

STATE OF NEW YORK

COUNTY OF NEW YORK

AFFIDAVIT OF DAMON L. ENGLE

Damon L. Engle, being first duly sworn upon oath deposes and states as follows:

That he is a chemist and that he is Plant Manager of the Texas City, Texas plant of Union Carbide Corporation, applicant herein; that polyvinyl chloride resins ("PVC") are produced at the Texas City plant; that among his duties and responsibilities, he is responsible for bringing the Texas City plant into compliance with Occupational Safety and Health Standard §1910.93q issued on October 4, 1974; that he makes this affidavit in support of a temporary variance from the enforcement of §1910.93q (g) (1) of the Occupational Safety and Health Standard for Exposure to Vinyl Chloride ("VCM").

I. Union Carbide Corporation seeks a temporary variance for 26.5 percent of the employees directly involved in polyvinyl chloride production at its Texas City plant, and potentially subject to vinyl chloride monomer exposure.

Union Carbide's Texas City plant is a large petrochemical complex employing 2306 people. In addition, there are currently 220 people on the premises employed by various contractors. Within this complex there are three major production facilities producing polyvinyl chloride from vinyl chloride (Exhibit I); a solvent vinyl resin plant producing 100,000,000 pounds per year; a suspension

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vinyl resin plant producing 175,000,000 pounds per year; and a non-solvent vinyl resin plant producing 25,000,00 pounds per year. A total of 351 employees are required to support the vinyl resin (PVC) production facilities, 234 of whom are directly involved in and thus potentially or actually exposed to vinyl chloride monomer (VCM).

Union Carbide Corporation is seeking a temporary variance only with respect to the reaction area of its Texas City suspension and non-solvent vinyl resin facilities (Exhibit II). These facilities employ only 62 people directly in the manufacturing operation (26.5 percent of the employees directly involved with PVC and VCM). All other operations involving VCM or PVC within the Texas City plant will fully meet the requirements of the standard for exposure to vinyl chloride.

II. Union Carbide Corporation has substantially reduced employee exposure to vinyl chloride at its Texas City plant since January of 1974.

Union Carbide Corporation has achieved this substantial reduction in employee exposure to vinyl chloride (VCM) by installing automatic analyzers; modifying existing equipment; revising work procedures; installing new and improved equipment; conducting employee training programs; and changing the resin processes after extensive study of vinyl chloride emission control technology. Some typical examples of how these steps have effected a substantial reduction in VCM exposures are as follows:

1. Solvent Vinyl Resins Area

<u>Job Description</u>	<u>VCM Exposure - 8 hr. TWA</u>	
	<u>May 1974</u>	<u>January 1976</u>
Autoclave Operator	3.5 to 23.6 ppm	0.22 to 8.10 ppm
Stripping Operator	1.1 to 2.8 ppm	0.34 to 0.65 ppm

2. Suspension Non-Solvent Resins Area

<u>Job Description</u>	<u>VCM Exposure - 8 hr. TWA</u>	
	<u>May 1974</u>	<u>January 1976</u>
Reaction Operators	4.0 to 18.3 ppm	0.88 to 2.95 ppm
	6.1 to 58.7 ppm	0.29 to 13.09 ppm
	7.3 to 310.5 ppm	0.71 to 1.64 ppm
Utility Operator	1.5 to 18.6 ppm	0.25 to 4.84 ppm
Dryer Operator	2.7 to 403.6 ppm	0.75 to 8.07 ppm

Exhibits III and IV show detailed personnel monitoring of a number of jobs within the vinyl resin production facility. Exhibits V and VI show the downward trend of the average vinyl chloride exposure within the areas devoted to vinyl resin production.

While the drop in employee exposure to vinyl chloride as measured by personal monitoring has been substantial the results of monitoring by the automatic analyzers (chromatographs) for January 1976 more clearly defines the potential for employee exposure. These analyzers operate 24 hours a day seven days per week; therefore, there is no likelihood of missing vinyl chloride emissions, i.e. by sampling during a low concentration period. The sample points, too, are at locations adjudged to be most troublesome.

Exhibit VII shows the potential for the Solvent Vinyl Resin area. The reactor area, shown by points one through nineteen, indicates a need for further work to achieve the VCM standards permissible exposure limits of 1 ppm 8 hr. TWA and 5 ppm maximum, but the goal appears to be well within Union Carbide's grasp. The Solvent Vinyl Resin processing area, as shown by points 21 through 39, is in substantial compliance, and we anticipate no continuing problem therewith.

