

MNY - TCA 2/24

RLT B M Z

To: B. M. G. Zwicker ✓

Date: 2-26-74

Location: Cleveland

From: ALGCP

Subject: In-Depth Epidemiological Study

In response to your letter of February 18, 1974 regarding the subject we are enclosing the following information:

1. Significant Work Practices Effecting VCI Exposure Levels
2. Chemicals Used in PVC Process Areas

R. N. Rylands
Plant Manager

RNR/ecw

cc: M.N.Johnson
E.W.Harrington
W.M.Wilcox
R.L.Cross
File

Enclosures/2

BFG65385

SIGNIFICANT WORK PRACTICES EFFECTING VCI EXPOSURE LEVELS

Avon Lake General Chemical Plant

Plant Start Ups

Bldg. 451 - Paste	-----	1951
Bldg. 461 - Pearl (West)	-----	1957
Bldg. 463 - Latex	-----	1963
Bldg. 464 - Pearl (East)	-----	1967
Bldg. 461 - (3300 gal. polys)	--	1971 (4 polys)
		1963 (8 polys)
		1964 (8 polys)

Start Up of G-90 Resin

1971

HRC Usage

Bldg. 464	-----	1967
Bldg. 461 (1100 gal)	-----	1972 -- (3300 gal) -- 1971
Bldg. 451	-----	1973

Copolymer Operation

Bldg. 461	-----	1957-1966
Bldg. 451	-----	1962-1971

Adequate Room Ventilation (Turnover to meet company standards)

Bldg. 464	-----	1967
Bldg. 463	-----	1963
Bldg. 461	-----	1974 (temporary)
Bldg. 451	-----	1974 (temporary)

Improved Evacuation System for Ventilating Polys

Bldg. 461	-----	1973
Bldg. 451	-----	1973

Improved VCI Efficiency (thru many projects)

1970-1973 gradual from 89% - 93.5%

Monitoring for VCI

Bldg. 451	-----	1973
Bldg. 461	-----	[
Bldg. 464	-----	[1974
Bldg. 463	-----	[

25131335

ecw/2/25/74

BFG65386

Avon Lake General Chemical Plant
CHEMICALS USED IN PVC PROCESS AREAS

Chemicals	Date Used B/451	Date Used B/461	Date Used B/464	Date Used B/463
Acetyl Cyclohexylsulfonyl Peroxide (ACSP)	1971-1974	1971-1974	1971-1974	
Acrylamide	1962-1963			1953-1974
Acrylic Acid - Glacial	1962-1974			1963-1974
Acrylonitrile	1952-1964			1963-1974
Alkyl Aryl Polyether Sulfonate, Sodium Salt (TritonX200)	1962-1974			
Alpha Methyl Styrene	1962-1965			
Ammonium Carbonate				1966-1974
Ammonium Hydroxide (28%)	1960-1962			
Ammonium Persulfate	1962-1963			1963-1974
Bisphenol A		1964-1973	1967-1973	
n Butyl Acrylate				1963-1974
s Butyl Percarbonate (SBP)	1972-1974	1972-1974		
Calcium Acetate			1968-1974	
Calcium Hydroxide		1957-1974		
Calcium Phosphate		1973-1974	1973-1974	
Caprylyl Peroxide	1951-1966	1957-1966		
Carboxymethylcellulose (Methocel)		1957-1974	1968-1969	
D1 Sodium n-octodecyl Sulfosuccinate (Aerosol 18)				1964-1968
Dodecylbenzene Sulfonic Acid (LAS)				1968-1974
t-Dodecyl Mercaptan				1965-1974
Ethyl Acrylate	1952-1964			1963-1974
2 Ethyl Hexyl Acrylate				
Ethylene Diamine Tetra Acetic Acid, Sodium Salt (Versene CA)		1971-1974	1973-1974	
Hexane		1966-1973	1967-1973	
Hydroxyammonium Sulfate				
Isobutylene		1957-1962		1971-1974

