

REVIEW OF BFG CHEMICAL ACTIVITIES
and
STATUS RELATED TO COMPLIANCE WITH THE OSHA VINYL CHLORIDE STANDARD

Substantial improvement in ambient vinyl chloride level in the working area atmosphere, as well as a dramatic lowering in the residual vinyl chloride level in our products has been achieved as a result of concentrated effort by Production, Engineering, and Research and Development over the past year. Specific efforts aimed at compliance with the OSHA vinyl chloride permanent standard have been underway since publication of the regulations on October 4, 1974. These efforts have been organized as a responsibility of each plant but with strong coordination from Cleveland Manufacturing. The status of Division activities to permit compliance with the provisions of the new standard is as follows:

Permissible Exposure Limit

The permissible exposure limit is defined in the new standard in terms of a maximum average daily exposure (the eight-hour TWA) of 1 ppm and a ceiling value (measured over a 15-minute period) of 5 ppm.

Early efforts to measure and reduce vinyl chloride monomer levels were based on area monitoring by portable organic vapor analyzers. This was followed by installation of permanently located, continuous sampling, analyzers which had much improved sensitivity. Because the permissible limit is defined in terms of employee exposure, rather than concentration existing in any given area, a parallel monitoring program based on personal exposure is underway.

Monitoring

Under the new standard, the primary function of area monitoring is to provide alarm capability. In addition, area sampling furnishes data that leads to early correction of leaks or other sources of exposure. A year ago, the average VCM level in process areas of the five PVC plants was 35-40 ppm. Today, it is less than 6 ppm.

We now have 18 permanently mounted, total hydrocarbon analyzers which provide continuous monitoring at 120 separate points in the process areas. In addition, we have two installations which employ more sophisticated, continuously monitoring, gas chromatographs, which can discriminate between vinyl chloride and other hydrocarbons. Six more of these units are on order and will be in operation by the end of the second quarter.

This automatic monitoring equipment has provided alarms to indicate monomer concentrations higher than 25 ppm. The units are being modified to provide a three-tier alarm system, flashing yellow lights to indicate concentrations above 10 ppm, flashing red lights to warn of levels above 25 ppm, and an audible alarm to indicate excursions above 100 ppm.

Monitoring - con't.

Personal monitoring is conducted by continuously drawing air from near a man's breathing zone through a small tube of charcoal by means of a battery operated pump attached to the man's belt. The tube is later analyzed by means of a laboratory gas chromatograph. We presently monitor about fifty people per day at the various locations. Under the new standard we will be required to monitor approximately 1,500 employees on a once per month basis.

Equipment for conducting personal monitoring has undergone a constant evolution and the new equipment, recently delivered to each plant, now permits rapid analysis with much improved accuracy.

A computer program has been developed to process and store personal monitoring data from all locations. This program provides both local and summary data which fulfills the requirement for long term data storage and provides the basis for early management action.

Monitoring results to date are as follows:

In areas which will be regulated

15% of 8-hour TWA values greater than	10 ppm
65% of 8-hour TWA values between	5-10 ppm
15% of 8-hour TWA values between	1-5 ppm
5% of 8-hour TWA values below	1 ppm

In areas which we do not plan to regulate

15% of 8-hour TWA values between	1-5 ppm
15% of 8-hour TWA values between	0.5-1.0 ppm
70% of 8-hour TWA values less than	0.5 ppm

Regulated Areas

The new standard requires the establishment of regulated areas where exposures beyond the permissible limit are expected. These areas must be reported to the OSHA Area Director by May 1, 1975. Entrance to such areas must be limited to a list of authorized personnel who become subject to requirements for long term medical surveillance. Daily area rosters, continuous monitoring, and respiratory protection equipment require careful administrative control.

Presently available exposure data indicate that all polymerization buildings, the dryer buildings and tank farms at some plants, and the three EDC cracking areas at the Calvert City plant would require regulation. In addition, a number of other process and warehouse areas at the Louisville plant now show exposure levels beyond the permissible limit.

