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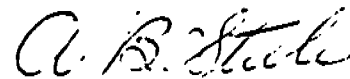
Date: July 2, 1974

From: Dr. A. B. Steele

Subject: UCC Contribution to the
SPI Presentation before
the OSHA Hearing on Pro-
posed Standards for Occu-
pational Exposure to Vinyl
Chloride

Many of you have contributed ideas and data in support of the position taken by the Society of the Plastics Industry; namely, that the actual human experience in the 36 plants operated in the United States in the manufacture of Polyvinyl chloride resins does not identify vinyl chloride as a material that impairs worker health when reasonable limits are imposed on its concentration in the workplace air. The industry's position was strengthened significantly by the testimony of our Dr. Carl U. Dernehl, who summarized the finding of no case of angiosarcoma of the liver among some 1,402 men working in 32 PVC plants even though their exposure time was sufficient for disease to have occurred and exposures were believed to have been in excess of 50 ppm on a time weighted average.

Appended for your reading and reference, please find a copy of the text submitted to SPI on the matter of industry experience as compiled and analyzed by us on behalf of SPI.


A. B. Steele

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STATEMENT OF PVC PRODUCERS IN THE UNITED STATES RELATIVE TO HEALTH
EXPERIENCE OF WORKERS IN PLANTS POLYMERIZING VINYL CHLORIDE

SUMMARY

The Department of Labor has imposed major restrictions on the exposure levels of workers in the VCM and PVC industry based on a possible connection between vinyl chloride exposure and deaths of a limited number of workers from angiosarcoma--a rare form of liver cancer. The Department's regulation on vinyl chloride limits in the workplace air is based, in part, on the findings of several scientists who report that vinyl chloride exposure in mice and rats causes cancer.

Because animal data are unreliable in measuring impact on man unless the test animal and man have been shown to have similar metabolic pathways and as such data have indicated a hazard from vinyl chloride exposure far greater than that generally experienced by workers and technicians in individual vinyl chloride monomer and polymer plants, a study was initiated to determine the actual experience in all operating plants within the United States where workers have been exposed to significant concentrations of vinyl chloride in the workplace air over extended periods of time. Reconstructions of past frequencies and levels of vinyl chloride exposure have been correlated with recent and current experience in 36 plants manufacturing PVC resins. The health status of individual workers has been determined by extensive medical examination and the cause of death of all PVC workers has been tabulated. Based on these evidences, we conclude:

- that there is no significant impairment of health to workers exposed to restricted amounts of vinyl chloride monomer for extended time periods.
- that exposures to high concentrations for short periods do not impair health; high concentrations being at or above the odor level of 250 - 300 ppm.

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- that an eight-hour time-weighted average (TWA) of 50 ppm represents a realistic exposure limit; at higher levels respiratory protection is appropriate.

RELEVANCY OF ANIMAL TOXICITY DATA

Extrapolation of animal toxicity data directly to man is fraught with gross uncertainty without prior knowledge of the manner in which man metabolizes the compound. Thus, in the case of vinyl chloride monomer, the finding of angiosarcomas in mice and rats should not be considered pertinent to man until it is demonstrated that rodents metabolize vinyl chloride in a manner and at a rate similar to man. While methods have been established for the determination of metabolites in man and rodents ⁽¹⁾, such experimental procedures have yet to be applied to vinyl chloride, leaving in serious doubt the relevancy of the animal test data that are used to brand vinyl chloride a carcinogen in man.

Because vinyl chloride is a carcinogen for rats and presumably even a more potent one for mice does not mean that the same rapid induction can or will occur in man. ⁽²⁾ The evidence provided by the industry survey ⁽³⁾ in itself is evidence that very few men have been involved to date.. Witness more than thirty years of manufacturing experience with only limited cases of angiosarcoma among more than 1500 workmen variously exposed for 15 years or more. Additionally, no case should be charged solely to vinyl chloride exposure if the victim has a history of exposure to other chemicals.

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- (1) In vitro vs in vivo chromatographic profiles of Carbaryl anionic metabolites in man and lower animals. Sullivan, L. J., B. H. Chin and C. P. Carpenter. Tox. Appl. Pharm. 22: 161-174 (1972).
 - (2) Deringer, M. K. - Journal of National Cancer Institute; 12, p. 437 - 445, October 1951.
 - (3) EPIDEMIOLOGICAL STUDY OF VINYL CHLORIDE WORKERS - FINAL REPORT - May 3, 1974: Tabershaw-Cooper Associates Berkeley, Calif. for Manufacturing Chemists Association.

