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Interoffice Communication

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To R. D. Gamblin

From J. A. DeBernardi

Date February 3, 1978

file EDC

Subject EDC Exposure - VCM Plant

As a result of the information obtained from the National Cancer Institute studies indicating ethylene dichloride (EDC) to be a carcinogenic compound, a review has been made of the personnel dosimeter results of VCM Plant employees to determine our status related to employee exposure to this material. The purpose of this letter is to inform you of our findings and indicate what is being done to reduce the potential of employee exposure. The existing allowable exposure limit for EDC is 50 ppm 8-hour TWA. NIOSH has proposed to OSHA a 5 ppm 8-hour TWA exposure level and 15 ppm for a 15-minute period for EDC. The NIOSH proposal was made in 1976 with no OSHA action to this date to adopt the recommendation.

It should be noted that the Cancer Institute study was conducted by the direct insertion of EDC into the test specimen's stomach, whereas it is my belief the NIOSH proposal is predicated on inhalation of vapor. Also, it is important to note that recent inhalation studies by Maltoni have been negative related to tumor formation in test specimens.

The personnel dosimeter results have been tabulated by ranges for the years 1976 and 1977 (through October). This data is shown in Tables I and II attached. The 1977 data was further broken down to indicate the work area in which the exposure occurred. This breakdown is shown in Table III attached. The majority of the personnel dosimeter records do not list specific jobs on which the employee worked, but rather the general area(s) in which the employee worked.

Using the exposure data in 1977 (through October), a total of 410 samples, the exposure distribution for 8-hour measurements is as follows:

ppm EDC	No. of Samples	%
0 - 0.5	225	54.9
0.5 - 1.0	43	10.5
1.0 - 5.0	91	22.2
5.0 - 15.0	35	8.5
Over 15.0	16	3.9
	410	100.0

This breakdown indicates that 87.6% of the results were within the NIOSH proposed standard limits. However, if a 1 ppm standard was set by OSHA, only 65.4% of the samples would be in compliance. Of the samples shown as "over

15 ppm," seven were in the 15-25 ppm range, six in the 25-50 ppm range, and three over 50 ppm.

The breakdown of exposures over 1 ppm by departments is as follows:

	1.0 - 5.0	5.0 - 15.0	Over 15	Total
Laboratory	3	1	0	4
Operations	38	14	5	57
Mechanical	51	19	11	81
Other	6	1	0	7
	98	35	16	149

Of the samples over 1 ppm the Operations Department accounts for 38.3% and Mechanical for 54.3%. Similar numbers for samples over the NIOSH proposed limit (5 ppm) are 36.3% and 58.9%, respectively. Of the samples shown as "over 15 ppm" in the Operations Department, three were in the 15-25 ppm range, two in the 25-50 ppm range, and none over 50 ppm. Similar breakdown for the Mechanical Department would be four in the 15-25 ppm range, four in the 25-50 ppm range, and three over 50 ppm.

As would be expected, the Operations and Mechanical departments' employee exposures are the major problem areas requiring attention. Projects presently under construction, or AFE'd, should have a very positive effect on EDC exposure reduction and overall lowering of EDC background levels at the VCM Plant. These include:

1) Process Sewer and Wet Vent Header
2) EDC Sample Point Revisions
3) Light Ends Dryer Revisions
4) T-500 Pit Revisions (clam shell pit)
5) Storage Tank Vents to the Incinerator System

Should further reductions be indicated to be necessary after completion of the projects mentioned above, two possible areas not yet evaluated would be:

1) Mechanical Seal Systems on EDC Pumps
2) Control Valve and Block Valve Packing Leakage

EDC ship loading operations is an area in which exposure data is lacking. In November one EDC ship loading was monitored for exposure and a second ship monitored in December. These monitorings were done using the job function approach; i.e., hose connect, hose removal, line blinding, etc. Results obtained were very high related to employee exposure. It is obvious that work will be required to reduce these job function exposures if we are to continue moving EDC by ship or barge. We intend assigning an engineer to be present at the next ship loading to pinpoint the major areas of EDC exposure and develop designs and/or procedure changes to eliminate these problem areas.

