

STUDY OF THE MORTALITY RATE AMONG WORKERS

EXPOSED TO VINYL CHLORIDE.

The object of this project is to establish the death rate among workers exposed to vinyl chloride and to gather up the particulars for an epidemiology^{AL} control of these workers.

Two reasons justify the substantiation of this study:

1) Vinyl Chloride would not only be responsible for a higher level of cancer of the liver where exposed workers are concerned but also for other types of cancers. In 1974, this possibility was mentioned by Monson, Peters & Johnson in their study of proportional death rate among workers exposed to vinyl chloride, published in The Lancet. We have established that in Shawinigan, men ranging from 25 to 64 years of age show a higher level of cancer of the liver, pancreas, bladder, lungs and brain than should be expected. A vinyl chloride plant was established in Shawinigan during 1943. Moreover, 20% of men who have cancer worked in vinyl chloride whereas only 4% of working men in this city work in the polymerization plant. For these reasons, we believe that vinyl chloride brings about the occurrence of cancers other than cancer of the liver.

We were recently able to track down the causes of death of 35 persons who worked in vinyl chloride. Among these 35 dead people, 28 were cancer cases. Moreover, on 20 cases of cancer of the pancreas in Shawinigan during the past 20 years, 6 persons were workers exposed to vinyl chloride.

It is therefore ~~the utmost~~ of the utmost importance to outline the mortality profile among workers exposed to vinyl chloride.

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2) The second reason that justifies the actual research project is the efficiency evaluation of the preventive measures urged by the Industry. If we establish the

these particulars in order to find out if the recommended preventive measures are efficient.

OBJECTIVES

A. General Objective:

Find out what is the effect of vinyl chloride exposure on the death rate of individuals in contact with this product while working.

B. Specific Objective:

- 1) Describe causes of death of workers exposed to vinyl chloride.
- 2) Establish the connection between mortality rate and age, personal habits such as alcohol and tobacco, length of time and level of exposure to vinyl chloride and the different plant locations where these individuals worked.

MEANS AND METHODS

A. Identify all workers in the vinyl chloride monomer industry in Shawinigan, Ville LaSalle and Varennes who had a six month exposure between the beginning of the polymerization operation in 1943 and January 1st, 1977. The identification must include the name, date of birth, social insurance number and last known address of each individual. These particulars will be obtained from the companies, the Union or from any other available source of information. The estimated number of these individuals is about 500.

B. Locate individuals who will be part of the study. We foresee no difficulty where active employees still working for the same companies are concerned. We will have to seek help from the Motor Vehicles Bureau, the Quebec Health Insurance office, the Unemployment Insurance Bureau and private investigation

agencies in order to locate the approximate 300 retired employees.

C. If individuals are dead, obtain reason for death.

D. If individuals are alive, locate their address and keep an annual contact with them.

E. For each individual included in our study, obtain information on their occupational history, their life style, their drinking and smoking habits. This information will be obtained through a questionnaire that will be handled by our investigating agent who will deal with each individual if alive and in case of death with his family.

F. Obtain information as to the importance of vinyl chloride monomer exposure for each individual. This will be done in two ways:

- 1) While contacting companies we will try to establish with them the length of exposure, the working location and the degree of exposure for each worker.
- 2) With the companies we will try to establish charts evaluating the level of exposure by occupation and by working location. These charts will enable us to find out accurately what level of exposure to vinyl chloride each worker was subjected to.

G. Organize a reference group.

In order to find out if the causes of death among workers exposed to vinyl chloride are normal or abnormal we must compare them with a reference group. In this study there is a possibility of two reference groups:

- 1) A first reference group could be made of individuals who worked during at

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least 6 months for the same companies at the same moment as the studied group and who were not exposed to vinyl chloride.