Continuing improvement will soon eliminate the need to regulate dryer building areas in the remaining plants. Continuing progress at Calvert City can be expected to eliminate all regulated areas from that plant. By the end of 1975 it is expected that only the twelve polymerization buildings will have to be maintained as regulated areas. Tank farm operations will be designated as hazardous during loading and unloading operations. A small area at the Avon Lake Technical Center is to be designated as a regulated area. The Brecksville Research and Development Center will contain no regulated areas. Elimination of vinyl chloride from the Independence Technical Center has freed this location from provisions of the new standard.

Methods of Compliance

The new standards place primary emphasis on engineering and work practice improvements to reduce exposure levels, and these areas have received major attention during the past year. Much of this effort has been centered around the Code Zero program. A significant portion of this program was aimed at the development of PVC resins which would have a structure permitting easier removal of residual vinyl chloride monomer. Improved polymerization recipes for general purpose resins, designated internally as UPS recipes (meaning uniform particle structure) have been introduced into all plants. Customer evaluation has been most encouraging and replacement of the three largest volume types should be complete by April 1, 1975. Similar recipe improvements have been demonstrated for the principal dispersion resin. Replacements in both of these areas have shown equal or improved productivity in addition to characteristics of easier monomer removal.

Several low volume, copolymer solution resins presented the most serious problem with regard to residual monomer level. The technical problems of structure improvement for these resins was especially discouraging. These represented a volume of 5-10 million pounds per year and have been dropped from the product line.

Opening of polymerizers for cleaning and recharging has been a major source of monomer exposure and the development of a closed poly mode of operations has been a major goal of the Code Zero effort. The successful demonstration of a method of coating polymerizer walls with a solution which prevents polymer buildup promises successful closed poly operation. To date, polymerizers have been operated for 75 successive cycles without the need for cleaning.

Improved ventilation in polymerization areas has been instrumental in reducing ambient vinyl chloride levels in work areas. In addition, all plants are being equipped with fiberglass ventilation stacks which will be used to collect miscellaneous vents from process equipment and discharge at a level approximately 140 feet above grade. The first of these stacks is now operational and installation of all twelve units will be complete by early Spring.

A major investment is being made to reduce monomer losses by continuous stripping columns for processing major product types. Construction is under way on nine units at a cost of approximately six million dollars. The first unit will be operational by July 1975. All units will be in service by January 1976.

Completion of the new large poly installation at Louisville will provide the most complete approach to improved work methods for reduced exposure. These new, large reactors have been designed for closed poly, remote operation under the most modern computer control and will utilize the new stripping column development for monomer recovery. We are rather confident that exposure levels in this largely outdoor installation will be below the permissible level and the area will not be regulated under the new OSHA standard.

NGC 05458

Methods of Compliance - con't.

The product and process improvements already accomplished have resulted in a significant reduction in residual monomer level in our products. Early in 1974 the level of residual monomer in our principal general purpose resins was in the range of 100-200 ppm. Today, with the use of the new UPS recipes and improved recovery techniques, the levels are in the range of 10-20 ppm. Completion of the new continuous stripping columns will reduce this level below 1 ppm. When this goal is reached our customers will be assured of no exposure problems in their facilities and we can hope to petition for removal of the cancer warning labels from our product packages.

Respiratory Protection

The OSHA standard has set up six different levels of VCM for which twelve types of respiratory equipment is prescribed. We have selected three levels; unknown, 1,000 ppm, and 10 ppm, and plan to provide proper equipment for these levels. OSHA has also included that during the first year, wearing of respirators shall be at the discretion of each employee for exposures not in excess of 25 ppm.

Our program will be based on providing half-face canister respirators for protection at levels up to 10 ppm. The same half-face respirator, with connection to broadly distributed network of breathing air stations will provide protection up to a level of 1,000 ppm. Protection for concentrations in excess of 1,000 ppm will be secured by means of self-contained breathing apparatus (Scott Air Pak).

This basic approach will be used at all plants with the exception of the Pedricktown plant. Pedricktown will provide a pilot installation to evaluate the use of air line respirators at all levels up to 1,000 ppm. While this alternate procedure would cause some disadvantage in terms of operator maneuverability and possibly efficiency, it will provide experience for an operation independent of the problems of NIOSH approval, availability and high cost for canister based respirators.

