



UNION CARBIDE CORPORATION

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June 17, 1975

Mr. John H. Stender (4 Copies)
Assistant Secretary of Labor
Occupational Safety and Health Administration
United States Department of Labor
14th Street and Constitution Avenue
Washington, D.C. 20004

Re: Petition for Modification and Amendment of
the Occupational Safety and Health Standards
for Exposure to Vinyl Chloride

Dear Mr. Stender:

Union Carbide Corporation, 270 Park Avenue, New York, New York 10017, hereby petitions the Occupational Safety and Health Administration, United States Department of Labor for modification and amendment of the standard for exposure to vinyl chloride (29 CFR Sec. 1910.93 (q)) published October 4, 1974 and in effect since April 1, 1975. This standard was admittedly a pioneering effort in establishing employee exposure levels for a suspected carcinogen manufactured and used world-wide in large quantities. As with all such efforts, time and experience have pointed out areas where the standard should be amended to enhance worker safety; to focus the regulation more specifically on problem areas; and to eliminate unnecessary and costly restrictions on industry which hamper its ability to provide work for labor. Additional information is now available on the impact of the standard, and, through discussions between OSHA personnel, industry, and labor, there is a better understanding of the problems involved in protecting the worker while not unduly restricting the industry in the performance of its basic function.

Union Carbide Corporation, therefore, submits this petition; asks that it be consolidated with others already submitted, such as that by Dow Chemical Corporation on May 12, 1975; or which may be later submitted; and urges that the Secretary propose an amendatory rule on the standard for exposure to vinyl chloride; for the adoption of the amendments to the standard herein considered. The proposed amendments we suggest are here limited in scope to specific areas of the standard. There is no desire on the part of Union Carbide to argue the question of the need for the standard.

Union Carbide Corporation accordingly proposes the following amendments to Part 1910, sec. 1910.93 (q) Vinyl Chloride:

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I. 1910.93 (q) (a) (2), Scope and Application, currently states:

"(2) This section applies to the manufacture, reaction, packaging, repackaging, storage, handling, or use of vinyl chloride or polyvinyl chloride, but does not apply to the handling or use of fabricated products made of polyvinyl chloride."

This should be amended as follows:

(2) This section applies to the manufacture, reaction, packaging, repackaging, storage, handling, or use of vinyl chloride or polyvinyl chloride but does not apply to the reaction, packaging, repackaging, storage, handling, or use of fabricated products, or of polyvinyl chloride containing less than one part per million by weight of vinyl chloride monomer.

Union Carbide Corporation has conducted extensive monitoring studies of the storage, handling, and use of resins containing less than one part per million by weight of unconverted vinyl chloride. Based on these studies, we conclude that when these resins are used and fabricated even by heat and pressure under minimal ventilation conditions, vinyl chloride monomer standard's "action level" of 0.5 parts per million vinyl chloride monomer concentration in the work-space air is not exceeded. These studies are set forth in full detail in the attached memorandum entitled Union Carbide Corporation Solution and Dispersion Vinyl Resins, Vinyl Chloride Monitoring Study.

II. 1910.93 (q) (a) (3), Scope and Application, currently states:

"(3) This section applies to the transportation of vinyl chloride or polyvinyl chloride except to the extent that the Department of Transportation may regulate the hazards covered by this section."

It should be amended as follows:

(3) This section applies to the transportation of vinyl chloride or polyvinyl chloride except:

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Polyvinyl chloride or materials made in whole or in part of polyvinyl chloride containing less than one part per million by weight of vinyl chloride monomer.

The Department of Transportation regulations may not be abrogated or made less stringent by this section.

Union Carbide Corporation's data, supporting the amendment first proposed also amply supports this amendment.

III. 1910.93 (q) (b) (5), Definitions, currently states:

"(5) 'Emergency' means any occurrence such as, but not limited to, equipment failure or operation of a relief device which is likely to, or does, result in massive release of vinyl chloride."

This should be amended as follows:

(5) "Emergency" means any occurrence such as, but not limited to, equipment failure or operation of a relief device which is likely to, or does, result in fire; explosion; exposure of employees to skin contact with liquid vinyl chloride; or require the use of self-contained breathing apparatus as set forth in section (g) (4) below.

In OSHA Program Directive #200-35, under 3. Explanations (29 CFR 1910.93 (q)), Item 4 (a), a massive release is defined to apply where there is a vinyl chloride concentration "greater than 100 parts per million". This statement of concentration corresponds to 1 cubic foot of vinyl chloride gas in 10,000 cubic feet of air or 0.16 pounds of vinyl chloride. Such a release can hardly be termed massive or even immediately hazardous to life, and certainly not warranting emergency action. Massive does not mean relatively insignificant or momentary. There is a need for a more explicit definition in the standard of what constitutes an emergency. The current definition destroys the meaning and efficacy of true emergency planning and reporting. Indeed, the language of the standard itself contains no such requirement; yet an amendment thereto is clearly necessary to reverse an interpretation by OSHA which cannot be described as authorized.