Because of its similarity with the studied group, this reference group would be ideal. However, we must realize the difficulties involved in gathering up such a group. There would be enormous problems in identifying individuals and in taking the necessary steps to locate them. Many of them are retired and the costs involved for that study would be doubled. We will not completely disregard this theory but we shall discuss its feasibility with people interested in this research.

2) A second reference group could be made of people who worked in other similar industries such as industrial chemicals, during the same period.

Because we are in the process of finishing a mortality study referring to petroleum refinery workers we will be able to use the results of the study in order to draw a parallel with this research project. However, we must be extremely careful in making such a comparison because other types of carcinogenic elements are present in the reference working environment and they could have influenced the mortality profile of the workers included in the reference group.

H. Use the Province of Quebec as a reference group because a group of workers is often compared to the general population of the community. In this case we will compare death rates among workers exposed to vinyl chloride with the general population of the Province of Quebec. It is important to note that the mortality rate is usually not as high where industry workers are concerned as it is with the population in general. The fact is that working individuals are in better health than community people of the same age. However, we have minimized this difficulty in comparing the expected death rate to the observed ones in groups of different exposure.

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I. Compare mortality rate between workers exposed to vinyl chloride monomer and the reference group as well as with the population of the Province of Quebec.

J. Establish a cardex file for workers exposed to vinyl chloride and include the findings obtained during this study as well as other particulars pertaining to the health and medical examinations of these workers. This cardex file may be used for further epidemiological observation of workers exposed to vinyl chloride.

RESULTS

From this study we can expect the following results:

1. Comparing mortality rate observed on workers exposed to vinyl chloride with the expected mortality rate obtained from the reference group or from the population of the province of Quebec and after adjusting for age, it will be possible to know if there are too many deaths where workers exposed to vinyl chloride are concerned and if these deaths occur sooner than normally.
2. By comparing the study groups with the reference group for each specific cause of mortality, we will be able to answer the question: "Are there too many cases of cancer among workers exposed to vinyl chloride?" We will also be able to know if only cancer of the liver is too high or if other types of cancer such as those mentioned in the introduction of this project are also too high.
3. We will describe occupational characteristics, alcohol consumption and smoking habits of individuals who have cancer for each cause or combined causes showing abnormal levels. This way we will be able to locate the agent responsible for this phenomenon and establish the importance of the relation between exposure to vinyl chloride and the time at which cancer actually occurs.

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4. We will compare mortality rates between the different companies and highlight the difference in the mortality rate say between Gulf and Monsanto. Because they use the same equipment, this difference could lead us to question the presence of a factor from external origin, i.e. the environment.

REQUIRED TIME FOR THIS RESEARCH

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|-----------------------------------|----------|
| 1) Formulation of questionnaire: | 2 months |
| 2) Identification of individuals: | 2 months |
| 3) Location of individuals: | 6 months |

<u>COMPANIES</u>	<u>RETIRED</u>	<u>ACTIVE</u>	<u>TOTAL</u>
MONSANTO	38	70	108
B.F. GOODRICH	8	88	96
GULF (Shawinigan)	(250)	0	(250)
(Varenne)	(5)	(20)	(25)

• Figures in parenthesis are approximate. .

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|---------------------------------------|-------------------|
| 4) Procurement of death certificates: | |
| 5) Filling of questionnaires: | 6 months |
| 6) Analysis and production of report: | 4 months |
| <u>TOTAL:</u> | <u>20 months.</u> |

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COST OF THE ACTUAL PROJECT

1) Personnel:

One professional reasearch assistant full time

\$19,500./ year (20 months) \$32,250.

One technical research assistant secretary full time

\$13,000./year (20 months) \$21,505.

Social benefits (11%) \$ 5,910.

Sub Total: \$59,665. \$ 59,665.00

2) Procedures:

Location of people 300 X \$20.00 \$ 6,000.

Inquiries 500 X \$15.00 \$ 7,500.

Classification of data \$ 1,000.

Analysis of data \$ 1,000.

