected in the blood or urine. The current TLV is 5 ppm.

C. Results and Discussion

1. The data from the two studies are consistent with no demonstrable effect of working at the Springfield plant on cause of death. This of course is not the same as saying there are no workers who developed disease and died from that disease because of their job. However, if this were the case the number of such persons are too few to be detected in the current data by the methods employed.
2. The excess of cancer and specifically of pancreas cancer seen in the first 86 deaths probably resulted because persons who died from cancer were selectively found. While this initial step was important and pointed out the need for a complete study, these initial results should not be interpreted as showing that working in the Springfield plant causes cancer.
3. In the NIOSH and Monsanto reports, there were slight excesses of deaths from cancer of the gastro-intestinal tract. No work history information was available. However, at our visit, Judith Killeen Zack provided work history summaries for 44 persons with gastro-intestinal cancer (and 12 persons with prostate cancer). On the basis of this review, no association is seen with departments which would suggest causality. Again, this is not to say that none exists, but only that if a causal association does exist, it cannot be detected with the data currently available (see Tables I and II). Duration of employment in certain areas has not been considered.
4. Monsanto indicated that they are negotiating with the University of Pittsburgh School of Public Health to do a retrospective cohort mortality study. This should be done so as to identify the persons who terminated prior to receiving vested pension rights and who subsequently died. A mortality study such as this would provide a complete picture of the cancer mortality experience to date, and also would permit a more complete and appropriate examination of work history.
5. One major problem with the proposed study will be the difficulty in assembling work histories from the microfilm. A large amount of extraneous material was microfilmed, and the cost and effort to abstract the needed information will be high - missing data will be unavoidable as well. Alternative sources of information such as seniority lists and job qualification lists could be helpful if available.

D. Conclusions

On the basis of data available to us there appears to be little association of occupation with mortality.

IV. Recommendations

We recommend that a cohort mortality study be conducted with the use of occupational information available on personnel and other records. If this study is conducted on the basis of an outside contract to a private institution, we recommend that a mechanism be found for an impartial scientist, acceptable to both the company and concerned union members to review the progress and outcome of this study. The mortality experience should also be updated beyond 1976.

V. References

1. Occupational Diseases: A Guide to Their Recognition, NIOSH (1977).
2. D.H. Wegman, J.M. Peters, R. Jaeger, W. Burgess, L. Boden. Vinyl Chloride: Can the Worker Be Protected: New England Journal of Medicine. 294: 653-657 (1976).
3. Current Intelligence Bulletin: Acrylonitrile. NIOSH (1977).
4. Proceedings of Styrene - Butadiene Briefing. NIOSH (1976).
5. C. Meester et al. Mutagenicity of Styrene and Styrene Oxide. Mut. Research 56: 147-152 (1977).
6. NIOSH Criteria Document: Occupational Exposure to Formaldehyde. (1976)
7. NIOSH Criteria Document: Occupational Exposure to Phenol. (1976)

VI. Authorship and Acknowledgements

This report was written by Drs. John M. Peters and Richard R. Monson who wish to thank both the Company and Union for their excellent cooperation.

VII. Tables (attached)

DIGESTIVE AND PROSTATE CANCER - DEATHS
DISTRIBUTION BY MOST REPRESENTATIVE DEPARTMENT WORKED

<u>Cases</u> <u>Dent.</u>	<u>Prostate</u> <u>12 (8.27 Expt.)</u>	<u>Pancreas</u> <u>6 (6.87 Expt.)</u>	<u>Liver</u> <u>6 (3 Expt.)</u>	<u>Stomach</u> <u>10 (7.7 Expt.)</u>	<u>Esophagus</u> <u>6 (4.2 Expt.)</u>	<u>Colon/Rectal</u> <u>16 (15.74 Expt.)</u>	<u>TOTAL</u>
SHEET	2	3	2	3	0	5	15
RESINOK	1						1
SAFLEX	1			1		2	4
VUEPAK	1		1				2
RESIDENCES.							
FOR-ALL-EMIDE			1				1
LUSTREX	3			2		2	7
PVC		2			1	1	4
INT. PROD.							
YAKIT.	1		1	1	3	2	8
SHIPPING/MATLS.			1	1	1	1	4
YAPD	1						1
GUARDS	1				1	1	3
SHIFT POOL							
RES. - SERV.		1				1	2
OTHER (ENG., LAB., LAB., STOREROOM)	1			2		1	4

MONSANTO SPRINGFIELD PLANT

INTESTINE AND PROSTATE CANCER -
DEATHS DISTRIBUTION BY EVER WORKED DEPARTMENTS

<u>Cases</u>	<u>Prostate</u> <u>12 (3.27 Expt.)</u>	<u>Pancreas</u> <u>6 (6.87 Expt.)</u>	<u>Liver</u> <u>6 (3 Expt.)</u>	<u>Stomach</u> <u>10 (7.7 Expt.)</u>	<u>Esophagus</u> <u>6 (4.2 Expt.)</u>	<u>Colon/Rectal</u> <u>16 (15.74 Expt.)</u>	<u>TOTAL</u>
<u>Dept.</u>							
SHEET	6	3	4	3	3	11	30
RESINCK	1	2	1	1	1	3	9
SAFLEX	3	1	1	3		8	16
VUEPAK	1	1	2	2	1	1	8
RESIMENES - Urea formaldehyde, melamine formaldehyde		1				1	2
FORMALDEHYDE			1				1
LUSTREX	3	2		3	5	7	20
PVC	1	2		2	1		6
INT. PROD.			1	1			2
TANK TRUCK				1			1
MAINT.	1	1	1	3	3	5	14
SHIPPING/MATLS.	1	1	1	1	1	2	7
YARD	2	1				1	4
GRAPDS	1		1		1	1	4
SHIFT POOL				1	1		2
RES.-SERV.		2		1		1	4
OTHER (ENG., LAW, LAB, STOREROOM)	2	2	1	2		5	12