



SOUTH CHARLESTON PLANT

**UNION CARBIDE CORPORATION
CHEMICALS AND PLASTICS.**

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Amendment
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May 2, 1975

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Mr. Grover C. Wrenn
Chief, Division of Health Standards Development
Occupational Safety and Health Administration
U.S. Department of Labor
1726 M Street, N.W.
Washington, D. C. 20210

Subject: Classification of Union Carbide Corporation
Vinyl Resins
Occupational Safety & Health Administration
Standard, Exposure to Vinyl Chloride

Dear Mr. Wrenn:

Union Carbide Corporation's vinyl resins containing less than one part per million by weight of residual vinyl chloride monomer should be considered fabricated products for the following reasons:

1. Vinyl resins containing less than one part per million are fabricated products in that one or more additional processing steps are required to reduce the residual monomer content to this low level.
2. During subsequent processing steps, including mass melting, the amount of vinyl chloride released is so small as to be almost unmeasurable when vinyl resins containing less than one part per million of residual monomer are used.

The health hazard protected against by Occupational Safety and Health Administration's Standard, Exposure to Vinyl Chloride, is the inhalation of vinyl chloride monomer in the work space air. The Environmental Protection Agency as well as other agencies are also concerned with the

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potential hazard from inhalation of vinyl chloride in the ambient air. To achieve these desirable objectives and to still secure the benefits of a viable plastics industry producing a useful product, the most logical approach is to interpret and promulgate regulations which work in concert for the greatest effect with an over-all minimum of disruption, overlap, and cost of enforcement. One such approach espoused by EPA and adaptable to the OSHA regulation is the creation of limits within the processes that provide incentive for technical innovation, that reduce the difficulties in enforcement and monitoring, and that achieve or improve the achievement of the safety objective; i. e., minimize vinyl chloride exposure with a minimum of industrial disruption. The current proposal provides all these desirable objectives. Vinyl chloride monomer is confined to a small segment of the industry, to a small segment of the worker population, and to a few identifiable plants.

Vinyl chloride monomer is produced by reaction of ethylene with chlorine or the reaction of acetylene with hydrogen chloride in a relatively few large plants. The vinyl chloride monomer is transferred to a PVC plant where it is dispersed in water, or dissolved in solvent and reacted to form the PVC resin. Some plants simply convert the bulk monomer to resin without the use of water or solvent. Regardless of the polymerization media, all vinyl chloride monomer is not converted to resin; thus, it must be removed from the resin either immediately after reaction or it is emitted from the resin during subsequent processing and fabricating steps, contaminating

both the work space and the ambient air. The removal of monomer from the resin immediately after polymerization varies in difficulty depending upon the form of the resin, particle or solution, the size of the resin particle, and the porosity of the particle. Fundamentally, it is easier to remove monomer from a resin solution than a solid; it is easier to remove monomer from a small particle than it is a large particle; it is easier to remove monomer from a porous particle than a nonporous particle. In general, given sufficient time and with a sufficiently high temperature, essentially all monomer can be removed. The resin, once freed of unconverted monomer, will not depolymerize or break down and emit vinyl chloride monomer. This fact is substantiated by industry, government, and university studies. Thus, improved monomer removal immediately after polymerization provides a basis for deregulating a major portion of the PVC industry as well as reducing the industrial and environmental population exposed to vinyl chloride. This ultimate step in monomer removal is not easy, despite its being technically possible, for many PVC resins. The PVC manufacturer must provide more processing steps as well as additional process time in the form of large tanks to, in a broad sense, fabricate a monomer-free PVC resin. For some PVC resins the regulation and control will always be required through the first plasticization and forming step. In this case, the subsequent processing causes mass melting and the release of residual vinyl chloride monomer to the ambient and work-space air. In the case of the resin where the residual

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monomer has been completely removed, subsequent processing may cause mass melting without the release of residual vinyl chloride monomer to the ambient or work-space air. Thus, monomer-free PVC resin, when converted to finished products or semi-finished products, will not emit monomer; therefore, it must have been "fabricated" during the secondary or tertiary monomer stripping operation where it was processed at temperatures and for times sufficient to cause the release of residual vinyl chloride monomer.

The foregoing principle of the "fabricated" monomer-free PVC resin is of no value unless it can be fitted to the real life situation; i. e., measurable results. Union Carbide Corporation has conducted extensive monitoring studies of transportation, warehousing, and forming operations involving resins containing less than one part per million of residual vinyl chloride monomer. These studies are reported in the attached memorandum entitled Solution and Dispersion Vinyl Resins. Vinyl Chloride Monitoring Study.

The results of the studies Union Carbide Corporation has conducted on its Solution and Dispersion Vinyl Resins are summarized as follows:

1. Monitoring the air space of large bins and hopper cars showed average VCM concentration of 0.75 ppm in un-ventilated spaces. The data ranged from 0 to 5 ppm.
2. Monitoring the air space of enclosed truck trailers along with resin analysis showed that when the resin contained less than one part per million residual VCM, the VCM concentration in a closed truck was as follows:

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<u>Resin Type</u>	<u>Mean Concentration</u>	<u>97.5% Of Test Concentrations Less Than</u>
Solution Copolymer	0.54 ppm	1.35 ppm
Solution Terpolymer	0.06 ppm	0.28 ppm
Dispersion	0.27 ppm	0.62 ppm

3. Monitoring the air in resin storage warehouses containing Solution and Dispersion Vinyl Resins showed an average vinyl chloride concentration of 0.06 ppm with 97.5% of the values less than 0.27 ppm.
4. Monitoring fabricating operation at ten separate locations, using Solution and Dispersion Vinyl Resins, showed the VCM concentration in the work-space air to be less than 0.5 ppm. Only two tests at one location showed values over 2 ppm (these two tests are believed to be erroneous).

On the basis of the foregoing discussion and its study, Union Carbide Corporation respectfully requests that vinyl chloride resins containing less than one part per million residual vinyl chloride monomer be considered "fabricated" products by virtue of their fabrication during secondary and tertiary stripping operations. In deed, based on the extremely low values of vinyl chloride concentrations reported by Union Carbide Corporation in the work-space air during resin forming operations, resins containing more than one part per million residual monomer could be considered fabricated products

Mr. Grover C. Wrenn

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too. Unfortunately, the limited scope of the Union Carbide Corporation study
does not define an acceptable limit.

Very truly yours,

R. N. Wheeler, Jr.

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Attachment

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