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IV. 1910.93 (q) (b) (6), Definitions, currently states:

"(6) 'Fabricated product' means a product made wholly or partly from polyvinyl chloride and which does not require further processing at temperatures and for times sufficient to cause mass melting of the polyvinyl chloride, resulting in the release of vinyl chloride."

This should be amended as follows:

(6) "Fabricated product" means a product consisting wholly or partly of polyvinyl chloride and which does not require further processing at temperatures and for times sufficient to cause the release of vinyl chloride monomer into the work-space air in excess of the action level.

We would, moreover, be receptive to any amendment that substituted "exposure" for "action" level. We see no reason to regulate industry in areas that have already been stated to be appropriate exposure levels.

When the present standard was promulgated, OSHA was not wholly knowledgeable in many aspects of the polyvinyl chloride industry and the industry was wholly unsure as to how to meet the scope of the standard. The result was that many of its provisions address themselves to the suspension vinyl resin process and the subsequent fabrication of these resins solely by calendaring, molding, and extrusion techniques. This was logical enough since suspension resin and its fabrication make up over three-quarters of the industry. There are, however, other resin processes which do not supplement the suspension resin industry. They exist because they supply markets or permit fabricating techniques that are not available for the suspension resins; and include solution coating; latex coating; organosol coating; plastisol casting and coating; and others similar in nature.

OSHA has sought, in its Program Directive 200-35, diligently to adapt the Standard to these less-understood applications. The objective has been to maintain the level of worker safety required by the Standard while easing some of its many burdensome requirements. The result has been only partially effective, however, and confusion in the industry is rampant.

The primary difficulty lies in uncertainty as to what is "mass melting", as applied to the definition of "fabricated product".

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The term "mass melting" is unfortunate, in that thermoplastic materials including polyvinyl chloride resins do not melt when heated. They merely become progressively softer and are thus more easily formed by pressure. They do not change as to physical integrity or form of input material merely on application of heat. Theoretically, it is true, any plastic could be heated to a temperature where it would flow with no pressure. Moreover, the thermoplastic will likely decompose or be destroyed long before this "melt" temperature is reached. In the case of polyvinyl chloride, it decomposes more readily than polystyrene or other such materials.

The objective of the definition for a "fabricated product" is to set a limit on the scope of the standard. The fact is that the above-described situation makes it unrealistic to do so as outlined. The standard currently sets an "action level" exposure of 0.5 parts per million; thus, the simplistic approach would be to define a "fabricated product" in terms of residual vinyl chloride monomer content of the product and the potential release of vinyl chloride monomer in terms of the "action level."

V. 1910.93 (q) (d) (4), Monitoring, currently provides:

"(4) The method of monitoring and measurement shall have an accuracy (with a confidence level of 95 percent) of not less than plus or minus 50 percent from 0.25 through 0.5 ppm, plus or minus 35 percent from over 0.5 ppm through 1.0 ppm, and plus or minus 25 percent over 1.0 ppm. (Methods meeting these accuracy requirements are available in the 'NIOSH Manual of Analytical Methods')."

This should be amended as follows:

(4) The method of monitoring and measurement shall have an accuracy and a precision rating equivalent to the method available in the NIOSH Manual of Analytical Methods.

The specification of the method of analysis in the standard is confusing, does not conform to the generally-accepted practice for specification of analytical method accuracy and precision, and implies (incorrectly) that accuracy of the NIOSH method is known.

The specification is confusing in that it states that the method of monitoring shall have certain accuracy. This specification

of the method makes no reference whatever to the number of samples required for each monitoring or to the ultimate accuracy of the monitoring measurement. Despite this clear omission in the standard, OSHA Program Directive #200-35 on Page 7, Item (12) (a) adds to its requirements via a putative interpretation thereof as follows:

"(a) The '95 percent confidence level' means that the employer is required to take a sufficient number of measurements so that the results obtained are statistically valid."

If this statement is the official interpretation, then the employer wholly contrary to the standard's requirements, would have to take multiple samples per monitoring determination. The total number would depend on how close the monitoring results were to the exposure limits. I.E., to be 95 percent "confident" that his vinyl chloride monomer exposure is not above the permissible one part per million limit, an infinite number of samples is required when the actual level is one part per million. From OSHA's point of view, this poses an impossible enforcement problem. ACSHO will have to have quite a few sample results to put it mildly before he can recommend a citation for exceeding the permissible exposure limit.