We also will complete 8-hour TWA monitoring on subsequent EDC ships to determine overall exposures rather than job function exposures.

J. A. DeBernardi

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TABLE I

1976 EDC EXPOSURE

PPM EDC	0 - 0.5	0.5 - 1.0	1.0 - 5.0	5.0 - 15.0	over 15.0
LABORATORY					
Analyst	17	6	8	0	1
OPERATIONS					
P/L Rack	19	0	5	2	0
P/L Off Sites	21	4	4	3	0
Block I	8	0	10	7	3
Block II	9	1	14	3	1
Boardman	16	3	5	1	0
Chief Operator	12	2	6	3	0
Shift Supervisor	48	13	29	11	3
MECHANICAL					
Leadman	20	3	12	0	1
Instrument Man	8	3	10	2	2
Carpenter	3	0	3	1	0
Toolroom man	1	1	1	1	1
Boilermaker	6	3	9	1	2
Electrician	3	4	2	1	0
Welder	8	3	6	2	0
Millwright	5	1	8	4	1
Pipefitter	7	4	6	2	0
OTHERS [1]					
Tech Staff, I	19	4	2	2	0
Tech Staff, II	20	4	7	2	1
Janitors	4	1	2	1	0
Farris Painters	6	0	4	2	0
TOTAL	260	60	153	51	15

1. Technical Staff I includes Process Engineers, Chief Chemist, and Manufacturing Chemist. Technical Staff II includes Department Heads and Office Personnel.

TABLE II

1977 EDC EXPOSURE
(Thru October)

PPM EDC	0 - 0.5	0.5 - 1.0	1.0 - 5.0	5.0 - 15.0	over 15.0
LABORATORY					
Analyst	15	4	3	1	0
OPERATIONS					
P/L Rack	34	7	8	1	0
P/L Off Sites	6	1	2	0	1
Block I	9	1	7	2	0
Block II	9	3	3	4	2
Boardman	21	0	5	0	0
Chief Operator	5	1	4	1	1
Shift Supervisor	36	1	5	7	1
MECHANICAL					
Leadman	20	3	8	1	1
Instrument man	9	0	8	0	0
Insulator	0	3	1	0	1
Carpenter	3	0	3	0	1
Toolroom man	3	1	0	1	0
Boilermaker	6	2	5	3	1
Electrician	7	2	1	0	0
Welder	3	1	6	2	1
Millwright	5	2	6	4	4
Pipefitter	4	1	6	3	2
OTHERS [1]					
Tech Staff II	14	4	3	1	0
Tech Staff I	12	3	2	0	0
Janitors	3	2	1	1	0
Farris Painters	1	1	4	3	0
TOTAL	225	43	91	35	16

1. Technical Staff I includes Process Engineers, Chief Chemist, and Manufacturing Chemist. Technical Staff II includes Department Heads and Office Personnel.

TABLE III

NUMBER OF EDC EXPOSURES BY WORK AREA

1977 (THROUGH OCTOBER)

GROUP	WORK AREA	PPM EDC 1 - 5	5 - 15	over 15
LABORATORY				
	Wet Chemical	3	1	0
OPERATIONS				
	Blk I & Blk II	11 (4)*	6 (3)*	2 (2)*
	Control Room	6	0	0
	Loading Rack	12	1	2
	Offsites	1	0	0
	General	8 (1)*	7 (1)*	1
MAINTENANCE				
	Blk I & Blk II	21 (3)*	6 (2)*	5 (3)*
	General	15	5	1
	Tank Farm	6	3	1
	C-500	0	0	3
	Shop	7	3	0
	Secondary	1	0	0
	Cooling Tower	1	2	1
OTHERS				
	General	5 (1)*	1	0
	Secondary	1	0	0
	TOTAL (Thru Oct)	98	35	16

* The number shown in parenthesis indicate the number of exposures that occurred during turnaround operations.