5/10/79 - O/C - R' Otto Connal - B+B

6/29/79 Copied for: Mr. J. W. Whittlesey✓

UNION CARBIDE CORPORATION
CHEMICALS AND PLASTICS
P. O. BOX 471, TEXAS CITY, TEXAS 77590

April 2, 1979

Dr. V. Alexander
U.S. Department of Labor
Occupational Safety & Health Administration
200 Constitution Avenue, N.W.
Room N-3673
Washington, D. C. 20210

Dear Dr. Alexander:

The following information is being supplied in response to your requests during your March 15 visit. These observations are provided for your background and research information only, and not in connection with any compliance review. They are subject to review and revision.

Employee Death Certificates

Dr. Glenn reports that we now have death certificates on ~~26~~ 29 of the 35 "unknowns". There are no primary brain tumors among the ~~26~~ 29.

Ethylene Purity

The most common commercial specification for pipeline ethylene on the Gulf Coast is 99.8% minimum purity; ethane content 0.2% maximum; for all other components, the maximum is normally 50 ppm or lower. Thus, it would be reasonable to assume that even a maximum ethylene release would carry with it probably nothing above the limits of detection.

Ethylene Production

Ethylene production in Texas City can be summarized as follows:

1941 - 1942		<100 million lbs./yr.
1943 - 1948	Avg.	200 million lbs./yr.
1949 - 1968	Avg.	600 million lbs./yr.
1969 - 1979	Avg.	1100 million lbs./yr.

Personnel Exposures to Ethylene

After restudy of the work histories of the eleven employees described in Dr. Glenn's letter of February 28, to you, we can divide the employees into two groups:

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(1) Employees who spent considerable periods in areas making or using several hundred million pounds of ethylene per year and

(2) Employees working in areas (or plant-wide) where exposure levels were essentially at the plant ambient air level (well under 50 ppm ethylene).

High Usage Areas	Minimal Exposure
Elder	Burck
Liles	Hinson
Mitcham	Malone
Pope	Perkins
Tuttoilmondo	Remme
Wurzlow	

Area Monitoring Data

To provide some order-of-magnitude data on total hydrocarbon levels in various parts of the plant, see Table I. The most likely area for high ethylene levels should logically be our "world-scale" #3 Olefins area, and you will note they are very low indeed. The only TLV for ethylene I am aware of personally is 1,000 ppm (ACGIH); because we have been so far below that level, only limited data exist.

Ethylene Usage

You requested that we identify the areas or units listed in the product list (our letter of February 26 to Mr. Miller) which handled large volumes of hydrocarbons. These are in Table II, and the page references are to the above letter. Please note that this information would be useful to our competitors, and we request its confidential handling.

I have also attached a tear-sheet from a recent issue of "C&E News" which provides you a bit of commercial background on ethylene.

Very truly yours,

D. L. Engle
Plant Manager

DLE/gt

cc: Dr. D. H. Glenn
Mr. J. B. Leverton

TABLE I

AREA EXCURSION MONITORING

TOTAL HYDROCARBONS

DATE	AREA	MEDIAN	RANGE
1973	Fuel Gas Area	<20ppm	N/A
1975	No. 2 Olefins (3 buildings)	100ppm	25 - 300ppm
1976	No. 3 Olefins (All buildings & areas)	80ppm	15 - 450 (3 above 200)
1976	Vinyl Acetate	50ppm	25 - 85 (3 above 75)

ETHYLENE - SPECIFIC

1976	No. 3 Olefins	20ppm	10 - 30
1979	Vinyl Acetate (converter operators)	0.07ppm to 4.98ppm	(8-hr TWA)
1979	Diethyl Sulfate (operators)	0.45ppm to 4.01ppm	(8-hr TWA)

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TABLE II

HYDROCARBON USAGE

PRODUCT	AREA	TYPICAL ANNUAL THRUPUT, MMLBY	LEVERTON LIST PAGE
Ethylene	No. 2 Olefins (when operating)	140	7
	No. 3 Olefins	1,100	8
	Ethanol	470	1
	Oxo - LPO	60	9
	Vinyl Acetate	125	18
	Diethyl Sulfate	5	3
	Ethylene Dichloride	15	19
Propylene	No. 3 Olefins	95	8
	Solvents & Acids (Isop)	400	14
	Marine Terminal	290	26
LPG/Refinery Gas (Liquid Petro Products)	No. 2 Olefins	120/0	7
	No. 3 Olefins	1,550/150	8
"Dripolene" (Heavy Hydrocarbons)	No. 2 Olefins	15	7
	No. 3 Olefins	130	8
	Marine Terminal	150	24
Butadiene	No. 3 Olefins	45	8
	Marine Terminal	170	24
Butylene	Oxo	45	10

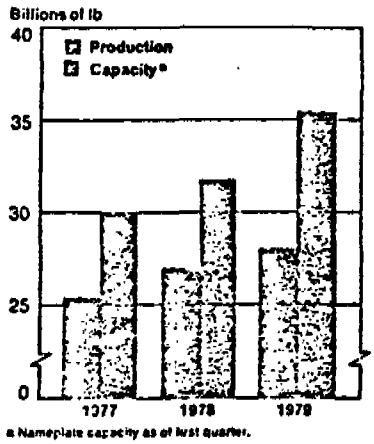
Key Chemicals

$CH_2=CH_2$

Ethylene

- *Capacity expanding*
- *Demand gains slowing*
- *Prices holding*

PRODUCTION/CAPACITY



a Nameplate capacity as of last quarter.