LEVELS OF VINYL CHLORIDE EXPOSURE IN PVC OPERATIONS

Experience within the PVC industry generally has shown that workers exposed to vinyl chloride have maintained health status comparing favorably to that of workers in other chemical and resin operations and to other industrial populations, yet the PVC workers have been exposed to significant concentrations of vinyl chloride in the workplace air over extended periods of time and to concentrations well in excess of the limits now imposed on the industry by the present temporary OSHA standard of 50 ppm ceiling level. Attempts to quantify the levels of exposure to which workmen were subjected in past years on each job and in each plant had to be abandoned because reliable measurements of vinyl chloride levels in the workplace air over extended periods of time are generally not available. However careful examination of certain plants and of their operating data has provided insight into the vinyl chloride exposure levels of workmen in specific assignments. Case studies have been documented and support the view that there is no discernible impairment to health of workers exposed either to restricted amounts of vinyl chloride for extended time periods or to high concentrations for short periods.

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CASE STUDY-VCM EXPOSURE IN PVC SOLVENT POLYMERIZATION OPERATIONS

The solvent process as operated by Union Carbide has remained essentially unchanged as to process, recipe, equipment and operating procedures since about 1951. It is the testimony of those closely associated with the plant operation that vinyl chloride emissions are presently of the same order of magnitude in the Solvent polymer plant as has been experienced regularly over the past twenty years. Furthermore, measurements of vinyl chloride monomer in the workplace air and of exposure of operators to monomer made recently are representative of the continuing condition since 1953 in which significant and frequent excursions beyond the 50 ppm ceiling standard were experienced as determined by detection of vinyl chloride odor (250 - 300 ppm VCM assumed as the odor threshold).

Recent determinations (January and February, 1974) identified the following VCM exposures to operators in the polymerization section of the plant:

<u>Operator Number</u>	<u>Time Weighted Average - PPM - 8 Hour</u>
1.	16.9
2.	9.8
3.	23.6
4.	3.5
5.	4.8
6.	21.3

One of the tasks assigned to these operators is the taking and testing of autoclave samples to determine degree of conversion. During sampling and testing, which occurs four times each shift and requires about eight minutes to complete the task, workplace environmental levels range as high as 400 ppm

in the sampling area.

Exposure time has been gathered on all employees working this job at the Texas City plant from 1948 to the present. There were 53 such employees; 24 had more than 1 year work experience on this job; 2 employees had 12 years of exposure. None of these have liver abnormalities, based on recent medical evidence. At South Charleston where a similar line is operated with almost identical exposure levels, a similar breakdown on operators is not available due to differences in job dynamics. Nevertheless, health of PVC workers is statistically similar to that of other workers in the same plant and no case of angiosarcoma has been identified among these operators.

CASE STUDY -- IMPROVED CONVERSION OF VINYL CHLORIDE MONOMER
IN PVC SUSPENSION AND PVC DISPERSION OPERATIONS

The economic realities of the VCM resin business since 1965 have forced all resin producers to seek improved efficiencies in conversion of VCM to PVC through modification of operating procedures and plant facilities.

