

Avon Lake Plant

Mr. O.F. Beckmeyer

Akron
Dept. 0020 - Bldg. 5-1

February 25, 1960

Enclosed is a report prepared by our Mr. George Wilson on studies he has performed on polymerizers at your Plant in which methyl alcohol is used.

The studies indicate that quite hazardous conditions exist and that immediate steps should be taken to control them.

W.E. McCormick

cc: Mr. T.B. Ngatz
Mr. W.W. Baughman

*Avon Lake
T.B. Ngatz
Polymerizers
Wilson
Studies*

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On February 9 and February 18, 1960, an industrial hygiene survey was made during polymerizer cleaning in Dept. 5661, Bldg. 461. This was for the purpose of determining the hazard from methanol. Samples 1 through 5 were taken on February 9.

I. Recommendations

1. Personnel cleaning polymerizers should wear supplied air equipment.
2. Personnel cleaning polymerizers should have pre-employment and periodic (six-month interval) ophthalmologic examinations.

II. Results

Sample No.	ppm Methanol	Remarks
1	7000	In polymerizer after it had been aired out 45 minutes, then closed 15 minutes.
2	6700	Man entered and started cleaning near top
3	4460	Man continued cleaning near bottom.
4	3670	Same as No. 3
6	896	Sample taken immediately after polymerizer was aired out for 20 minutes (Poly #104).
7	1069	Man entered and started cleaning.
8	581	Cleaning continued
9	244	" "
10	82	Industrial hygienist in polymerizer. No cleaning in progress. Sample taken about 10 minutes after #9.
11	16,000	Sample taken immediately after removal of cover (Poly #102).
12	1528	Man entered and started cleaning 10 minutes after cover was removed.

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<u>Sample No.</u>	<u>ppm Methanol</u>	<u>Remarks</u>
13	657	Same as #12, about 5 minutes after #12.
14	61	General atmosphere in area near polymerizers.
5	68	Near opening to blend tank on first floor.

III. Remarks

1. Prolonged exposure to methanol should not exceed 200 ppm.
2. There appears to be a wide range of methanol concentration during cleaning.
3. The most vapor is generated when methanol trapped behind the polymer film is released by the cleaning operation.
4. Samples #6 and 12 indicate that a 20 minute airing is preferable to a shorter period.

George L. Wilson

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REPORT OF VISIT TO AVON LAKE
GENERAL CHEMICAL PLANT
MARCH 26, 1963

On March 26, 1963, an industrial hygiene survey of some operations was made at the General Chemical Plant, Avon Lake, Ohio. Following are our recommendations and the results of this survey:

I. Recommendations

- A. The operator should use respiratory protection when metering MDI.
- B. Clear #7 Stabilizer should be kept off the skin.

II. Results

- A. In order to properly evaluate potential health hazards, air samples were taken at some operations. Following are the results:

1. MDI at Estane manufacture.

Sample No.	ppm MDI	Remarks
1	less than .01	Operator's exposure transferring MDI from heated drum to tank.
2	less than 0.01	Same as #1.
3	0.03	Operator's exposure metering MDI.

2. Dibutyl tin dichloride (DBTD) at manufacture of 82946 Dark Gray Geon.

Sample No.	mg. DBTD per cu. m. of air	Remarks
1	0.25	Mix mill operator's exposure.
2	0.20	Same as #1.
3	0.41	Strip mill operator's exposure.
4	0.38	Same as #3.
5	0.9	Over bucket as 4 banbury batches were dumped.

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3. Total gases from 82946 resin. Two samples were taken for mass spectrometer analysis. #1 was taken directly over a batch just after it came from the banbury. #2 was taken at the surface of the batch as it was cut from the mix mill. Results are in ppm.

	#1	#2
Vinyl Chloride	150	Trace
Sulfur Dioxide	49	52
Carbon Oxysulfide	16	8
Hydrogen Chloride	64	66
Styrene	8.5	6.5
Other	170	104

III. Comment

- A. The 0.03 ppm TDI in the air when metering it may cause respiratory reactions in sensitive individuals if continued a long period of time. The air-line respirator which is available in the area should be used at this operation.
- B. The results of the air samples taken when running 82946 or similar compounds containing Cardinal Clear #7 (707995) should not be regarded as the final and complete answer. A more complete mass spectrometer or other study may be necessary to completely characterize these gases. The "other" listing apparently consists mostly of C_4 hydrocarbons, probably from the butyl groups in Clear #7. The absence of benzene ring compounds (except styrene) is somewhat surprising, in view of the proposed chemical structure of the material. The presence of so much sulfur dioxide is somewhat surprising. The styrene may come from the 2301X36 compound in 82946.
- C. Cardinal Clear #7 is a semi-solid material which is difficult to handle. Skin contact may cause irritation. If it is used in substantial quantity, a good method of dispensing it will have to be developed.