Orders have been placed for sufficient masks, canisters, and fittings to cover needs at all plants. Delivery is assured for a sufficient number for somewhat restricted operation but delay in NIOSH approval procedures and hesitancy on the part of safety equipment manufacturers to gear up for high volume production leaves the availability and price open to some question.

Medical Surveillance

The program for medical surveillance required by the OSHA standard is quite specific and organized efforts to meet these obligations are well underway. It is estimated that physical examinations will be required for approximately 2,000 employees. The tests to be performed have been identified. It has been determined that a liver scan will be performed, in lieu of the second of two physical examinations required each year for employees having more than ten years of vinyl chloride connected service.

A standard physical examination form has been developed which will permit simplified computer handling of medical data as well as work history. Provisions have been made for employee notification as required by the standard.

Medical Surveillance - con't.

Spirometers, to measure vital capacity, have been put into operation at each plant and all equipment necessary for dispensary examinations is now available at the plants. The entire program has been reviewed with each plant physician.

The existing medical examination program will be continued. This program will more than meet the requirements of the new standard.

Training

Ongoing safety training at each plant handling vinyl chloride has long emphasized procedures for minimizing exposure to this material. Very specific training requirements are indicated for compliance with the new standard. A three-part training program has been designed to provide a unified approach to these training responsibilities.

Corporate Employee Communications has developed an audio-visual presentation to explain the requirements of the new OSHA standard. The script for this presentation has been edited and awaits final approval.

The Corporate Training and Education Department has similarly developed a program to cover the training requirements specified in the standard. This is also based on a slide-projector-audio cassette presentation and will provide for a second installment toward the total training needs.

It is expected that production of multiple copies of these programs will begin during the week of February 17, 1975. Plans are underway to have a training representative from each plant attend a training meeting on March 14, 1975 in Akron, at which time the completed training programs would be available.

The two audio-visual presentations would be supplemented by a third training session which would be devoted to the specific problems and procedures that are a function of each plant's operation.

Hazardous Operations and Emergency Situations

The standard defines hazardous operation in a way which permits temporary classification of areas during jobs which might be expected to result in high exposure. This classification will be used to provide control over exposure during tank car loading operations without limiting required entry into tank farm areas by railroad crews.

In addition, each plant has defined a number of hazardous tasks for which special respiratory equipment or protective clothing is required. Special monitoring procedures have been established to define the personal exposure resulting from such tasks in order to devise improved procedures.

Emergency situations have been discussed with all plant representatives. Any emergency situation requiring notification of the OSHA Area Director will be routed through the Cleveland Safety Department to provide uniformity of action. Each plant has developed emergency procedures which outline proper employee action to insure maximum safety.

Signs and Labels

The need for special identification of plant areas and any packages or containers which might involve exposure to vinyl chloride provides a number of special problems.

Identification of plant areas and intraplant containers is relatively straight forward. Each plant has obtained the necessary signs to define regulated and hazardous areas. These signs will be posted during the last week of March. Labels for plant containers, sample vessels, etc., are available at each plant and offer no problem.

Package labeling designs have been prepared but are being reviewed on an industry-wide basis with coordination by S.P.I. The required package warning legend as well as the necessary identification for tank cars, bulk trucks, etc., present serious problems with a major impact on public relations and shipping costs. The unified approach being developed through S.P.I. is of special value. It is anticipated that final plans for product and vehicle markings will be complete by February 28, 1975.

Problem Areas

While progress toward compliance with the new OSHA standard has been very encouraging, a number of serious problems remain.

A workable method for handling outside contractors and occasional visitors to regulated areas must be developed. The most rigid interpretation of the standard would make it virtually impossible to obtain competitive bids on work that must be performed in regulated areas by contractors and various service representatives without a complete shut down of these facilities. A proposed policy that is thought to be workable will be sought as a requested variance or will be adopted as an interpretation, subject to possible future citation.

The cost and suitability of canister respirators which have been approved to date would present an overwhelming burden with regard to cost and logistics, if a substantial number of employees chose to use respiratory protection at exposure levels below 25 ppm during the "voluntary" period. Of course, the problem would be even more serious after the April 1, 1976 voluntary deadline unless there is significant improvement in cartridges and canisters for respirator protection.