BFG65387

CHEMICALS USED IN PVC PROGRESS AREAS

Chemicals	Date Used B/451	Date Used B/461	Date Used B/464	Date Used B/463
Isopropylpercarbonate	1965-1972	1966-1973	1967-1973	
Lauric Acid	1962-1965 1973-1974			
Lauroyl Peroxide	1951-1974	1960-1966	1968-1974	
Lead Acetate	1951-1956	1957-1959		
Lithium Stearate	1962-1965			
Methanol	1952-1974	1957-1974	1968-1974	
Methylacrylamide				1971-1974
Methyl Methacrylate				1966-1974
n Methylol Acrylamide	1962-1963			1963-1974
Nonyl Phenoxypoly Ethanol (Igepal CO-887)				
n Octyl Acrylamide				1971-1974
Phosphoric Acid	1952-1964			
Polyoxyethylene Sorbitan Monolaurate (Tween 21)	1954-1957	1957-1974	1967-1974	
Polyvinyl Alcohol	1951-1957	1957-1974	1967-1974	
Potassium Hydroxide	1952-1953			
Potassium Persulfate	1962-1966			1963-1974
Saturated Fatty Alcohols (C ₁₀ through C ₂₀ Mixed)	1951-1974	1960-1971		
Sodium Decyl Benzene Sulfonate (Santomers)				1963-1968
Sodium Hydroxide	1951-1974			
Sodium Lauryl Sulfate	1951-1974	1960-1971	1963-1974	
Sorbitan Monostearate (Span 60)		1971-1974		
Sodium Formaldehyde Sulfoxylate				1972-1974
Styrene				1966-1974
Sulfate Ester of Alkylphenoxypoly Ethanol, Ammonium Salt				1971-1974

BFG65388

88558722

CHEMICALS USED IN PVC PROCESS AREAS

Page 3

Chemicals	Date Used B/451	Date Used B/461	Date Used B/464	Date Used B/463
Tetra Sodium Pyrophosphate				1965-1974
Tri Sodium Hydroxyethyl Ethylene Diamine Triacetate (Hamp-ol 120)				1966-1974
Trichloroethylene		1958-1964		
Tri Decyl Ester of Sulfo Succinic Acid, Sodium Salt (Aerosol TR-70)	1962-1971			
Tri Sodium Phosphate	1963-1966			1965-1974
Vinyl Acetate	1962-1971	1957-1966		1972-1974
Vinyl Chloride	1951-1974	1957-1974	1967-1974	1963-1974
Vinylidene Chloride				1963-1974

R. W. McKay/bp 68050722
2-21-74

BFG65389

CAM 4

CALVERT CITY PLANT

Page One
3/21/74Chemicals Used in VC1 Process Areas & Acrylic Acid Plant

Chemical	Dates Used Bldg 615 VC1 Process Bldg	Dates Used Bldg 621 Laboratory & Mass Spec Anal.	Dates Used Bldg 614 Hydrogen Plant	Dates Used Bldg 632 Acrylic Acid Process Bldg
Activated carbon	1952 → 1963		1954 → 1962	
Acrylic acid	1957 → Present	1957 → 1974		1957 → 1974
Acrylamide				1960 → Present
Chlorine	1952 → 1963			
Carbon tetrachloride	*			
Chloroprene	*			
Ethylene dichloride	See Note (1) *			
Ethyl acrylate				1957 → Present
Mercuric chloride	1952 → 1963			
Methanol	1952 → 1963	1954 → 1974		
Phenol	1952 → 1957	1952 → 1957		
Sulfuric acid	1952 → 1963			1957 → 1968 (est)
Trichloroethylene	1952 → 1963*			
Trichloroethane	*			
Tetrasodium pyrophosphate (closed C.W. Sys Treat)	1952 → 1963			
Vinyl chloride	1953 → 1963	1953 → 1974		
Vinyl acetate				1957 → 1974
Ortho dichlorobenzene	1952 → 1963			
Propane			1952 → 1954 (est)	
50% caustic	1952 → 1963			1952 → 1974
Calcium chloride	1952 → 1963			
Hydrogen chloride (gas) anhydrous	1953 → 1963			

Note (1) A sizable number of chlorinated byproducts were produced in the VC1 process. Data should be in records as to the composition of these substances, which were called: loboils and hiboils.