George L. Wilson

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April 8, 1963

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6-21-63

On May 29, 1963, air samples were taken in a 4,000 gal. polymerizer during cleaning. This was for determination of vinylidene chloride exposure.

Practically no vinylidene chloride was present, It is therefore not necessary to perform routine liver function tests on polymerizer cleaners.

Following are the results obtained on air samples by mass spectrometer analysis.

Contaminant	Sample No. 1 ppm	Sample No. 2 ppm	Sample No. 3 ppm
Vinylidene Chloride	less than 1	less than 1	less than 1
Vinyl Chloride	19	22	19
Ethyl Chloride	25	31	26
Hydrogen Chloride	43	57	62

Sample No. 1 was taken as the polymerizer was entered. Nos. 2 & 3 were taken during the scraping process, No. 2 on the walls about 5 feet from the bottom, and No. 3 on the bottom. All represent the cleaner's exposure.

Will you please secure for me Dr. Curry's comment on these results, particularly his ideas on what gives rise to ethyl chloride and hydrogen chloride?

George L. Wilson

cc: A. Vittone
W. W. Baughman

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Report of Visit to Avon Lake General Chemical Plant
October 13 & 19, 1966

Two visits were recently made to the Avon Lake Plant on October 13 and 19. Industrial hygiene surveys were performed in various areas for noise, dust, and MDI.

I. Recommendations

- A. Provide a major effort toward completing and implementing an in-plant hearing conservation program for personnel. This program should include pre-employment, reassignment, and periodic audiometric examinations and issuance of ear protective devices to individuals working in noise hazardous areas.
- B. The area in Building 433, adjacent to the Estane dicer and granulator, must be regarded as a noise hazardous area, and personnel working there should be equipped with ear protective devices.
- C. Expedite an engineering program for noise reduction at various sites of noise origin. Special attention and consideration should be given to the "noise" aspect of prospective new equipment.
- D. No atmospheric problem of excessive MDI concentration currently exists in the Estane manufacturing area. Housekeeping in this area is poor, however, and sloppiness in this respect may eventually lead to serious industrial hygiene problems where any of the diisocyanates are handled.
- E. The entire warehouse area in Building 433 may at times present both noise and dust hazards. The Estane dicer and granulator are located here and both are sources of excessive noise. All personnel in the warehouse should be included under the hearing conservation program and attention should be directed to reducing noise originating from this equipment.
- F. The dicer operator on the Estane line and other personnel in the immediate area should be supplied with U.S. Bureau of Mines respirators approved for silica dust.

Initiate action immediately for installation of local exhaust ventilation to confine and remove dust from this operation.

II. Results and Discussion

A. Noise

Table I presents results of noise measurements performed at eight different locations.

- 1. Measurements at Location No. 1 (CM line at bagger stations) indicate hazardous noise no longer exists in this area. Results of the current survey will be checked on a future visit, and, if verified, personal ear protective devices will no longer be required in the area.

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Previously, noise measurements had been made at this location (See report of 7-26-66) after heavy curtains had been installed to close the 6'x6' opening in the north end of the cuber enclosure. Although these curtains aided in reducing noise at the bagger stations, they did not succeed in bringing the critical octave band average below 85 decibels. The curtains had been replaced by a rigid, transparent, plastic panel at the time the current measurements were made and this device appears adequate for eliminating hazardous noise exposure at the bagger stations.

2. Noise at the bagger station on the No. 2 Banbury line remains at a hazardous level. However, a recent attempt to reduce the noise level has been partially successful. A curtain of flexible vinyl strips (each strip approximately 4" wide) has been suspended in the region between the cuber and bagger station.

Noise measurements at this bagger station on March 29, 1966 (See report dated April 22, 1966) showed a 90 decibel average of the 300-600, 600-1200, and 1200-2400 decibel octave bands. Current measurements, with the flexible vinyl curtain in position, show an 88 decibel average over these octave bands. Additional measurements will be necessary to determine if this 2 decibel reduction is directly attributable to the presence of the curtain. The noise level at the bagger station remains too high, however, even with the curtain in place, but if the 2 decibel reduction is shown to be real, perhaps further refinement and engineering of this type of barrier will provide satisfactory noise control.

Recently, at the suggestion of Mr. A. Vittone, two members of the Corporate Division's New Product Planning Group were asked to consider BFG's Deadbeat material for use in this noise problem. Mr. Don Smith and Mr. John Peterson of the New Products Group, will visit the Avon Lake Plant to obtain first-hand information on this project. Suggestions and recommendations will be submitted to the Plant.

3. Noise measurements at Locations 4, 5, and 6 were obtained for a matter of interest and record. Noise in the Drier Building (No. 452) appears to be adequately controlled. On the first floor, between the No. 1 and No. 2 drier cones, an average of 83 decibels exists over the critical octave bands. This is an acceptable level.