Shipping and warehousing present immediate problems due to the possibility of exposure beyond the permissible limit under conditions beyond our immediate control. This problem has been reduced dramatically as RVCM levels in our product have been lowered, but total solution will depend on some process improvements that will not be completed until year end.

Competitive Information

Most PVC companies are not taking the OSHA standard and the April 1, 1975 implementation date as serious as BFC. Many believe further legal action will delay its implementation. One company expressed the thought that area inspectors will enforce the standard differently.

NGC 05461

Competitive Information - con't.

Ambient vinyl chloride monomer levels at competitors' plants varied from 2-3 to 20 ppm in process areas. Many companies have gas chromatographs to measure the VCM levels.

The RVCM levels in the product was generally in the range of 10 to 200+ ppm. Not many companies are currently in the 10 ppm range and most think of this as a goal. No one even mentioned a goal of 0-1 ppm RVCM for finished products.

No one has gone out of the business except for the Olin plant, and this was because of a VCM shortage. The Atlantic Tubing and Rubber Company will delay the construction and start-up of their rebuilt plant until economic conditions improve. Goodyear shut down a portion of their PVC capacity at Niagara Falls. Uniroyal is searching for a source of dispersion resin that would permit them to shut down their Painesville production.

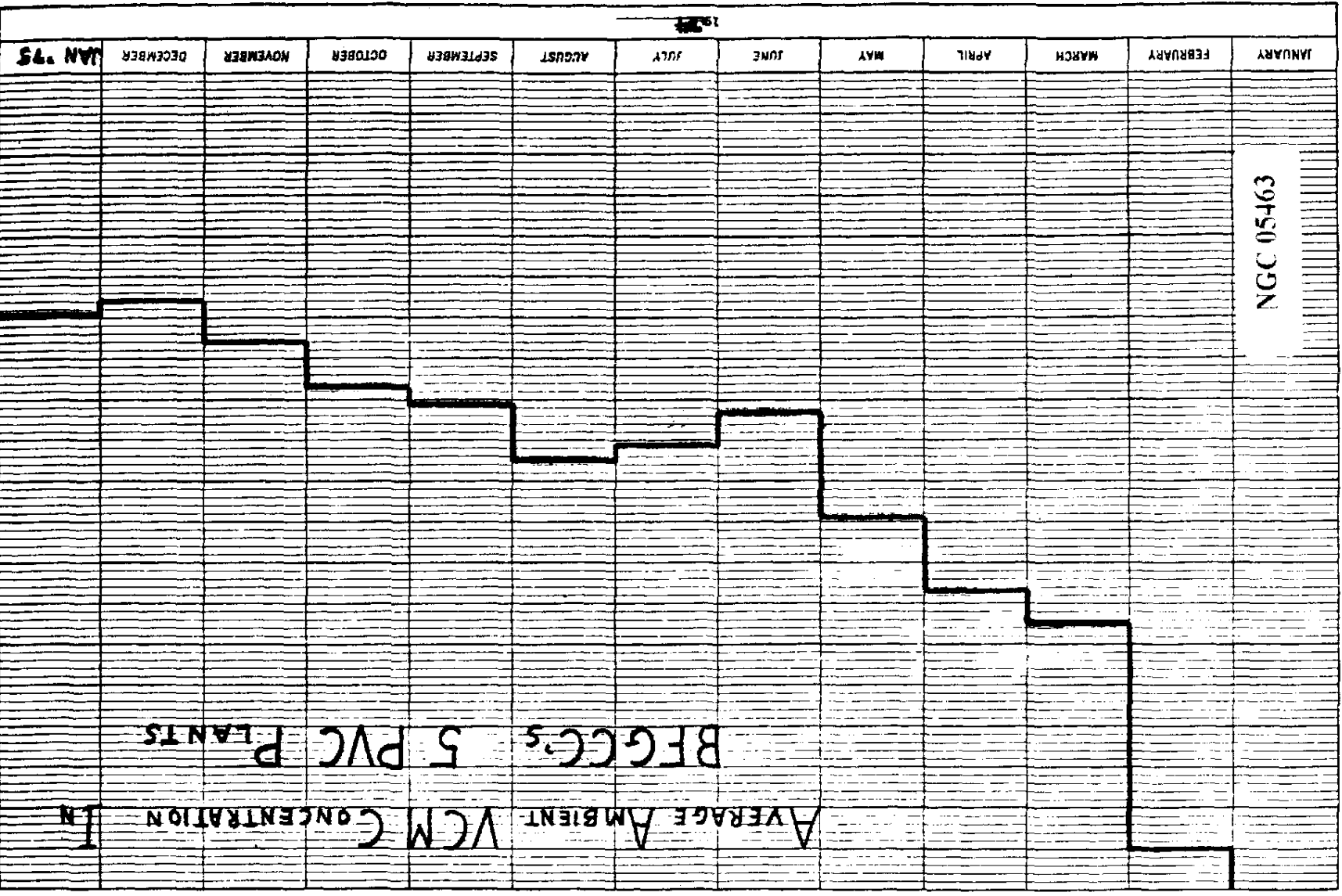
February 7, 1975

NGC 05462

AVCM, PPM IN AIR

0 2 4 6 8 10 12 14 16 18 20

NGC 05463

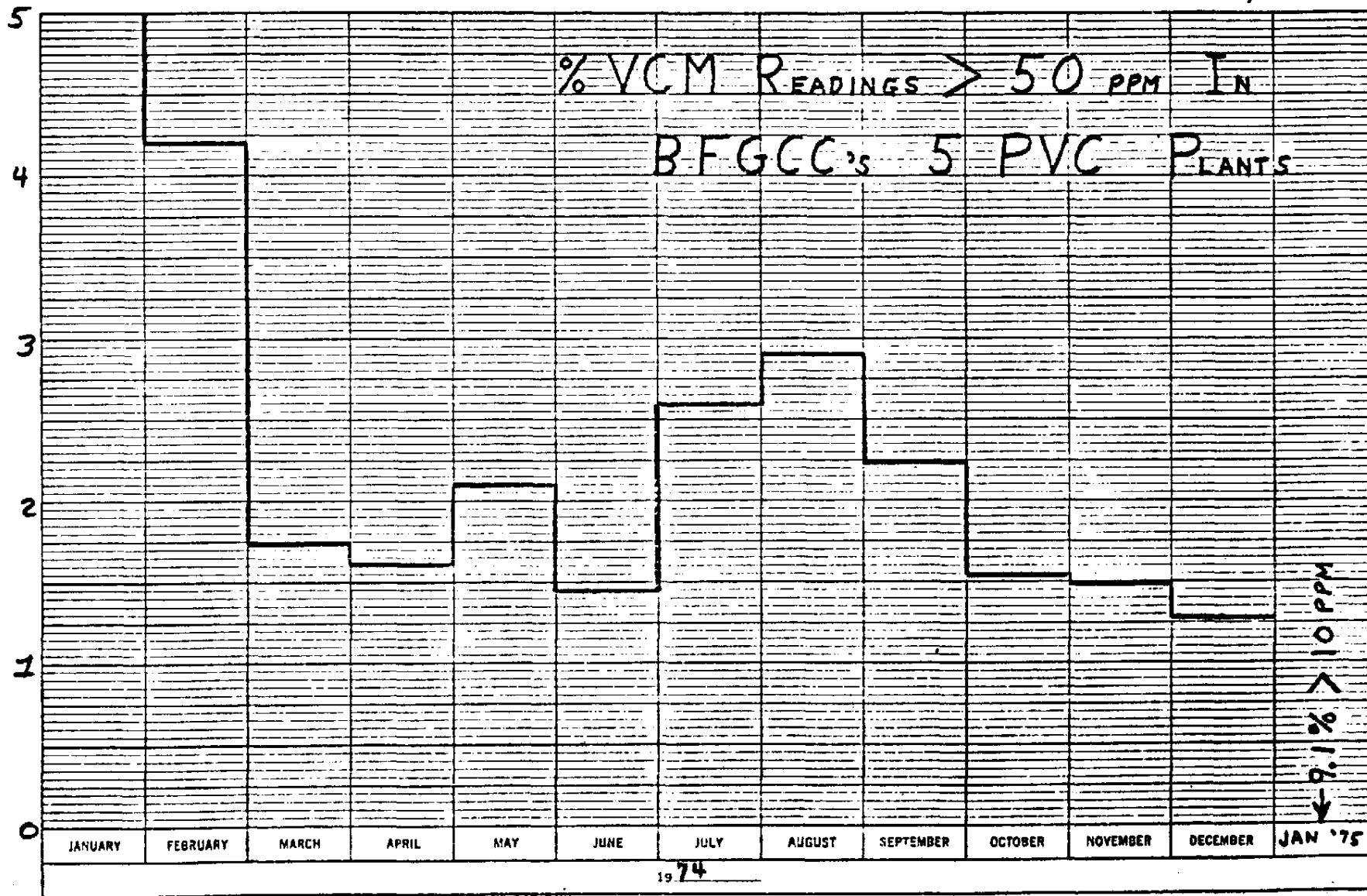


BFGCC-5 PVC PLANTS

AVERAGE AMBIENT VCM CONCENTRATION IN

NGC 05464

% OF ALL READINGS



PLANT MANAGERS' MEETING - FEB., 1975
CHECK LIST FOR OSHA VINYL CHLORIDE STANDARD

<u>OSHA Administrator</u> <u>Reports to</u>	<u>ALGC</u> L.S.Wallis Plt.Safety Engr.	<u>CC</u> J.R.Render Plt. Mgr.	<u>HENRY</u> D.E.Giffin Prof.Ser. Mgr.	<u>LONG BEACH</u> W.A.Spillman Tech.Mgr.	<u>LOUISVILLE</u> C.C.Talbott PVC Prod. Mgr.	<u>P-TOWN</u> D.P.O'Keefe Prof.Ser. Mgr.	<u>ALTC</u> L.A.Bennett Plt.Mgr.	<u>BRECKSVILLE</u> M.Lukity Mgr.Adm.Ser.
<u>Plant Enrollment - Feb.</u>	572	617	270	146	1004	237	424	444
<u>No. of Reg. Areas</u>	4	3	2	1	8	3	1	0
<u>People assigned to Reg. Areas</u>	38/21/50/50	31/23/23	60/2	29	38/0/56/27 5/46/3/4 GA/-/GA/GA CR/GA/OB/OB .68/0/.88/ .88/.63/.88/ .02/.25	13/20/12	18	-
<u>Area from which people will work</u>	CR/CR/GA	CR/CR/CR	CR/Shed	CR-GA	GA/-/GA/GA CR/GA/OB/OB .68/0/.88/ .88/.63/.88/ .02/.25	GR/CR/GA	CR-GA	-
<u>Est. fract. time above 1 ppm</u>	.95/.01/.95/ .95	0/0/0	.15/.10	.45	.75/.75/ .25	.16	-	-
<u>Area Monitoring</u>								