Exhibit VIII shows the status of the Suspension Non-Solvent Vinyl Resins area. The reactor area, as shown by points 1 through 19, indicates a need for a great deal of work. The average concentration is in excess of 2 ppm. Variability results invaluability excursions within a range of six through ten ppm. A limit below which ninety-five percent of the values fall would be in excess of 10 ppm. The suspension non-solvent resin processing area similarly indicates a need for a fair amount of work. But we anticipate in this area to be in compliance with the standard by April 1, 1976.

To summarize, Union Carbide Corporation has already substantially decreased employee vinyl chloride exposure since January 1974 and further reductions will be made in certain areas prior to April 1, 1976.

III. Union Carbide Corporation is committed to the reduction of employee vinyl chloride exposure. We have made a maximum personnel and financial commitment to develop feasible engineering and work practice controls to achieve full compliance with the OSHA standard.

Union Carbide, as a matter of corporate policy, has always been active in the study of health effects resulting from chemicals exposures, and in minimizing of exposure of employees to chemicals that may indeed be hazardous. Thus, we have maintained a fellowship in industrial toxicology at Mellon Institute (now Carnegie-Mellon) Pittsburgh, Pennsylvania for many years. Each large Union Carbide chemicals plant has a fully staffed industrial hygiene group. In addition, the Corporation has freely made its information and resources available for widespread cooperative industry efforts in the fields of toxicology, epidemiology, and industrial safety.

The results of these policies and practices are well represented in the Texas City plant which I manage. For example, the principle of good ventilation which we follow dictates that the only fully enclosed manufacturing buildings are control rooms where sensitive instruments (as well as employee comforts) require such action. The use of solvent cleaning as opposed to manual cleaning for PVC resin reactors was pioneered by Union Carbide, and is in use at Texas City in all reactors where the technology is applicable. The medical surveillance program required by the OSHA VCM standard is very similar to that in use by Union Carbide Corporation for a number of years.

The receipt of data indicating that vinyl chloride was a carcinogen and the issuance of OSHA's VCM regulation resulting therefrom, touched off a maximum commitment of corporate resources

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to the reduction in employee vinyl chloride exposure. Our program for control of vinyl chloride exposure has been based on the following steps:

1. Education and training of employees with regard to the hazards of vinyl chloride.

2. Immediate correction of the obvious problem areas of high vinyl chloride exposure. For example, all control rooms have been provided with uncontaminated air supplies.

3. Development of analytical tools to determine the full extent of the vinyl chloride exposure problem. For example, the Texas City polyvinyl chloride facility is fully monitored by four automatic analyzer systems providing up-to-the-minute data on the concentration of vinyl chloride in the workspace air. These instruments were designed and built by Union Carbide Corporation personnel.

4. Location of problem areas via the new analytical tools. The low permissible exposure limits imposed by the OSHA standard made even minor leaks or emissions major problems. For example, high workspace air concentrations in the solvent vinyl resin processing area were traced to inefficient still operation in another area, which resulted in appropriate corrective measures.

5. Development of solutions to the workspace air vinyl chloride concentration problems. The solution to a particular problem in some cases required a change in work procedure; in others, new equipment; in others, revision of existing equipment;

in some instances, a combination of all three. For example a still in the solvent vinyl resin area was provided with a new base section; operating conditions were revised; and additional quality control testing was initiated.

6. Implementation of the problem solutions. This step was the most time-consuming, particularly when new equipment had to be designed, purchased and installed.

7. Restudy of the system for other remaining problems and to achieve the low permissible exposures is an essential part of the program. Where there were many large and small problems previously one tended to mask the existence of another which could be corrected only when discovered. In addition, as vinyl chloride concentration is reduced, the amount of effort and money to achieve further reduction increases with geometrical rapidity.

While it is not possible to show in detail each problem and its solution, Exhibit IX lists the major items. Union Carbide Corporation's commitment in terms of financial resources is shown in the following tabulation:

New Investment

Solvent Vinyl Resins.....	\$ 975,000
Suspension Non-Solvent Resins.....	\$1,420,000
Total.....	\$2,395,000

Expense

Non-Recurring	
Solvent Vinyl Resins.....	\$ 75,000
Suspension Vinyl Resins.....	\$ 325,000
Sub Total.....	\$ 400,000

Recurring Annually	
General Plant Costs*.....	\$ 500,000
Research and Development.....	\$ 250,000
Sub Total.....	\$ 750,000

Total Recurring and Non-Recurring Expense.....\$1,150,000

*General plant costs cover industrial hygiene, medical, laboratory and other supporting costs.