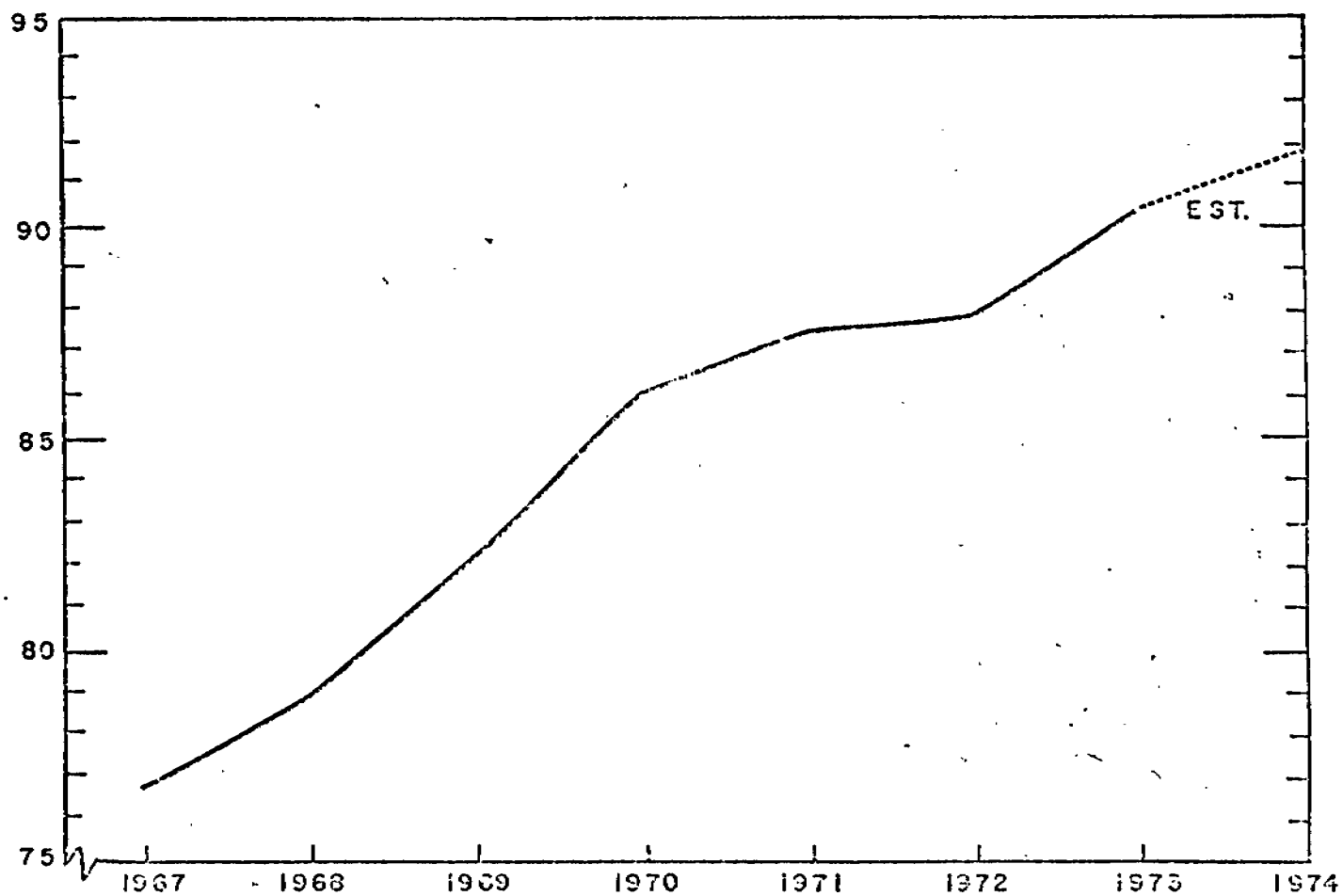
Increases in monomer efficiency (Polymer/Monomer charged x 100) from 85 per cent in 1968 to 96 per cent in 1974 in suspension resin manufacture are documented. Improved machinery for recovering VCM from vapors released in venting and stripping sections is estimated to have accounted for more than half of the improvement. Similar improvements in monomer efficiency within the PVC dispersion resin process have been recorded; i.e. 78% in 1968 increasing to 91 per cent in 1973 is representative of the improvement. While such increases in monomer efficiency were oriented toward economic considerations, reductions in monomer lost to the air lessened the amount that emitted to the workplace atmosphere. Graphs A and B record the annual improvements being achieved in monomer efficiency in polymer production of both suspension and dispersion resins.

Recent measurements within both PVC suspension and dispersion operations established that maximum VCM levels in the workplace air approximated 30 ppm TWA (eight hour) at a ceiling of 45 ppm. Based on the known improvement in monomer efficiency, it is certain that the VCM levels in the workplace environment in 1974 are below those of prior years when recovery was less efficient; and that PVC workers in the prior years were exposed to significantly higher concentrations than is presently experienced.

The employee health records of workmen operating in the majority of the plants where the data show a significant and continuing reduction in VCM losses from the experience of 1967 show no measurable deterioration in the health of the workmen exposed during this period.