<u>No. of Present Monitors GC/THA, (Future)</u>	1/4 (1/4)	1/0 (4/0)	0/1 (0/3)	0/1 (1/1)	0/4 (1/4)	0/2 (0/4)	0/0 (1/1)	0/0 (0/1)
<u>Total pts. sampled</u>	24	10	12	6	24	12	0	0
<u>Total pts. planned</u>	24	40	18	12	30	24	12	6
<u>Date sampling compl.</u>	2-17-75	5-1-75	4-1-75		2-24-75	5-1-75	-	4-1-75
<u>Present alarm level</u>	25/50	none	25	25	25	25	-	-
<u>Present signal type</u>	Y/Aud.	-	Red	Red-Aud.	Aud.	Red	-	-
<u>Future signal type</u>	Y/R/Aud.	CRT	Y/R/Y-R	Y/R/Aud.	Y/R/Aud.	R/Aud.	Y/R/Aud.	Y/R/Aud.
<u>Future levels</u>	10/25/100	1/5/25	10/25/100	10/25/100	10/25/100	25/1000	10/25/100	10/25/100
<u>Date to complete alarms</u>	5-1-75	5-1-75	5-1-75	6-1-75	6-1-75	5-1-75	5/75 - 8/75	4-1-75
<u>Avg. level - most recent week</u>	10/4	0.2	2	1.1	2.0	4.1	2.0	-
<u>Personal Monitoring</u>								
<u>Present Method</u>	Flasher(MS)	Flasher	Flasher	Outside	Flasher	CS ₂	Flasher	Flasher
<u>Date for Flasher completion</u>	3-14-75	compl.	2-21-75	3-7-75	2-28-75	4-1-75	complete	3-3-75
<u>Number of personal pumps</u>	28	15	11	8	22	11	17	13
<u>Who is to conduct</u>	Pers.Mon. Tech.	Safety	Fore/S.E. opr.	Lab	Foremen	OVA	OVA	OVA-Safety
<u>est. no. monitored monthly</u>	175	275	124	70	543	65	45	40
<u>est. no. sp. tasks monitored monthly</u>	74	26	20	20	37	20	13	0
<u>est. no. monitored quarterly</u>	80	50	-	66	7	125	7	20
<u>Est. Total Monthly monitorings</u>	276	318	144	112	582	127	60	47