* Present in EDC Synthesis units since 1964.

01000000

BFG65390

CALVERT CITY PLANT

Chemicals Used in VC1 Process Areas & Acrylic Acid Plant
(continued)

Chemical	Dates Used Bldg 615 VC1 Process Bldg	Dates Used Bldg 621 Laboratory & Mass Spec Anal.	Dates Used Bldg 614 Hydrogen Plant	Dates Used Bldg 632 Acrylic Acid Process Bldg
Acetylene	1953 → 1963	1954 → 1963		
Dowtherm A			1957 → 1963	1957 → 1974
Hexane				1957 → 1974
Allyl chloride				1957 → 1974
Allyl sucrose				1957 → 1974
Pentaerythritol				1957 → 1974
Caprylyl peroxide				1957 → 1974
Monoethanol amine			1952 → 1962	
Purchased natural gas			1954 → 1962	
Acrylonitrile		1954 → 1968		1957 → 1968
Mercury, liquid (instruments + gauges)	1952 → 1963	1954 → 1974	1952 → 1962	1957 → 1970 E
Beta-propiolactone				1957 → 1974
Benzene		1957 → 1974		1957 → 1974
Acrylamide sulfate				1957 → 1968 E
Ammonium bi-sulfate				1957 → 1968
Ammonia	1952 → 1963			1957 → 1974
Potassium persulfate				1957 → 1974
Carbopol				1957 → 1974
Methylene blue				1957 → 1974
Phenothiazine				1959 → 1974
Paramethoxyphenol				1959 → 1974
Tert-butyl acrylamide				1959 → 1974
Tert-butyl perbenzoate				1959 → 1974
Ethylene diamine				1959 → 1974
Diphenyl-P-phenylenediamine				1959 → 1974
Eugenol				1959 → 1974

17000000

BFG65391

CALVERT CITY PLANT

Chemicals Used in Ethylene Plant

Chemical	Approximate Concentration	Dates Used
<u>PROCESS GAS</u>		
Hydrogen	Mol % 17.0	1963 → 1974
Methane	34.0	1963 → 1974
Ethane	6.0	1963 → 1974
Ethylene	29.0	1963 → 1974
Acetylene	0.4	1963 → 1974
Propane	4.5	1963 → 1974
Propylene	7.5	1963 → 1974
Propadiene	0.05	1963 → 1974
Methyl Acetylene	0.20	1963 → 1974
C4 Fraction	1.25	1963 → 1974
Gasoline Fraction	1.50	1963 → 1974
Fuel Oil Fraction	0.20	1963 → 1974
<u>PROCESS FEEDSTOCK</u>		
1. Propane	Mol %	
Ethane	3.0	1963 → 1974
Propane	95.0	1963 → 1974
iso-Butane	1.0	1963 → 1974
normal-Butane	1.0	1963 → 1974
2. Butanes		
normal-Butane	99.0	1966 → 1968
iso-Butane	1.0	1966 → 1968

25130312

BFG65392

CALVERT CITY PLANT

Chemicals Used in Ethylene Plant
(continued)