POLYVINYL CHLORIDE DISPERSION RESIN OPERATIONS
VINYL CHLORIDE EFFICIENCY
TOTAL POLYMER/MONOMER CHARGED X 100

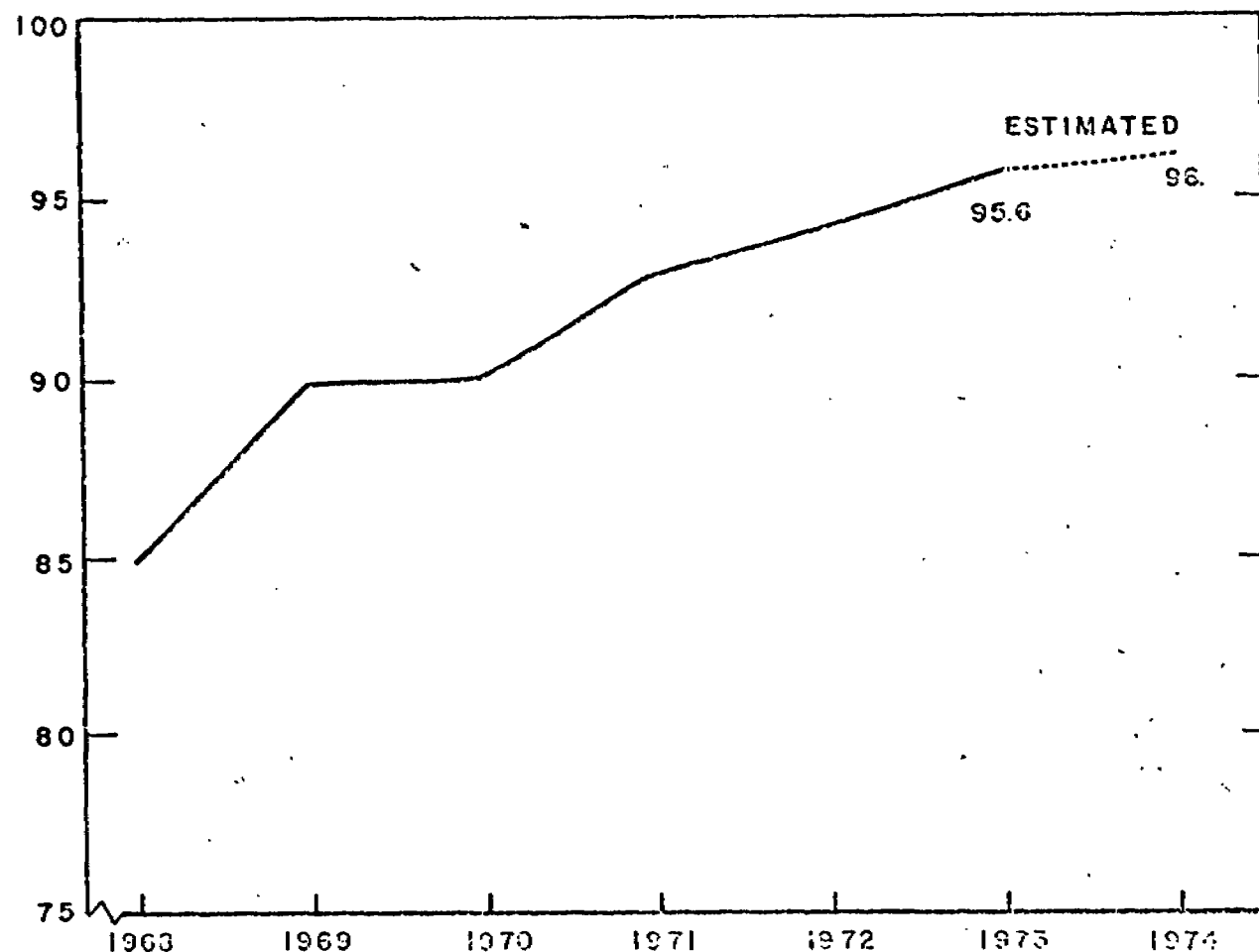
EFFICIENCY
PER CENT



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POLYVINYL CHLORIDE SUSPENSION RESIN OPERATIONS
VINYL CHLORIDE EFFICIENCY
TOTAL POLYMER/MONOMER CHARGED X 100

PER CENT



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CASE STUDY - PVC SUBSTITUTION PLAN - DOW CHEMICAL COMPANY

Testimony of V. H. Fowe
at Public Hearing on VCM (OSHA)
February 15, 1974

"Our Polymer Plant #1 was operated from 1946 to 1972. Between 1950 and 1959, several industrial hygiene surveys were conducted. A number of job classifications (polymerizer operators, drier operators, monomer still operators, and monomer transfer operators) had workplace environmental levels ranging from 50 to 385 ppm vinyl chloride. After installation of a continuous analyzer for the workplace air in 1959, improvements were achieved. Vinyl chloride TWA values ranged from 25 to 85 ppm during the period 1960 - 1967."

"Our present Polymerization Plant, Polymer Plant Number Two, began operation in 1953. Historically the TWA values have been decreased over this period of time. In the early history, TWA values of 105 - 240 ppm were observed. During 1973, TWA values for vinyl chloride in the air were in the 1 to 25 ppm range." *

* Mutchler, J. E. Kramer, C. G. - "Report on Relation of Exposure to State of Health of Dow Chemical Workers" - Gordon Conference, Tilton, N.H., August, 1968 - TLV Citation

INDUSTRY PROFILE

PVC resin production in the United States approximated 4,600,000,000 pounds in 1973:

Number of producers (domestic)	22
Number of Plant locations	36
Number of producers by process:	
Suspension	- 22
Dispersion	- 10
Bulk Non-solvent	- 4
Solvent	- 1
Emulsion	- 3

Number of Production Workers: 5,045

Relative to the number of domestic plants manufacturing PVC resins, only four plants have been identified as having a possible connection between vinyl chloride exposure and the development of angiosarcoma in workmen; ten of the twelve cases being traced to two plant locations.