In addition to the new investment and expense to date, Union Carbide Corporation is planning further expenditures as follows:

Solvent Vinyl Resins.....	\$ 350,000
Suspension Non-Solvent Vinyl Resins.....	\$4,250,000
Total Planned Expenditures.....	\$4,963,000

8. Provision of respirators for all affected employees for use as required, and maintenance of such equipment.

9. Establishment of a medical surveillance program as required by the standard.

10. Designation and posting of solvent, suspension and non-solvent resin areas as regulated areas.

11. Writing an operational plan for emergency situations.

12. Installing monitoring facilities, as shown in Exhibit XII accompanying this affidavit.

13. Establishment of a system for maintaining the necessary OSHA-required records; making the required reports; and labelling polyvinyl chloride containers.

Based on the foregoing matters, Union Carbide Corporation has demonstrated that it is committed to the reduction of employee vinyl chloride exposures to the permissible limits required by the OSHA standard.

IV. The Reasons for Union Carbide Corporation Variance Request

Despite a major effort on the part of Union Carbide Corporation to develop and implement vinyl chloride engineering and work practice controls and procedures to limit employee exposures to the permissible limits imposed by the OSHA standard, concentrations of vinyl chloride monomer in the suspension non-solvent reactor area will unavoidably be in excess of the permissible limits for a year. Union Carbide Corporation, therefore, needs a temporary variance from the standard for the reasons set forth below. While we ask for a continuation of subsection (g) (1) of the standard for one year as allowing employee discretion on respirator usage up to 25 ppm per fifteen minute period, our situation is such that we would have no difficulty in being confined to a 10 ppm ceiling on such employee discretion. Rarely, if ever, such has been our progress to date in meeting the standard, will employees be even potentially exposed to any higher concentrations.

1. The Environmental Protection Agency has designated vinyl chloride a hazardous pollutant and is proposing a national emission standard to be promulgated no later than June 20, 1976. Contrary to normal practice, EPA proposed standard involves control of emissions outside a plant premises through specification of plant

equipment and operating procedures, which necessarily overlaps the OSHA standard on in-plant vinyl chloride exposures.

The OSHA standard, while severely restrictive, can be characterized as a performance standard. Employee exposure in other words, was to be limited to 1 ppm 8 hour TWA (5 ppm 15-minute ceiling) by any feasible engineering or work practice means without detailed specification of what they might be. This standard wisely imposed no limit or restraint on technology. By contrast, the proposed EPA standard specifies equipment to be used, such as: the type of pump seal; the type of compressor seal; the leak detection equipment and procedure; and many other similar items, even including a sampling procedure. The EPA standard, when promulgated, will force each employer including ourselves to revise the engineering and work practice program developed for OSHA compliance to meet the new requirements imposed on the exact same area by EPA.

Since the content of the final EPA standard will not be known until June, and the current proposal contains many items of questionable validity; we at Texas City can't possibly afford to try to anticipate its content in our engineering program.

Thus it can be said that the overlap between the OSHA standard and the proposed EPA regulations is delaying our full implementation of the OSHA standard by more than six months, measured from the EPA proposal's promulgation and including the time required to formulate a program acceptable to both government agencies. Union Carbide Corporation expects to be forced to delay

major capital expenditures in the polyvinyl chloride area until the impact of the EPA regulation is known; understood; and translated into practical compliance action. Union Carbide Corporation, as well as others, has submitted a written commentary on the proposed EPA regulation pointing out questionable areas and suggesting changes (Exhibit X) which are now being considered.

2. The use of respirators in the Texas City plant's suspension non-solvent polyvinyl chloride reactor area will be excessive. After a careful review of ongoing work and anticipated results, Union Carbide Corporation can fully comply with the OSHA standard as it applies to 73.5 percent of the directly involved employees of the Texas City plant. The remaining 26.5 percent of the employees, those working in the suspension non-solvent reactor area, will have to wear some form of respirator 30 percent of the time. A closer study of this problem shows that 42 operating people will average 20.8 percent of the time in respirators while twenty maintenance people will average fifty percent of the time in respirators. Maintenance operations invariably result in some emissions; thus, a particular job could require a use of a respirator for a full day.

3. The use of respirators for a major portion of a work day by an employee is an unsafe practice.

Operation of a resin (polyvinyl chloride) production facility is a complicated cooperative venture involving a very

few employees and a massive investment in facilities. The worker must not only be cognizant of scientific principles but also be fully aware of the surrounding equipment as well as work closely with fellow employees. The job involves working with automatic controllers, multi-level equipment, and fellow employees, who are usually at some other location in the plant.