This same requirement for multiple samples is implied in Program Directive #200-35, Page 4, Item 6:

"Assuming an error of $\pm 25\%$ in the sampling procedure and analytical method for a six-hour sampling period, the concentration should be 1.66 ppm" (presumably for a citation).

Methods of analysis are conventionally defined in terms of accuracy and precision indices, both of which affect the result. To clearly separate the factor of accuracy from the factor of precision (as is done in the Program Directive) enough determinations of a single situation must be made to secure a significant mean value which, in turn, may be directly related to method accuracy, as the Program Directive does.

The American Society for Testing Materials, as well as NIOSH, however, specify analytical methods in terms of accuracy and precision indices. A representative calculation of these terms could be as follows:

The results of ten determinations on a standard sample containing 0.45 parts per million vinyl chloride monomer yield a mean value of 0.483 parts per million and a standard deviation of ± 0.046 parts per million.

$$\text{Accuracy percent Systematic error} = \frac{(0.483-0.45) (100)}{0.45} = 7.3\%$$

$$\text{Precision percent} = \frac{(0.046) (100)}{0.483} = 9.5\%$$

These terms are widely used as criteria for evaluating and specifying methods of analysis. To specify accuracy only implies a sufficient number of results so that precision is not a significant factor, which ignores the generally accepted definition of measurement methods, as used by NIOSH.

The method of analysis from the NIOSH Manual of Analytical Methods for vinyl chloride, issued as part of Program Directive #200-35, is defined by NIOSH as being operational but the accuracy and precision are unknown. Thus, unless NIOSH has yet unpublished studies of accuracy and precision on this method, there is no way of knowing whether it meets the criterion of accuracy cited in the standard. Since the NIOSH method is obviously the reference method for compliance, there is no alternative but to modify the standard we have, as proposed. Furthermore, as regards Union Carbide Corporation strongly recommends that the NIOSH analytical method be modified to provide for calibration of the sample pump before and after any monitoring, not merely once every 2 to 3 months. For a critical analysis, such as monitoring, the assumption that a sample pump will maintain its calibration over an extended period is not valid.

VI. 1910.93 (q) (c) (1) under Permissible exposure limit state

"(c) (1) No employee may be exposed to vinyl chloride at concentrations greater than 1 ppm averaged over any 8-hour period."

This should be amended as follows:

(1) No employee may be exposed to vinyl chloride at concentrations greater than 1 part per million, averaged over any 8-hour period as determined by a monitoring frequency at the minimum provided in the

standard. When an employee's work space is monitored hourly by automatic analyzers, the permissible exposure limit is two parts per million averaged over the eight hour period.

The proposed amendment, to the layman, appears to be a plan 100% increase in the permissible exposure limit and a lowering of level of safety provided by the standard. This is not true. The proposal utilizes available technology to achieve a greater degree of control over the employees' exposure to vinyl chloride, and thereby actually improves the level of safety provided the employee.

Control of a worker's environment is not achieved or demonstrated in terms of a single eight hour sample taken once a month or once a quarter. The quality of control is dependent upon the following factors:

1. The number of samples taken.
2. The accuracy and precision of the method of analysis.
3. The time that elapses between sampling and the corrective action.

This proposal involves improvement of Items 1 and 3. It replaces a requirement of one sampling per month with 720 individual samples and determinations per month. Statistically, this means that the possibility of bias or error is reduced tremendously, as the following table demonstrates:

<u>Number of Samples</u>	<u>Bias or Standard Error of the System</u>
1	.00
2	1.414
10	1.054
100	1.005
1,000	1.0000

For example, in a work environment where the mean vinyl chloride monomer concentration is 0.5 parts per million and the precision of the determination of this concentration is 1.2 parts per million (the precision of the test method in this case was 0.07

parts per million), one-half the test values will be less than the action level of 0.5 and 65.5% of the test values will be below 1.0. If a single monitoring test is done during the month, the odds are one-to-one that it will be below the action level limit and 65.5 to 34.5 that it will be within the permissible exposure limit. In actuality, the worker is exposed to concentrations over the permissible exposure limit 34.5% of the time. This is actual data taken from an automatic chromatograph sample point. Personal samples taken on employees in this same area, at the same time as required by the standard, showed no exposure over the permissible limit.

Testimony submitted by Union Carbide Corporation at the 1974 public hearings on the vinyl chloride standard substantiated further the recommendation we make herein. Multiple manual samples showed a plant to have an average vinyl chloride monomer concentration of 10.24 parts per million with 95% of the values under 46 parts per million. The automatic chromatograph in the same plant, though not at the same time, showed an average vinyl chloride monomer concentration of 16.3 parts per million with 95% of the values less than 69 parts per million. It is clear that the chromatograph sampling more nearly represents the true situation.