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PVC PLANT LOCATIONS
U.S. PRODUCERS - 1974

<u>PVC Plant No.</u>	<u>Plant Startup Date</u>	<u>No. of PVC Workers</u>	<u>Reported Cases Angiosarcoma</u>
1	1957	64	0
2	1963	46	0
3	1961	80	0
4	1963	155	0
5	1946	75	0
6	1966	158	0
7	1968	120	0
8	1954	130	0
9	1953	300	0
10	1960	40	0
11	1970	55	0
12	1946	300	3
13	1956	60	0
14	1956	27	0
15	1956	76	0
16	1966	140	0
17	1963	187	0
18	1936	272	1
19	1947	140	0
20	1959	74	0
21	1955	150	0
22	1950	74	0
23	1971	30	0
24	1953	241	0
25	1965	200	0
26	1947	350	1
27	1965	70	0
28	1965	180	0
29	1942	266	7
30	1969	90	0
31	1955	98	0
32	1968	150	0
33	1965	95	0
34	1967	160	0
35	1957	70	0
36	1949	322	0

UNITED STATES PVC PLANTSDURATION OF RESIN MANUFACTURE

<u>Span of Operations</u>	<u>Number of Plants</u>
1 to 5 Years	3
6 to 10 Years	9
11 to 15 Years	6
16 to 20 Years	8
21 to 25 Years	4
More than 26 Years	6

GENERAL CONSIDERATIONS

Various parties involved in considering the possibility that vinyl chloride monomer is a causative agent of angiosarcoma in humans recognize:

- that as of this date no definite connection has been established between angiosarcoma among workers and any of the major chemical raw materials used in polymerization of PVC. However, vinyl chloride monomer, being a volatile chlorinated hydrocarbon, is the primary target due to its being the abundant raw material to which workers might have had the most exposure.
- that vinyl chloride is not the only raw material involved in resin production in the two plants where multiple cases of angiosarcoma have been identified among workers; acrylates, vinylidene chloride among others have been listed as additional reactants.
- that no rationalization has yet been published as to why the lack of angiosarcoma among workers in the vast majority of PVC plants employing the same basic processes for resin manufacture; none among workers in other plants of the same producers reporting multiple cases of angiosarcoma in single plant locations.
- that the development of angiosarcomas of the liver developed in animals exposed to vinyl chloride has been used to postulate that VCM is the etiologic agent in the excess of deaths due to angiosarcoma of the liver in PVC workers. A study of the possible impact of exposure in other work situations, of the eating and drinking habits of the afflicted workers, and of other complicating health problems has not been made.

The National Institute for Occupational Safety and Health (NIOSH) has branded VCM as a potential health hazard to PVC workers primarily on the basis of inductive reasoning. Yet the health experience of workers in the 36 PVC polymerization plants indicates that no serious health problems exists generally in PVC plants with but two exceptions.

A. B. Steele

May 28, 1974

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THE SOCIETY OF THE PLASTICS INDUSTRY, INC.

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QUESTIONNAIRE RESULTS ON VINYL CHLORIDE EXPOSURE

EXPOSURE LEVELS

1. Odor of vinyl chloride monomer present throughout much of the day.
NO - 21 plants, YES - 7 plants; Average number of years - 7.7
Before 1960 - 6 plants, 1960-1970 - 3 plants, After 1970 - 1 plant
2. Odor of VCM present occasionally during the work day.
NO - 3 plants, YES - 25 plants; Average number of years - 11.3
Before 1960 - 10 plants, 1960-1970 - 23 plants, After 1970 - 19 plants
3. Odor of VCM a rare event in any work day.
NO - 3 plants, YES - 25 plants; Average number of years - 2.9
Before 1960 - 0 plants, 1960-1970 - 6 plants, After 1970 - 25 plants
4. Have there been process or processing changes introduced which have resulted in an increased escape of VCM?
NO - 23 plants, YES - 5 plants; Average number of years - 2.6
Before 1960 - 2 plants, 1960-1970 - 3 plants, After 1970 - 1 plant
5. Have there been process or processing changes introduced which have resulted in a reduction in the escape of VCM?
NO - 1 plant, YES - 27 plants
Before 1960 - 4 plants, 1960-1970 - 12 plants, After 1970 - 24 plants
6. Do you have environmental measurements prior to 1970?
NO - 24 plants, YES - 4 plants

PERSONNEL EXPOSURE DATA

1. When did the plant start to work with VCM?
1940-1950 - 4 plants, 1951-1960 - 12 plants, 1961-1970 - 10 plants
1971- 1974 - 2 plants

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2. How many employees are working with VCM?

Total - 3957 employees, Average per plant - 141 employees

3. How many employees are still working for you who once worked with VCM but do not do so now?

Total - 1503 employees, Average per plant - 54 employees

4. Of the persons identified in 2 and 3 above give the number who have been exposed for the following time intervals.

	<u>Total employees</u>	<u>Average per plant</u>
More than 1 and up to 10 years	3515	126
10 and up to 15 years	611	22
15 and up to 20 years	286	10
20 and up to 25 years	244	9
25 years and more	128	5

5. Of the persons identified in 2 and 3 above give the number falling within each latent period given below and considering only employees with more than one year of service. A latent period is the time lapse from first exposure to the present date.