HOW MADE

Cracking various hydrocarbons from ethane to gas oil by catalytic processes or in the presence of steam

MAJOR DERIVATIVES

Polyethylene 45%; ethylene oxide/glycol 20%; vinyl chloride 15%; styrene 10%

MAJOR END USES

Fabricated plastics 65%; antifreeze 10%; fibers 5%; solvents 5%

FOREIGN TRADE

Exports and imports negligible

PRICES

Contract—13 cents per lb with slight shading; spot market small

COMMERCIAL VALUE

$3.5 billion for total production, 1978

Success is quite relative these days for basic olefins. For example, insiders say that the kingpin of this group, ethylene, will have an outstanding year in 1979 if the price merely holds, even in the face of a huge wave of new U.S. production capacity.

In other words, ethylene producers are really in trouble. A quick look at capacity and demand forecasts leads to no other conclusion.

In 1978, nameplate ethylene capacity increased at a rate one and two thirds times the forecast demand increase of a billion pounds or so in 1979, when this capacity will first be available for full-scale use. For next year, capacity additions amounting to almost four times this demand increase will be coming on stream.

Operating rates will fall during 1979 as they did in 1978. Pessimistic forecasts for the U.S. economy in 1979, if accurate, could mean even lower growth in ethylene demand and yet lower operating rates.

Some faint hope for ethylene producers is that recent official production estimates have proved to be too low. For example, the 1977 final production figure for ethylene from the International Trade Commission is 25.4 billion lb. This is up nearly 1 billion lb from preliminary estimates of just a few months ago. Annual production for 1978, based on the first eight months of preliminary ITC estimates, runs well over 27 billion lb. This is again some 12% over similar estimates at this time in 1977.

Company officials forecast that production during the fourth quarter of 1978 will slow for several reasons. As a result, 1978 production would be about 26.5 billion lb. Such production would give a reasonably good gain over preliminary estimates for 1977 production. In fact, this increase could exceed capacity additions that went fully on stream during the year.

However, the higher final production total for 1977 suggests that a higher than expected total also will result in 1978. Ethylene production probably has been running along well enough to reach a 1.5 billion lb gain this year.

Some of this added production has gone into inventories, which may be nearing 2.5 billion lb. Although large, this volume is not considered excessive. The reason is that considerable product is needed just to fill pipelines and to meet contract needs during times of plant operating problems or maintenance shutdowns.

Next year, some additions to inventories also will be necessary. However, these probably will not be large. Companies adding major capacity next year—Exxon Chemical, Shell Chemical, and Texaco—are all current producers of ethylene and hence have storage and pipeline systems already in operation. As a result, inventory additions will be about 200 million lb.

The forecast growth in consumption of ethylene in 1979 at a billion pounds or slightly more assumes slower growth in the U.S. economy, but not an outright decline. This ethylene growth, called "conservatively optimistic" by one industry source, will lead to a 1979 production of 28 billion lb, up about 5%.

This consumption will come mostly from ethylene's most important uses—polyethylene and vinyl chloride for polyvinyl chloride. High- and low-density polyethylene and ethylene dichloride, precursor to vinyl chloride, account for 60% of ethylene demand. In spite of their size and maturity, these uses are forecast to grow at a rate above ethylene's 5%.

Offsetting good growth in ethylene demand for polymer products, including styrene, are slower rates for use in ethylene oxide and its derivatives, especially ethylene glycol. (Direct production of ethylene glycol from ethylene is just getting under way with apparent difficulties, so its growth rate is not meaningful.)

The other large-size use of ethylene, conversion to ethylbenzene for styrene, has declined in growth for some time. Growth in 1979 probably will be half the average rate for all uses of ethylene. Use of styrene in polymers and in styrene-butadiene rubber (SBR) has relatively low growth. Use in acrylonitrile-butadiene-styrene resins and other resins is growing at rates of more than 5%. However, their base is small and total consumption small compared to that of polystyrene and SBR.

With only modest hopes for increasing demand in 1979, it may be a year of strategic planning adjustments in ethylene. Since feedstock and other costs continue to increase, price cutting seems unacceptable. However, much new efficient capacity will be in operation. The obvious solution is for planners in 1979 to shut down old capacity in 1980.