NGC 05465

	ALGC	CC	HENRY	LONG BEACH	LOUISVILLE	P-TOWN	ALTC	BRECKSVILLE
Most Recent Monitoring No./Month	208	120	138	228	132	100	72	40
Fract. > 1 ppm	.50	.46	.14	.14	.18	.43	0	.10
Fract. > 10 ppm	.15	.20	0	0	0	.09	0	0
Fract. > 25 ppm	.05	.20	0	0	0	0	0	0
Date into computer	2-24-75	Nov.75	1-27-75	1-24-75	2-28-75	2-4-75	2-17-75	2-26-75
<u>Training</u>								
No. session per indiv.	2	2	2	3	2	2	2	2
Who to conduct								
initial	Shellenberger	W.C.O'Brien	Ehnle	Gen.For-Safety	OSHA	OSHA - Safety	Safety	Safety
quarterly	Dept./Safety	Foremen	Ehnle	Foremen	Foremen	Area Mgr.-Tech.	Foremen	Supr.-Safety
<u>Medical</u>								
date new forms in use	3-1-75	3-1-75	3-1-75	3-1-75	3-17-75	3-1-75	3-17-75	3-15-75
date spirometer in use	1-17-75	2-1-75	2-1-75	3-1-75	3-17-75	3-1-75	1-17-75	1-15-75
<u>Signs</u>								
Date reg. areas posted	4-30-75	4-1-75	3-31-75	3-31-75	3-17-75	3-28-75	4-1-75	as req'd.
Date labeling of containers	-	4-1-75	3-31-75	4-1-75	3-17-75	4-1-75	4-1-75	4-1-75
<u>Roster</u>								
No. of locations	3	4	2	2	13	2	1	-
date started	4-30-75	4-2-75	3-15-75	4-1-75	3-24-75	4-1-75	4-1-75	-
<u>Respirators</u>								
No. of breathing stations in reg. areas	174	25/30/30	65	30	4/4/6/0 2/6/0/0	16/21/2	25	6
Source of breathing air	Inst. Air	Fact. Air	Inst.	b.a.comp.	Fact.	Inst.	Inst.	bottles
No. of $\frac{1}{2}$ masks on hand	60	100	10	2	0	86	10	0
No. of canisters on hand	900+	1050	446	240	1000	450	150	0
Resp.cleaning equip. ordered	yes	rec'd	yes	yes	none	none	none	none
est. compl. resp. cleaning equipment	4-1-75	2-15-75	3-31-75	4-1-75	4-1-75	6-30-75	4-1-75	4-1-75

TO		FIELD POINT OR DEPT & BLDG. NO.	DATE YOUR LETTER
Vic Goode		Henry Plant	
FROM		FIELD POINT OR DEPT & BLDG. NO.	DATE THIS LETTER
Harry Calsing		Cleveland Office	1-27-76
SUBJECT			

PVC Recovery Vent Disposal

This note will confirm information given to Walt Edwards by phone on January 20, 1976.