	<u>Total employees</u>	<u>Average per plant</u>
More than 1 and up to 10 years	2916	104
10 and up to 15 years	768	27
15 and up to 20 years	354	13
20 and up to 25 years	257	9
25 years and more	128	5

DATA FROM CURRENT EXAMINATION PROGRAMS

1. Give the number of persons who have been examined since January, 1974.

Total - 7232 employees of which 2775 include retirees and 4457 exclude retirees

2. Were liver profile studies made?

NO - 3 plants (representing 132 employees), YES - 25 plants (representing 7100 employees)

3. Did the studies include at least bilirubin, SGOT, LDH and alkaline phosphatase?

NO - 3 plants (representing 132 employees), YES - 25 plants (representing 7100 employees)

4. How many of those examined showed an abnormality in:

	<u>Total employees</u>	<u>Average per plant</u>	
one test	957	56 (17 plants)	
two tests	162	11 (15 plants)	
three tests or more	78	8 (10 plants)	
	<u>% of total</u>	<u>% of those incl. retirees</u>	<u>% of those excl. retirees</u>
one test	13.2	34.5	21.5
two tests	2.2	5.8	3.6
three tests or more	1.1	2.8	1.8

5. Have you had any cases of angiosarcoma?

NO - 22 plants, YES - 3 plants, Incomplete data - 2 plants

6. Was this determination made by your own survey?

NO - 2 plants, YES - 22 plants, Partly - 1 plant, Incomplete data - 2 plants

7. What percent of the total exposed population was covered in the survey?

95.5% of total exposed

8. Were retired personnel included?

NO - 14 plants, YES - 9 plants, Not applicable or no data - 2 plants

9. Were persons who had left your employ and gone to work elsewhere included?

NO - 19 plants, YES - 8 plants

10. Did you review causes of death of those who died while still employed by you?

NO - 3 plants, YES - 22 plants, Not applicable - 2 plants

11. Did your plant participate in the Tabershaw-Cooper epidemiologic survey?

NO - 7 plants, YES - 20 plants

I am Carl U. Dernehl, M. D., Associate Medical Director of Union Carbide Corporation, testifying on behalf of the Society of the Plastics Industry. I am a board certified specialist in Occupational Medicine and have been practicing this specialty for more than 30 years. For 8 of these years I had medical supervision of a vinyl chloride monomer plant's employees and employees of a polyvinyl chloride plant. I have held teaching appointments at the Medical Branch of the University of Texas, the Baylor Medical School and, at present, at the Medical School of New York University.

The Society of the Plastics Industry has conducted a health survey of the polyvinyl chloride producers. This survey was conducted to determine if there are factories in which vinyl chloride exposure occurs and in which there have been no cases of angiosarcoma of the liver even though adequate exposure had occurred. Adequacy of exposure must be judged both by time and concentration of the toxicant.

In this survey, 36 plants of 20 producing companies were covered. Plants in which cases of angiosarcoma had occurred were discarded from the data. Because the most brief exposure period reported in existing cases was 12 years, all plants with 10 years operating experience or less were also discarded from the data as having exposure time insufficient to result in evidence of disease by current criteria. Accordingly, the data

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covers 16 company plants which employ 2,372 persons currently in work permitting exposure to vinyl chloride, plus 1,471 persons who had worked with vinyl chloride in the past but do not do so now. Thus the survey is looking at 3,843 persons some of whom have not worked long enough to expect the disease to become evident.

However, 787 persons had worked more than 10 years with vinyl chloride and 1,402 persons had a time lapse since first exposure to vinyl chloride of more than 10 years. This last figure, called a latent period, does not require constant exposure but it covers those persons who may in the past have worked with vinyl chloride but do not do so now. The data shows 104 persons have been exposed to vinyl chloride for more than 20 years, but 416 persons have a time lapse from first exposure to the present time of 20 years or more. There are those who insist that any exposure to a carcinogen however remote in time initiates changes which ultimately result in cancer formation. If this be so, then we must accept the fact that we have here 1,402 persons who have the necessary time element for some of them to develop cancer. In addition, over one half of these 1,402 people have been continuously exposed for more than 10 years to vinyl chloride.

Having established that sufficient exposure in terms of time has occurred, attention must be directed toward the concentration of vinyl chloride in the air of the work place. Only 2 out of 16 plants indicated

existence of measurements of the environment prior to 1970. Because of the scarcity of data, the presence or absence of the characteristic odor of vinyl chloride was used as a measure of exposure. Vinyl chloride is believed to have an odor threshold in the vicinity of 250 ppm. Therefore, if the odor is detectable, vinyl chloride is present at least in a concentration of 250 ppm. The concentration may be much higher.