The major use of respiratory equipment imposes an additional limit on a worker who is already fully utilizing his five senses, as well as his means of communication, his knowledge and his mobility. A respirator limits the employee's peripheral vision as well as his direct vision; thus the use of his most valuable sense is restricted. His head contacts a pipeline resulting in considerable pain. He misses the flashing of a warning light. He is distracted by steaming respirator lens and general discomfort. The next breath of air is not relief from a bodily need but is an additional burden to be overcome. The respirator hose hooks on a projection and stops him like a door edge in the dark. In general the employee becomes so enmeshed in discomfort and harness that his work assignment becomes secondary. Personnel or equipment accidents foreseeably occur as a result. Even assuming the employee masters the vision, discomfort, clumsiness and breathing problems, he still cannot speak to a fellow worker or seek his aid via speech.

The final problem is elapsed time. Charcoal canisters or air tanks must be replaced when exhausted; thus the employee must

always be aware of how much time has elapsed and of the time required to return to a safe area to replace an air tank or canister. NIOSH has recognized this problem in their work to develop a respirator with an elapsed time indicator and one which has a longer use time. NIOSH indeed has recommended a nine month delay in full implementation of the respirator section of the OSHA standard. Union Carbide Corporation has found that use of respirators for a major portion of the work day involves greater physical hazard than exposure to minimal levels of vinyl chloride.

4. Employee resistance to respirators and restrictive safety rules is a major problem. The OSHA statute imposes on us the full responsibility for enforcement of the regulations. This, however, is extremely difficult unless the employer engages one supervisor per employee. The whole basis of our society is that, given the proper rules and the training in the logic of those rules, each person will react in the desired manner. In no place is this more true than the area of employee safety where an employee will make the proper and safe moves for any given situation if he is thoroughly trained. This training must overcome not only creative discomforts but also must overcome prior experience. Employees in the VCM-PVC industry have for many years been acclimated to high vinyl chloride exposures. They have also learned to be comfortable both at home and on the job; thus the precipitous drop in permissible vinyl chloride exposures has created a resistance problem. This was recognized in the initial OSHA vinyl chloride standard which

permitted exposures to 25 ppm on a voluntary basis as opposed to previous limitations of 500 and 50 ppm. Union Carbide Corporation has had substantial employee resistance and complaints about wearing respirators for a major portion of the work day. Employee resistance to wearing of respirators has been marked, despite issuance of instructions to, and periodic counselling of, all employees with respect to the necessity therefor as set forth in Mr. Engle's letter of March 1, 1976 to all employees (Exhibit XI). At present, no employee in the plant involved in polyvinyl chloride operations has chosen voluntarily to wear respirators, and no employee will wear such device unless specifically instructed to do so, where such wearing is required by regulations or where the Company requires him to engage in hazardous operations.

An extension of the voluntary ceiling is reasonable and necessary for speedy effectuation of engineering and work practice control programs.

5. Major capital investment programs involve the use of contractors and contractor personnel in the completion of said programs. Union Carbide Corporation plans the investment of over \$4,250,000 in new and replacement facilities at the Texas City plant to achieve environmental and safety goals. The "safe" procedure for this program would be to shut the plant down until the necessary items were fully installed and tested. This procedure, however, is self-defeating. To shut down and fail to supply customers for PVC would impose hardship on the customer as well as encourage

the customer to obtain material from another source. Without customers, there is no justification for the plant's future operation, and therefore the expenditure of new capital is not needed. Union Carbide is committed to providing a lawful environment for its employees and those of its contractors. For this reason, it believes that carrying out a major capital investment program is contingent upon providing an acceptable work environment to its contractor personnel.

Even more difficulty in encountering resistance to wearing of respirators is inexorably anticipated in the completion of the Carbide program of installation of new equipment to meet the OSHA standard, with respect not only to Carbide employees but to employees of outside contractors engaged to complete the program as well. Carbide plans to spend some \$4,250,000 in the area for which this variance is sought, and it is expected that the use of respirators as will be required not only of employees but also of such contractor personnel, will severely hamper the progress of the program; delay its completion date; create substantial work inefficiencies; and not only cost Carbide considerable additional unnecessary monetary expenditures but also will hamper and defer its ability to achieve final compliance with both OSHA and EPA regulatory requirements.

V. Union Carbide Corporation's program will provide for employee safety and health as required under OSHA, as well as achieve full compliance with Environmental Protection Administration Regulations.