Inside the grinder rooms extremely hazardous noise levels exist and continuing precautions should be exercised to prevent personnel exposure to this noise without proper ear protective equipment. Ear muffs are now worn by personnel entering these rooms; time in the rooms should be held to an absolute minimum. Doors to the rooms should be maintained in good operating conditions to assure complete and positive closure.

4. Hazardous noise areas exist in Building 433 (Estane).

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The area near the Estane granulator was previously surveyed on March 29, 1966 and a recommendation made at that time for fitting personnel, working in the area, with ear protective devices. Current noise measurements made at floor level near the granulator were found to be even greater than those measurements of the previous survey.

Noise near the dicer also presents a significant noise hazard.

TABLE I

Noise Levels in Various Plant Areas

Location	Sound Level Value in Decibels Frequency Range, Hz									Avg. db. 300-600,600- 1200,1200- 2400 oct.bds
	Over- all	0- 75	75- 150	150- 300	300- 600	600- 1200	1200- 2400	2400- 4800	4800- & up	
1. Continuous Mill Line, both lines operating.										
a. Between No. 1 & No. 2 Bagger	93	86	86	84	85	84	83	80	74	84
b. Between No. 1 Bagger and west wall.	93	87	87	83	84	84	82	79	74	83
2. No. 2 Banbury Line at bagger station (No. 1 line not running)	96	86	85	88	88	86	86	86	80	87
3. No. 2 Banbury Line at bagger station (No. 1 line & No. 2 line running)	97	87	86	90	88	88	89	88	80	88
4. Drier Building 452 between No. 1 & No. 2 cones, 1st floor	96	93	87	88	87	84	79	76	69	83
5. Drier Building 452, in No. 1 Grinder Room	110	96	92	99	105	105	95	89	77	102
6. Drier Building 452, in No. 2 Grinder Room	104	87	88	94	97	101	92	84	73	97
7. Near Estane Dicer Warehouse area, Bldg. 433	97	87	85	89	89	87	89	88	81	88
8. Near Estane Granulator Warehouse area, Bldg. 433	95	86	83	89	89	87	82	78	69	86

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B. MDI

Table II contains data on MDI sampling performed in the Estane production area in Building 433. The previous survey of this area, performed February 17, 1966, disclosed no significant concentrations of atmospheric MDI. The current survey also indicates the process to be under satisfactory control since no hazardous concentrations of MDI were detected.

Atmospheric Concentrations of MDI in Building 433

<u>Sample Location</u>	<u>MDI Concentration (ppm)</u>
1. Calibration station, operator area (6 min. sample)	0.01
2. Calibration station, approximately 4' from tap (11 min. sample)	0.01
3. General room atmosphere, midway between both lines. Not extruding or calibrating (14.4 min. sample)	0.005
4. Region near extruder head (7 min. sample)	0.01
5. Region near extruder throat (10 min. sample)	0.005

C. Dust

Two areas of concern in regard to the generation of atmospheric dust were examined during the recent visits. One of these areas is Building 452, the Drier Building, and the other is Building 433, specifically, the warehouse area housing the Estane line where Cab-O-Sil and Superfloss are handled.

The dust condition existing in Building 452, arising from the drying of paste resin, cannot reliably be evaluated at the present time because of a lack of background information relating PVC dust concentrations to pulmonary effects. It is evident from observation that a continual airborne dusty condition exists within the Drier Building and recent measurements place the concentration of this dust at 3 milligrams per cubic meter. This is probably a conservative value since one of the driers was inoperative during the time these samples were obtained, and visually, the atmospheric dust condition was estimated to be minimal.

A dust concentration of 15 milligrams per cubic meter is generally accepted as a tolerable limit for inert or nuisance particulates and this is considerably greater (5X) than the PVC dust concentrations recently

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measured in Building 432. It has been presumed, in the past, that PVC dust may be regarded as an inert or nuisance particulate, but little reliable investigation has been performed to substantiate this presumption.

Hi-Sil and Superfloss are being used in increasing amounts in Building 433 as a dusting (and compounding?) material for Estane.

One short run which was observed on the Estane line in the warehouse area produced extremely dusty conditions. A single sample for airborne dust, taken near the operator's position on the platform near the dicer, resulted in a sample with a dust concentration too high to count. A second sample taken approximately 20' from the dicer showed an airborne dust concentration of 1 million particles per cubic foot (mppcf).

The recommended maximum allowable concentration for crystalline quartz (SiO_2) is 2.3 mppcf. It is likely that this concentration might be easily exceeded in the general atmosphere of Building 433 during a lengthy run employing the Estane dicer.

Dust concentration in the dicer operator area is highly excessive on even a short run and presents a hazardous situation.

Robert W. Modrell
Robert W. Modrell (g2)

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