Three guide lines of exposure were used. The heaviest was when the odor of vinyl chloride was present most of each work day. Intermediate exposure was when the odor of vinyl chloride was present occasionally during a work day. Light exposure was when the odor of vinyl chloride was a rare event on any work day. Four companies reported that the odor of vinyl chloride was detectable most of the work day prior to 1960. Between 1960 and 1970 this condition was present in only 2 cases and after 1970 it no longer occurred.

All 16 of those reporting stated that the odor of vinyl chloride was present occasionally during the work day at some time in the plants history. Eleven said this occurred prior to 1960. During 1960 to 1970 the number increased to 15 cases and from 1970 to date the number is 10. It is interesting to note that in 3 cases there were process changes reported as occurring during 1960-1970 which resulted in increased escape of vinyl chloride thus largely accounting for the increased incidence of exposure.

The low exposure level reflects the general improvement which has been occurring in the industry. Before 1960 the detection of vinyl chloride odor was never a rare event but was common as already indicated. During 1960-1970 the situation improved where 4 of those reporting stated that odor detection was a rare event. In the period since 1970 this number has increased to 15 of the 16 reporting. There is some conflict in reports between intermediate exposure and light exposure after 1970. Thus 10 plants reported occasional exposure during a work day and 15 plants reported that exposure was a rare event. This discrepancy cannot be explained but it really is not too important since it refers only to the last four years.

In brief the data show that the 1,402 men not only had a significant time element in their work exposure but they also were exposed for much of the time to what must surely have been considerably more than a time weighted average of 50 ppm in recent years and most probably in excess of 250 ppm in years prior to 1960.

Since January 1, 1974, a total of 3,285 examinations have been made on employees of which 872 were made on retirees. The examination of 3,249 of these men included the liver profile tests found in the SMA-12, namely, bilirubin, SGOT, LDH and alkaline phosphatase. Fifteen per cent of those examined had an abnormal test result in one of the four tests in

the liver profile. This falls within the levels of abnormality we in Union Carbide have observed in approximately 900 employees who have not been exposed to vinyl chloride and also in 400 office personnel not exposed to any chemicals in their work place. The frequency of abnormalities in 2 tests (2.7 per cent) and 3 tests (1.3 per cent) in the same person also are comparable with control groups. This evidence suggests that workers in this survey group are not significantly different from their fellow workers who are not exposed to vinyl chloride in regard to liver function tests.

In summary, this survey has disclosed the existence of 1,402 men having a latent period of exposure to vinyl chloride of more than 10 years. Four hundred sixteen of them had a latent period of more than 20 years. Also, 787 men were exposed to vinyl chloride for more than 10 years with 104 of them being exposed for more than 20 years. Based upon odor recognition it is estimated that these men were exposed to a time weighted average of at least 50 ppm and in earlier years to much more than this. Examinations of these men have failed to show the existence of abnormal liver function tests in greater proportion than would be found in a control population. There is no case of angiosarcoma of the liver among these 1,402 men even though their exposure time is sufficient for disease to have occurred and exposures are believed to have been in excess of 50 ppm.

This absence of cases of angiosarcoma is supported by the independent epidemiological study conducted by Tabershaw-Cooper Associates for the Manufacturing Chemists Association who also found no new cases of angiosarcoma of the liver. A copy of the Tabershaw-Cooper study is attached for the record.

The plants in which cases of angiosarcoma have been found have an employment of 1,188 persons. The finding of 13 cases results in a ratio of one angiosarcoma for each 91 employees. If these plants are the same as the plants in this survey the incidence of angiosarcoma should be in the same ratio and we should have found 21 cases. The fact that not one case was found cannot be ignored. There are people in the survey group who have the same latent period as those seen in cases of angiosarcoma. This suggests that the difference lies in the degree of exposure which in the survey group is estimated at more than 250 ppm in early years and about 50 ppm in recent years.

We submit that these data fail to support the need for an exposure level as drastic as that proposed in the Standard, and in fact, these data suggest that the level of 50 parts per million proposed in the temporary emergency standard was not unrealistic.

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To: (See Attached Distribution List)

Date: July 9, 1974

JUL 12 1974

R. N. WHEELER, JR.

Subject: Comments on Proposed Standard
For Occupational Exposure to VCM

The testimony to date clearly established that an assessment of the risk of VCM exposure at any level was made impossible by the absence of medical knowledge. Under such circumstance, all uncertainties must not be resolved in favor of health safety as proposed by OSHA in setting non-detectable limits on VCM.

Since the appropriate threshold level for safe toleration of VCM is unknown, OSHA proposes to protect against the unknown by simply assuming that exposure to any VCM presents a health hazard.

In doing so, OSHA disregards the documented human experience - SPI, Dow and Carbide testimony - which provides direct evidence to the contrary; namely, that exposure of workmen to moderate amounts of VCM over extended periods does not present a health hazard.