Chemical	Approximate Concentration	Dates Used
RECOVERED PRODUCTS		
1. <u>Ethylene</u>		
Ethane	0.15	1963 → 1974
Acetylene	10 ppm	1963 → 1974
Ethylene	99.85	1963 → 1974
2. <u>Propylene</u>		
Propane	2.3	1963 → 1974
Ethane	0.1	1963 → 1974
Ethylene	0.05	1963 → 1974
Propylene	97.3	1963 → 1974
3. <u>Mixed C₄'s</u>		
1,3-Butadiene	62.4	1963 → 1974
1,2-Butadiene	0.3	1963 → 1974
1-Butene & iso-Butylene	23.9	1963 → 1974
2-Cis-Butene	3.4	1963 → 1974
2-Trans-Butene	4.5	1963 → 1974
iso-Butane	1.1	1963 → 1974
n-Butane	1.2	1963 → 1974
Monovinylacetylene	1.4	1963 → 1974
Ethylacetylene	0.3	1963 → 1974
C ₅ 's+	0.4	1963 → 1974

BFG65393

81030732

CALVERT CITY PLANT

Chemicals Used in Ethylene Plant
(continued)

<u>Chemical</u>	<u>Approximate Concentration</u>	<u>Dates Used</u>
<u>RECOVERED PRODUCTS (continued)</u>	<u>Liquid Volume %</u>	
<u>4. Aromatic Gasoline</u>		
Mononolefins	3.3	1963 → 1974
CODA Compounds	13.6	1963 → 1974
Cycloolefins & Triolefins	17.1	1963 → 1974
Alkyl Benzene	56.9	1963 → 1974
Indans	7.5	1963 → 1974
Indenes	0.6	1963 → 1974
Napthalene	0.2	1963 → 1974
Benzene	46.0	1963 → 1974
Cyclo Pentadiene	10.0	1963 → 1974
Dicyclo Pentadiene	4.0	1963 → 1974
<u>5. Fuel Oil</u>		
Cycloolefins & Diolefins	0.40	1963 → 1974
Triolefins & Cycloolefins	21.6	1963 → 1974
Alkyl Benzene	16.9	1963 → 1974
Indans	13.3	1963 → 1974
Indenes	18.7	1963 → 1974
Napthalenes	12.2	1963 → 1974
Acenaphthenes	5.1	1963 → 1974
Fluorenes	6.8	1963 → 1974
Anthracenes	3.2	1963 → 1974
Acphenanthrene	0.8	1963 → 1974
Pyrenes	0.8	1963 → 1974
Chrysenes	0.2	1963 → 1974

7765394

BFG65394

CALVERT CITY PLANT

Chemicals Used in Ethylene Plant
(continued)

Chemical	Dates Used	Comments
PROCESS TREATMENT CHEMICALS		
Tertiary-Butylcatechol (TBC)	1963 → 1974	Added to C-4 fraction.
Caustic Soda (sodium hydroxide)	1963 → 1974	Added to caustic column for CO ₂ removal.
Methanol	1963 → 1974	Added periodically to process for preventing hydrate formation.
Toluene	1964 → 1974	Added periodically for process flushing.
Ethylene Glycol	1963 → 1974	Added to pumps.
Lube Oil (Gulf)	1963 → 1974	Used in the compressor lube oil system.
Dearborn 66	1963 → 1974	Used for boiler water treatment.
Dearborn 201	1963 → 1974	Used for boiler water treatment.
Dearborn 601	1965 → 1974	Used for boiler water treatment.
Dearborn 693	1965 → 1974	Used for boiler water treatment.
Dearborn Super	1963 → 1965	Used for boiler water treatment.
Nalco 262 (1)	1965	1. Added to feedgas compressor (trial).
	1971 → 1972	2. Added to the furnaces (trial).
Hydrogen Sulfide	1971 (approx. 3 mos.)	Added to furnaces.
Betz AF-103 (old DM-255) (2)	1966 → 1971	Antifoulant for feedgas stripper.
DuPont A0-5 (3)	1964 → 1972	1. Inhibitor for feedgas stripper.
	1972 → 1974	2. Added to the aromatic gasoline product.
Injection Oil	1965 → 1972	Antifoulant for feedgas compressor.
Sulfuric Acid	1971 (approx. 6 mos.)	pH control for caustic oil separation.
Betz FS-20 (4)	1966 → 1972	For fuel oil stability.

