

RECEIVED

SEP 26 1986

2611 Putter's Lane
Melbourne, Florida 32901 P. F. DAVEY
September 26, 1986

Peter F. Davey, Esquire
Law Department
Union Carbide Corporation
39 Old Ridgebury Road
Danbury, Connecticut 06817

Re Dendinger and Wallace vs Chrysler Products Corporation
Mr. Robert A. Bunda's letter dated June 9, 1986

Dear Peter;

Mr. R. A. Bunda's letter to you dated June 9, 1986 states that he has questions regarding my letter to Ms. M. J. Friar dated May 10, 1985. I have attempted to answer his needs in the following:

I Polyvinyl chloride resin processes and various PVC resins.

Attached for his education are:

1. Wheeler, R. N., "Poly (vinyl chloride) Processes and Products" Environmental Health Perspectives Vol. 41 pp. 123-128 (1981)

This article briefly describes the various PVC resin process and resins in current industrial use. It does not describe the UCC bulk process used to make VYNW-5 resin.

2. Wheeler, R. N., Specialty Vinyl Chloride Resin Processes. Effects of Governmental Regulations, American Chemical Society Meeting in San Francisco 1976. Pages 12-15 describing UCC's continuous bulk PVC resin process ie non-solvent (UCC) process.

II Uses of UCC PVC resins at Chrysler Plastics

Suspension PVC Homopolymer resin was dry mixed with plasticizer, stabilizer, pigments and other additives, fluxed (converted to a hot plastic compound) in a Banbury mixer, converted to a sheet on a two roll mill or extruded from an extruder, calendered into a thin film and probably laminated with a cloth backing to yield upholstery materials for auto seats etc. Suspension PVC Homopolymer is the lowest cost PVC resin and would be the primary resin raw material.

Nonsolvent Copolymer VYNW-5 can be processed as described for Suspension PVC Homopolymer but its major use was for specialty vinyl films, powder coating, or solution gel coating. It cost about 10%

UCC
048067

more than Suspension PVC Homopolymer thus it is very unlikely that it was used as a calendering resin. One possible use is in a plastisol formula to laminate vinyl film to itself or to cloth backing.

Solution Vinyl PVC VYHH, VMCH and VYNS-3 resins cost about three times as much as Suspension PVC Homopolymer and their low molecular weight precludes their use as calendering resins. These resins were probably used to formulate vinyl printing inks (in the ink room) or to formulate vinyl coatings to spray on upholstery fabrics for a glossy finish.

The point of the foregoing discussion is that UCC nonsolvent PVC and solution PVC VYHH, VMCH and VYNS-3 were used in operations at Chrysler separate from the calendering operation for suspension (PVC) homopolymer resins. Specific knowledge as to their use could affect the validity of the plaintiffs' claims.

III Potential Emissions of Vinyl Chloride Monomer from UCC PVC resins

Vinyl chloride monomer, a gas, is polymerized (reacted) to form polyvinyl chloride, a white thermoplastic solid, in a polyvinyl chloride manufacturing facility. Depending on the manufacturing process varying amounts of unconverted vinyl chloride monomer remain adsorbed in the finished product. Since vinyl chloride is a gas insoluble in the polyvinyl chloride it escapes to the ambient air over a period of time. The rate of escape or emission varies with the temperature of the PVC. The higher the temperature the more rapid the emission rate. PVC itself does not break down and emit vinyl chloride.

Based on information and belief it is possible to hypothesize the following:

All the UCC PVC resins shipped to Chrysler were produced in Texas City, Texas. They were loaded into bulk ship containers and shipped via container-ship to Perth Amboy, N. J. where they were off loaded to a storage yard. As needed for shipments or to maintain a warehouse inventory of bagged resin, the PVC resin in the bulk containers was packaged in fifty pound multiwall kraft paper bags and palletized in 2250 pound pallet loads. A truck load of bags was 18 pallets or 40500 pounds of PVC resin.

The average time the UCC PVC resin was in bulk containers, storage, and transit was 32 days. The average time the bagged resin was warehoused awaiting shipment was 14 days. Transit time from Perth Amboy to Chrysler and storage time at Chrysler prior to use are factors too but they cannot be readily evaluated.

A study of a suspension process PVC resin conducted by UCC showed the resin lost 37% of the contained residual vinyl chloride monomer when stored in a bulk container for one month. The study also showed that the bagged PVC resin lost 85% of its contained residual

vinyl chloride monomer in one week of storage in bags. Aeration of the resin for one hour during bagging or emptying bags caused a loss of 20% of the contained residual vinyl chloride monomer.

The UCC PVC resins are believed to have had the following vinyl chloride content at the time of manufacture:

Resin	ppmw RCM
Suspension PVC Homopolymer	860
Nonsolvent PVC VYNW-5	15
Solution PVC VYHH, VMCH, and VYNS-3	1

The bagged PVC resin arrived at Chrysler Plastic Products with less than the hypothetical RCM content:

Resin	ppmw RCM
Suspension PVC Homopolymer	94.0
Nonsolvent PVC VYNW-5	1.6
Solution PVC VYHH, VYNS-3, VMCH	0.1

Note: If all factors were considered the RCM would be lower but this would entail extrapolation of data.