The LEL (Lower Explosive Limit) of VC1 is 3.6% (vol) in air. This converts to 7.45% by weight. It is my understanding that your poly building ventilation stack blower draws about 12,500 CFM. The specific gravity of ambient air is 0.074 lb/cu.ft.

$$12,500 \text{ ft}^3 \text{ air/min} \times .074 \text{ lb.air/ft}^3 \times 1/29 = 31.9 \text{ moles air/min.}$$

∴ "gas" handling capacity of fan is about 31.9 moles gas/min.

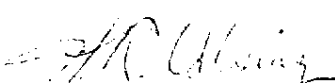
$$31.9 \text{ moles gas/min.} \times \frac{3.6 \text{ moles VC1/mole gas} \times 60 \text{ min/hr} \times 100}{100} = 62.5 \text{ lb VC1/mole} = 4310 \text{ lb VC1/hr*}$$

*This number is slightly lower than the value given Edwards by phone.

Thus, it would take the addition of approximately 4310 lb/hr of VC1 to your building ventilation system to bring the stack concentration up to the LEL.

Since your recovery vent condenser discharges on a batch basis, I suggested to Walt Edwards that the instantaneous VC1 discharge rate be estimated, although from the above information, there would appear to be no problem.

Incidentally, your estimated average vent rate of 40 lb. VC1 per hour would appear to be excessive. This amounts to almost 1000 lb/day and suggests extremely high non-condensibles leakage into your system and/or poor performance (i.e., insufficient cooling) in your recovery vent unit. I would expect a VC1 loss rate of approximately 20 to 30% of your value. I have discussed this with John Palkovic.


H. R. Calsing

HRC:jmh

cc: W. E. Brodine
J. Palkovic
T. R. Linak
H. Waltemate

1976 PROJECTS ACCORDING TO LOCATIONS

Completed

821

GENERAL

58. Evaluate Short Breathing Hose
76. Improve stripping of Dispersion slurries
82. Make fog system operable
88. Revamp Breathing Air System
89. Issue personal Ni-coil hoses
90. Change Hansen fittings
94. Install Ni-coil air hoses at air stations
106. Provide training of production personnel to properly install R.D. flanges, etc.
107. Complete evaluation of ongoing foreman training program

OUTSIDE

68. Extend control room air in-take
73. Install fog system over interceptor pit
81. Extend building ventilation air intake
86. Change Procedure for shutting down columns
92. Pressurize Safe Haven area-North stairwell
111. Install alarm in area of south stairwell

1st FLOOR

57. Extend Relief Valves in Compressor Area
61. Pipe 11J Compressor Seal Water to sump
69. Install sewer flush system
75. Install special exhaust system on recovery gas filters
78. Remove blowdown tank strainers
96. Install Alarm level signs in poly building

2ND FLOOR

54. Install Pressure Regulator on steam for blowdown tanks
62. Install spot ventilation on Blend Tank #8
64. Install Exhaust Hoods on Dispersion blend tank manheads No. 5, 6, & 7
65. Install exhaust hoods on the homogenizers
72. Install exhaust hoods on homogenizer sewer
97. Repair or replace blowdown tank block valves
102. Evaluate and modify breathing air stations
105. Install additional hose ports
109. Install 4 inch sewer valve on poly 14

3RD FLOOR

53. Investigate Canvas Collar for Lenape excursions - two in use
55. Fabricate and begin using Valve Testing Apparatus
56. Re-evaluate and begin Exhausting Poly with Poly Exhaust System during HRC'ing (Pearl Side)
63. Pipe stack drain to sump
67. Repair and install Micro-chip computer
71. Install back pressure control valves on VCL filters
85. Install Scott Air Pak Hanger
93. Install Butterfly valves on Pearl charge headers
95. Modify Bendix 6000 Chromatograph to Monitor Ambient Air
103. Install new mechanical alarm relay system to replace microchip
104. Connect breathing air up to chromatograph
108. Installation of Paste Poly exhaust system
110. Remove J-way valves on Dispersion charge lines

ROOF

59. Tie-in Vent Condenser to Common Stack
74. Humidity common stack

NGC 05468