B

539

5/10/74

CALVERT CITY PLANT

Chemicals Used in Chlor-Alkali Plant

Chemical	Dates Used Chlorine Manufacturing Bldgs 661, 663	Dates Used Utility Bldg 662
Muriatic Acid	1966 → 1974	1966 → 1974
Sulfuric Acid	1966 → 1974	
Phosphoric Acid	1968 → 1974	
Mercury	1966 → 1974	
Carbon Dioxide	1968 → 1974	
Sodium Hydroxide	1966 → 1974	1966 → 1974
Carbon Tetrachloride	1969 → 1974	
Filter Aid		
Cellulose	1966 → 1974	
Diatomaceous Earth	1970 → 1974	
Sodium Hypochlorite	1966 → 1974	
Sodium Hydrogen Sulfide	1970 → 1974	
Sodium Chloride	1966 → 1974	
Graphite	1966 → 1969	
Ferrous Sulfate	1966 → 1967	
Soda Ash	1966 → 1968	
Barium Carbonate	1967 → 1968	
Ferric Chloride	1967 → 1968	
Starch	1967 → 1968	
Chlorine	1966 → 1974	
Ethylene Glycol	1966 → 1974	
Sodium Molybdate	1967 → 1974	
Gunk - Carbon Met	1966 → 1974	1966 → 1974
Nalco 675	1967 → 1968	
Nalco 110	1967 → 1968	
Barium Chloride	1967 → 1968	
Hydrazine	1972 → 1974	
Calcium Chloride	1968	
R-11	1966 → 1974	
R-12	1966 → 1974	
Activated Carbon	1972 → 1974	1966 → 1974
Sodium Sulfide	1970 → 1974	
Hydrogen Gas	1966 → 1974	1971 → 1974

57000000

BFG65396

CALVERT CITY PLANT

Chemicals Used in Boiler House & Utilities

Chemical	Dates Used Boiler House & Utilities Bldgs 613 & 662	General Description
Betz 45	1968 → Present	Liquid formulation of water soluble chromate (hexavalent) & zinc salts.
Betz 412	1972 → Present	Phosphate based sequestrant (alkaline in nature).
Betz C-30	1971 → Present	Slimicide. Composition: Bis (trichloromethyl) sulfone 20%; methylene bithiocyanate 5%; inerts (solubilizing & dispersing agents) 75%. USDA registration number 3876-61.
Betz Phosphate No. 8	1967 → Present	100% sodium hexametaphosphate - technical grade (P_2O_5 content: 68%).
Betz 522	1973 → Present	Liquid cationic polymeric (organic) coagulant.
Betz 1190	To begin in 1974	Liquid cationic polymeric (organic) coagulant. Approved for potable water use.
Morpholine	1965 → Present	40% solution of hydrazine.
Dearborn 63	1965 → Present	35% hydrazine solution.
Dearborn 66	1965 → Present	Cobalt catalyzed sodium sulfite (99%) approved for use in USDA plants.
Dearborn 201	1965 → Present	High (49.5%) content blend of ortho & poly phosphates with lignin and tannin dispersives.
Dearborn 601	1965 → Present	Complex organic compound of the polyoxy type dispersed in sulfonated lignins (U.S. patent 2,727,867).
Dearborn 693	1966 → Present	None available.
Nalco 607	1970 → 1973	Described as a quarterized polymeric amine; more specifically, poly-methyl ethylene (ammonium) chloride. This material is approved for use in treating potable water.
Nalco 650	1970 → 1973	Natural mined clay of the bentonite type, approved for potable water use.
Nalco 8151	1973 → Present	Natural mined clay of the bentonite type; approved for potable water use.

89010000

BFG65397