As outlined above, in Section III it involves education of employees, locating problems, providing solutions for those problems, ensuring their implementation, and the continued restudy of the process as problems are solved to discover heretofore unidentified problems that need resolution as well. The current plan involves the expenditure of \$4,963,000 for new and revised facilities that are compatible with OSHA and EPA regulations, as well as completion of ongoing capital projects. As noted already, this program is subject to revision based on what are the provisions of the EPA regulation as finally promulgated. The discussion of individual items in the program can only be tentative, as outlined in Exhibit X until final requirements are known. Union Carbide, however, is prepared to spend the amount of capital necessary to bring the current facilities into compliance with the OSHA vinyl chloride standard to avoid withdrawal from this business area and joining others who have already dropped out of PVC production because of inability to meet rising costs.

It should here be noted that the Texas City plant has produced either ^{VCM}~~VCM~~ or PVC resin ever since 1948. During that period several hundred employees have been exposed to vinyl chloride monomer in varying concentrations; at least twenty percent of them have had such exposure at over 200 ppm for a prolonged period of years. Numerous employees have been exposed in the earlier days of production to VCM at above the odor threshold of 1950 ppm. Such threshold was ascertained by tests conducted

at the South Charleston, West Virginia plant in July of 1974, and the results reported to OSHA and made a part of the record of hearings which preceded issuance of this standard.

Union Carbide, as part of its documentary input to the said OSHA hearings, reviewed the medical record, including death certificates where appropriate, of every one of the numerous individuals employed at Texas City who had once been exposed at any time or any period to VCM; its findings, presented to OSHA for use in its hearing record, were that none of these individuals had any signs of angiosarcoma, nor even of any liver (or other) abnormality that could in any way be attributed to vinyl chloride exposure.

It should also be noted that compliance actions taken to date have diminished Carbide's suspension non-solvent resin production capacity by twenty percent; its dispersion resin capacity by thirty percent; and has had no effect on levels of solvent resin production.

Applicant, however, despite such record, and despite its realization that the thirteen VCM reported exposure-linked deaths in the United States were limited to 4 of the 36 PVC producing plants, and that 32 others in the industry had records similar to Union Carbide at Texas City, nevertheless determined that the plant's compliance with the OSHA VCM standard posed a challenge which it was prepared to attempt to meet, and has spent great effort and considerable sums money in doing so.

VI. Union Carbide Corporation has informed its employees and its employee representatives of its request for a temporary variance from the OSHA standard.

I. as Plant Manager, requested Mr. Clarence Casey of our Industrial Relations Department to discuss Union Carbide Corporation's request for a temporary variance with our Texas City, Texas plant employee representatives of the Texas City, Texas Metal Trades Council (AFL-CIO). Mr. Casey has done so and has secured their written approval of this application. Exhibit XI contains their letter endorsement of the request.

Specifically, Mr. Casey met with Mr. Paul Teague, Business Manager of the union, which has been the bargaining representative of our employees at this plant for many years, and with whom we currently have a contract in force. He advised him that we were seeking a temporary variance, as set forth in the application, and asked for his comments, stating that he hoped he and his Committee could approve our action. Mr. Teague met with the Committee, and after discussions, has given us the letter of approval attached as in Exhibit XI, setting forth the reasons for the union endorsement of this application.

Mr. Teague's address is:
1032 24th Avenue, North
Texas City, Texas 77590

The address of the Metal Trades Council is:
2800 Texas Avenue
Texas City, Texas 77590

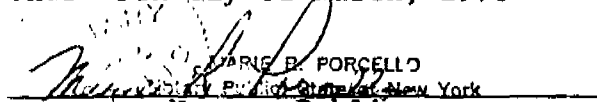
Furthermore, I have caused a copy of this entire application to be furnished Mr. Teague, as Business Manager of the union, and asked that he discuss it as he deems necessary with his Committee and the employees whom the union represents.

I have also caused a notice to be posted, to inform plant employees of this request for a temporary variance from the OSHA vinyl chloride standard, in those areas within the plant where employee notices are normally posted. The notice summarized the application, informed employees that they could examine a copy in our offices, and, in particular, it notified the employees of their right to request a public hearing on the application.

VII. The request for a temporary variance from the OSHA vinyl chloride standard as discussed in this affidavit will provide sufficient time as well as relief from the regulation to permit Union Carbide Corporation fully to plan and implement a program of feasible engineering and work practice controls at the Texas City plant for full compliance with the OSHA standard.



Subscribed and Sworn to before me
this 15th day of March, 1976


MARIE B. PORCELLO
Notary Public
Qualified in Westchester County
Cert. Filed in New York County
Commission Expires March 30, 1977