As to the time elapsing between sampling determination and corrective action, the difference in degree of control is even more striking. If a manufacturer is large enough to maintain a full-time industrial hygiene laboratory, the samples, as required by the standard, are taken one day and the results are available the next day; thus, at least twenty-four hours must elapse before any indicated corrective action can be initiated. For the small manufacturer who cannot economically support his own industrial hygiene laboratory, the sample taken one day is mailed to a contract laboratory. The result is known and corrective action is taken only after five to seven days, as a usual matter. An automatic chromatograph on the other hand delivers its results in less than five minutes; thus, corrective or control action can be initiated almost immediately.

Thus, in terms of absolute worker safety, the proposal to raise the permissible exposure limit to two parts per million averaged over an eight hour period, when an automatic analyzer is used full time, is fully justified. This proposal recognizes clearly the limitations of current OSHA prescribed methods of analysis, and states that the exposure level achieved through

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automatic chromatograph monitoring at 2 parts per million will be no greater --and indeed, probably will be less-- than the exposure levels ascertained through currently permissible methods. Much more is known about the worker's exposure, the possibility of error is reduced, and corrective action can be initiated almost immediately. The automatic analyzer, generally, is being used throughout the vinyl chloride monomer and polyvinyl chloride industry by knowledgeable, concerned manufacturers. OSHA should recognize the contribution to safety and that this equipment provides incentive for its use in worker safety.

VII. 1910.93 (q) (j), Training, states:

"(j) Each employee engaged in vinyl chloride or polyvinyl chloride operations shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use."

This should be amended as follows:

(j) Training. Each employee engaged in vinyl chloride or polyvinyl chloride operations, where exposures exceed the "action level", shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use.

The training program required by the Standard is applicable to the manufacture of vinyl chloride monomer and to the manufacture of polyvinyl chloride resins. In these areas it is useful and appropriate. The standard, however, goes on to apply the same costly, time-consuming training requirement to areas where it is not necessary and where they add little or nothing to worker safety. While there are indications that OSHA has not intended to require that the full training program be given truck drivers, fabricating industry workers, and other employees whose exposure is less than the "action level", the industry should not be required to comply with the letter of the standard, on penalty of being subjected to variable enforcement action where no worker benefit will result; where no prohibited exposure levels will occur; and no training to meet them will be anything but an empty exercise. The proposed amendment provides for clarification of this section.

VIII. 1910.93 (q) (1) (3) under Signs and labels states:

"(3) Containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride shall be legibly labeled:

Contaminated with
VINYL CHLORIDE CANCER-SUSPECT AGENT"

This should be amended as follows:

(3) Containers of polyvinyl chloride resin waste, contaminated with vinyl chloride monomer so that the air in the immediate area shows vinyl chloride monomer concentrations in excess of the action level, shall be legibly labeled:

Contaminated with
VINYL CHLORIDE CANCER-SUSPECT AGENT

The purpose of the label is to protect workers from excessive exposure to vinyl chloride monomer; thus, the requirement for labeling should relate to that purpose. Broad requirements for unnecessary signs and labels on products that will not in any way subject employees to impermissible exposures or hazards, are burdensome and reduce the impact of the label on the worker to those situations where its need is clearly demonstrated.

IX. 1910.93 (q) (1) (4) under Signs and labels states:

"(4) Containers of polyvinyl chloride shall be legibly labeled:

POLYVINYL CHLORIDE (or TRADE NAME)

Contains

VINYL CHLORIDE
VINYL CHLORIDE IS A CANCER-SUSPECT AGENT"

This should be amended as follows:

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(4) Containers of polyvinyl chloride, contaminated with vinyl chloride so that the air in the immediate area shows vinyl chloride monomer concentrations in excess of the action level or so that the polyvinyl chloride resin by analysis contains more than one part per million vinyl chloride monomer by weight, shall be legibly labeled:

POLYVINYL CHLORIDE (or TRADE NAME)

Contains

VINYL CHLORIDE
VINYL CHLORIDE IS A CANCER-SUSPECT AGENT

The purpose of signs and labels is to protect the worker from excessive exposure to vinyl chloride monomer. The requirement for such labels should thus be related to that purpose, as discussed previously.

In the absence of an emission standard on vinyl chloride from the Environmental Protection Agency, it is not possible to propose amendments to the OSHA standard or the Environmental Protection Agency standard to reduce overlapping requirements and to establish common bases of regulation where possible. Union Carbide Corporation believes that, with the many governmental agencies concerned with various aspects of safety, each agency should work toward a goal of common nomenclature, common methods, and common regulations where possible. As a result of this belief, Union Carbide Corporation may propose additional amendments to the OSHA standard when the need is apparent.

Very truly yours,

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