Sub Total: \$15,500. \$ 15,500.00

Travelling Expenses:

For investigators 500 X \$ 5.00 \$ 2,500.

For those in charge of the research \$ 3,500.

Sub Total: \$ 6,000. \$ 6,000.00

4) Material and Equipment: \$ 1,000.

Sub Total: \$ 1,000. \$ 1,000.00

Total: \$ 82,165.00

Cost involved to sustain the research:

(Drafting of the form of procedure)

(Salary for the technical team) 30% \$24,650.

\$ 24,650.00

TOTAL: \$ 106,815.00

BUDGET JUSTIFICATION

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1) Professional Assistant:

The Professional Assistant will have a university bachelor degree and experience

in research. The average salary for a professional assistant is \$19,500. His task

will be to co-ordinate all research activities, to establish contact with Government agencies and companies, to prepare the questionnaire, to hire investigators, to make sure that the obtained data are accurate, as well as to participate to the analysis and to the publication of the findings.

2) Technical Assistant Secretary:

The research co-ordinator will be helped by a Technical Assistant Secretary. This person will be responsible for all secretarial and technical help pertaining to this research. She will also make the necessary research in Government registers. The job is open. The average secretary salary is \$13,000.00/year.

3) Location of individuals:

The average cost involved in locating individuals is \$40.00 in a private investigation agency.

Because of the experience acquired by our research group, we can do the job for about half that cost which will then be \$20.00 a case. As we foresee about 300 persons to be located, the cost involved will amount to \$6,000.00

4) Investigation:

We will pay \$15.00 for each completed investigation. We have acquired experience in prior studies and this cost seems to be the most advantageous. However, \$15.00 will not include the investigator's travelling expenses. Travelling expenses amount to an average of \$5.00 per case. These expenses are forecasted in the budget under travelling expenses.

5) Classification & Analysis of Data:

The amount of obtained data will be reasonable⁸⁵ and we believe we can handle them for the relatively low sum of \$2,000.00

6) Travelling:

Travelling expenses include communication that will take place on a regular basis between the companies and the research staff. We have forecasted 10 trips between Quebec and each location mentioned in this research.

7) The 30% involved to sustain the research will enable us to cover the cost incurred in drafting the form of procedures, unexpected expenses as well as to insure the upkeep related to the efficiency of the research team.

TERMS AND CONDITIONS OF THE
AGREEMENT.

1) Dr. Gilles Thériault, from the University of Laval, will be responsible for this research project.

2) The expenses involved in this research project should be shared among the three companies on a pro-rata basis reflecting the number of individuals that will be included in the research. The expenses should then be as follows:

MONSANTO	22%	\$23,500.00
B.F. GOODRICH	20%	\$21,363.00
GULF OIL	58%	\$61,952.00

3) Following is the breakdown of how payment should be made:

- $\frac{1}{2}$ of the sum at the beginning of the research
- $\frac{1}{4}$ of the sum when the progress report will be submitted.
This could take place about 10 months from the beginning of the operation.
- $\frac{1}{4}$ of the sum when the project will be terminated and when the final report will be submitted.

It is understood that every five months interim reports will be submitted to the companies involved.

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4) The author of this project reserves the right to publish the results of this research in a scientific publication. However, it is understood that the results will not be published before 6 months after the submission of the final report.

5) The University will not be responsible as to how the results of this study will be used.

6) None of the parties involved may be considered at fault in the carrying out of their obligations in pursuance of this agreement, if such carrying out is postponed, held up or impeached because of force majeure. Force majeure is any circumstance, outside the control of the parties involved, that they could not have possibly, within reason, been able to foresee and which they could do nothing to prevent from happening. Force majeure consists of, but is not limited to, an act of God, strikes, partial or full stoppage of work, lock-out, fires, riots, interventions by civic or military authorities, acceptance of regulations and enactment issued by any Government or legal authority, war whether it is declared or not, or because the head of research cannot continue this project because of sickness, death or departure from the University (terminated employment).