We must emphasize that our proposal rests not on the view that VCM exposure of workmen represents no risk but rather on the view that given the evidence, no substantial danger of angiosarcoma of the liver has been proven to exist with exposures of workmen to any moderate VCM concentrations (50 - 250 ppm, TWA - 8hr.) We hold that OSHA must base its limits of exposure on proof of a demonstrable hazard to emphasize health rather than a conjecture as to the possible relationship of incidence of disease vs. VCM exposure levels.

A. B. Steele

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BACKGROUND INFORMATION ON VINYL CHLORIDE AND EMPLOYEE HEALTH

Union Carbide has been producing polyvinyl chloride in South Charleston, West Virginia, since 1935, and in Texas City, Texas, since 1947. The company stopped producing vinyl chloride monomer several years ago and now purchases the monomer from other companies.

Even before the discovery of a possible relationship between exposure to vinyl chloride monomer and angiosarcoma (a rare type of cancer that affects the blood vessels of the liver), the company's work practices have been directed toward minimizing workers' exposure to any chemicals -- including vinyl chloride.

Union Carbide's vinyl chloride plants are operating well below the limit set by the U. S. government for worker exposure to vinyl chloride monomer. The government standard is 50 parts per million of vinyl chloride monomer and the level of exposure at Union Carbide plants is 25 parts per million on a time-weighted average, with some personnel operating positions at time-weighted average levels as low as 5 parts per million.

Personnel monitors are being used by the company to evaluate the degree of exposure to vinyl chloride by individual workers. In addition, the air at the workplace is being monitored and when these indicate concentrations above 50 parts per million air masks are required to be worn by workers in the area. This is done about 5 per cent of the time for two-thirds of the operating positions.

When B. F. Goodrich disclosed early this year that several of its employees who worked in the polymerization of vinyl chloride had died of angiosarcoma, Union Carbide began a review of the medical records of its current employees and the medical and death records of former employees.

To date, this review has turned up one case of angiosarcoma and another possible case of the liver disease. The first case resulted

in the 1968 death of an employee who had worked in vinyl chloride polymerization at South Charleston from 1944 to 1962. This death was reported to the National Institute of Occupational Safety and Health on February 28.

In mid-March, Union Carbide learned of a liver ailment of an employee who worked in vinyl chloride polymerization from 1942 to 1964. This illness was reported to NIOSH as adenocarcinoma, as it was initially diagnosed by several pathologists. Subsequently the National Cancer Institute disclosed at a meeting of the New York Academy of Sciences on May 10 that this case had been diagnosed as angiosarcoma. Union Carbide has requested written confirmation of this diagnosis so that the employee and other employees can be informed.

Union Carbide provides periodic health checks for its employees and those who have been working with vinyl chloride for ten years or more will receive medical examinations every six months. All of the company's vinyl chloride workers have been reexamined since February 1974. In addition, the company has joined with Local 598 of the International Association of Machinists and Aerospace Workers in assisting a medical research team from the Mt. Sinai School of Medicine, New York, to further examine the vinyl chloride workers.

Union Carbide is stepping up efforts to lower vinyl chloride emissions by improving equipment and developing new engineering concepts, as well as to provide advanced instrumentation to monitor vinyl chloride emissions.

The company is also participating in several industry-wide studies to learn more about the problem and how to deal with it. These studies are being sponsored by the Manufacturing Chemists Association.

the Society of the Plastics Industry and the National Institute of Occupational Safety and Health.

On May 10, the Occupational Safety and Health Administration proposed that the level of vinyl chloride monomer exposure at plants be lowered from the present temporary standard of 50 parts per million to a "no detectable"* level. However, there is no technology or operating procedure at present to achieve this reduction. One alternative would be to insist that workers wear air masks in the vinyl chloride operating area. Experience has shown this to be extremely impractical. Thus, if the proposed standard becomes permanent, and a person in the work area can never be exposed to more than $1\frac{1}{2}$ parts per million of vinyl chloride monomer, Union Carbide will find it virtually impossible to operate its vinyl chloride units.

*OSHA has defined "no detectable" level as one part per million plus or minus 50 per cent.

NIOSH visited plant weeks starting June 10, 17 ~ led by James (Jay) Jones
{ Dispersion Vinyls
 Solvent Vinyls
 NGS-2 (Dyneal) Resin

VCM

Oct. 74 - Oct. 75	40 ceiling	25 TWA	SPI proposal
Oct. 75 - Oct. 76	25 ceiling	no TWA	
Oct. 76	25 ceiling	10 TWA	

Get Bert Murray & evaluate community exposure to VCM

1. 3/11/74 first community sampling for vinyl chloride monomer
2. Air sampling has been done by:
 - a. Grab samples ~ syringe & analyzed by gas chromatograph detectability 60 ppb
 - b. Carbon tube sampling & analyzed by gas chromatograph detectability < 1 ppm
3. Thirty samples in community
> " " in plant areas outside of vinyl & dyneel units