IV Chrysler Plastics Products Company Operations.

Specific knowledge of Chrysler's plant and operations is not available, however based on information and belief using data from:

Vinyl Chloride Monomer Emissions From the Polyvinyl Chloride Processing Industries Arthur D. Little Inc., Report to U. S. Environmental Protection Agency, Research Triangle Park, North Carolina 76086-11 Draft May 1975

It is possible to hypothesize the nature of the operation.

Chrysler Plastics Products at Sandusky, Ohio operated four PVC calendering lines to produce cloth backed vinyl upholstery material. Major raw materials i.e. suspension PVC resins and plasticizers were received via bulk carrier trucks and rail cars for a cost saving of approximately one to two cents per pound. Other materials including suspension PVC resins for test runs were received in bags, boxes and drums which were stored in a receiving warehouse area for future use. Suspension PVC resins generally come in bulk from producers in the immediate area such as B. F. Goodrich, Firestone, Air Products and Chemicals, and General Tire. Based on A. D. LITTLE the suspension PVC received averaged 689 ppmw RCM with a range of 40 to 2800 ppmw (42 samples).

A. D. Little states calendering lines are designed for a through put of 2000 to 10000 pounds of PVC compound per hour. The compound containing 33 to 60 % PVC resin. An average calendering line would thus use 2820 pounds of suspension PVC resin per hour of operation.

A PVC calendering plant at full capacity would probably operate two shifts with the third shift for maintenance and cleanup. Assuming one hour to start up a line and one hour to shut it down, fourteen productive hours are available for each operational day. Product changes, color changes and pattern changes take up time so conservatively net operating time is assumed to be seven hours thus a normal day's operation would utilize 78960 pounds of suspension PVC resin.

The Plant probably did not operate on week ends and on five holidays each year. Additionally summer is traditionally slow in the plastics processing industry and there is the annual auto model change, so the plant was shut down one month for vacation. Actual days of plant operation could be 230 days per year thus annual usage of suspension PVC resin would be 18,160,000 pounds. *18MM*

Assuming that all R VCM is emitted from the PVC in processing then the plant emitted 54.4 pounds of vinyl chloride daily and 12,512 pounds of vinyl chloride per year. *is this VCM*

If all PVC resins are lumped together and considered to be used in calendering UCC's position is:

Year	% of PVC Annually from UCC	% of Annual R VCM Emissions
1973	0.457	0.0608
1973	0.149	0.0002
1974	0.116	0.0001
1975	0.021	0.0000
1976	0.147	0.0002
1977	0.073	0.0001

UCC cannot deny that its products emitted vinyl chloride but its contribution to the whole was miniscule even if the hypothetical situation is considerably in error.

V Miscellaneous Questions

Flexol plasticizers, glycol fluids, methyl ethyl ketone (MEK) and latexes are unrelated to PVC resin.

Non solvent copolymer VYNW-5 and Solution Vinyl VYHH, VYNS-3, or VMCH are all PVC resins irrespective of whether they are identified in my letter dated May 10, 1985 as (PVC). I failed to carry through with the (PVC) designation used previously in the letter.

I hope this letter clears up Mr. Bunda's questions he stated in his letter dated June 9, 1986. If he wants more information then I will need some data on Chrysler's operations such as the amount of resin used and the nature of their operations.

Very truly yours,

R. N. Wheeler, Jr.
R. N. Wheeler, Jr.

7

Regarding Requests for Production of Documents Directed
to All Defendant PVC Manufacturers

Document Items 1, 2 and 3 can be supplied from existing sales records as shown in my letter to Martha J. Friar Esq. dated May 10, 1985.

Document Item 4 could possibly be satisfied by pages 34-42 of my report for Maliko et al versus Union Carbide Corporation entitled Polyvinyl Chloride-Vinyl Chloride Monomer, Literature Survey and Engineering Opinions dated April 10, 1978. p. 12
inl x 1

Document Item 5 data could be drawn from my files for 1974 and later through specific analysis of materials sold to Chrysler cannot be identified.

Document Item 6 can be partially supplied from my own and other Corporate files.

Document Item 7 is not available except to the extent the sales records in Item 1 provide it.

Document Item 8 can be partially drawn from Document Item 5.

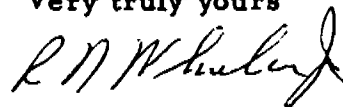
Document Item 9 can be partially drawn from my files though not all OSHA documents were kept. p. 12

Document Item 10 cannot be supplied except to the extent stated in Interrogatory No. 19.

Note: References to "my files" mean those records sent to Ms. Elizabeth Van Dyck in the Danbury office when I retired in 1985. Except for a copy of my report prepared for Maliko et al versus Union Carbide Corporation in 1978 and a draft copy of an A. D. Little report on Vinyl Chloride Monomer Emissions from the Polyvinyl Chloride Processing Industries prepared for EPA in 1975 I have essentially no records here.

I would be pleased to discuss these answers with you or Mr. Bunda by telephone.

Very truly yours



R. N. Wheeler, Jr.

UCC
046071