

INTER-OFFICE MEMO

TENNECO CHEMICALS, INC.

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 FROM W.C. Champion
 SUBJECT VCM Monitoring Program -
 March, 1974

AT Piscataway

DATE April 9, 1974

AT Burlington

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Resin Plants - Operating Area Monitoring (High Personnel Exposure)

Air monitoring via Century OVA continued at both plants. The results shown in Tables I (Flemington) and II (Burlington) summarize the findings for each plant and compare the March readings with those reported last month.

In the two plants, only five areas had average concentrations in excess of 50 ppm. These were:

1. Flemington tank farm area (500 ppm) - an outdoor area of generally low personnel exposure time.
2. Burlington homopolymer compressor area (76 ppm) - this problem has been corrected by improved ventilation.
3. Dispersion "A" Plant latex blend tank area (240 ppm) - improved ventilation is being engineered.
4. Dispersion "A" Plant penthouse (94 ppm) - a single day's high readings due to a tower hatch leak led to this high average.
5. Dispersion "B" Plant latex blend tank area (60 ppm) - improved ventilation is being engineered.

In Flemington, only one other area exceeded a 25 ppm average - the monomer unloading compressor shack (28 ppm). All but seven Flemington monitoring points showed the same or lower averages in March, compared with February's figures. In the reactor building, higher than desired concentrations around the recovery compressors (21 ppm average) caused high concentrations immediately above at the foreman's desk on the reactor floor (22 ppm), and also in the stripper bottom (10 ppm), stairwell (20 ppm), lavatory (17 ppm) and charge meter (14 ppm) areas. Ventilation changes are being engineered which should reduce exposures in these five areas. The remaining two points which increased reflect high readings at the bagger station during Gaylord filling

(17 ppm average), a very infrequent operation, and sampling of bulk trucks (13 ppm).

The Burlington resin plants showed significant reductions in VCM exposure, with only two monitoring points showing an increased average in March. Both of these were due to single incidents of monomer leaks discovered during monitoring, which had significant effects on the averages. In addition to the >50 ppm areas mentioned above, Burlington had three areas of greater than 25 ppm average exposure: copolymer recovery area (30 ppm), dispersion "A" Plant wet cake bin (28 ppm) and tower cleaning (38 ppm).

Although all Burlington plant areas had generally reduced exposures, the plastisol plants showed the greatest improvements, with average exposures in both plants reduced by 75%. This reflects improvements in plant ventilation and stripping techniques. Further efforts to preclude excursions over 50 ppm VCM and reduce average exposure by increased ventilation are underway.

A number of job functions which showed high readings in February were not monitored in March, since the use of air-supplied breathing apparatus is now required for these jobs. These jobs are indicated on the attached tables.

Time-Weighted Average (TWA) Exposure Values

Although the significance of time-weighted exposure averages is questionable in light of the recent OSHA emergency standard, we have recalculated the TWA's for our plant operating personnel as an indicator of improvement in work practices and as a guide in identifying remaining problem areas. Job time analyses were reviewed and revised by Production management, and TWA exposure values calculated. Tables III and IV compare the March results with those reported last month for Flemington and Burlington, respectively. As previously mentioned, a number of high exposure job functions now require supplied breathing air, and this has resulted in greatly reduced TWA's for the affected personnel. No job classifications in either plant show exposures of greater than 50 ppm TWA. In Flemington, only one job - that of shift foreman - is over 25 ppm. At Burlington, three classifications are over 25 ppm - plastisol "A" Plant tower operator/dumper, plastisol laborer/tower cleaner (water) and plastisol tower cleaner (manual). As the area monitoring data show, however, many excursions of greater than 50 ppm exposure continue to be encountered. The frequency of these excursions, and their consequent effect on TWA's, will only be determined when permanent monitoring becomes available.

Personnel Monitoring

Three types of personal monitoring pumps have been obtained and are under evaluation. The Bendix pump, widely used for dust analysis, has a throughput rate (designed for nominal 2 liters/minute) which is too fast for use with a carbon absorption cartridge. The MSA pump, the standard pump used for monitoring organic solvent vapors and TCE, has a designed nominal throughput rate of 1 liter/minute. This flow rate gives significant "break-through" (loss) of VCM in the standard carbon absorption tube in ten minutes of operation. Although it is possible to operate this pump at lower rates,

we have found it difficult to do this with acceptable reproducibility.

A third pump of new design is the "Sipin" pump, manufactured by SKC, Incorporated. This pump is lighter in weight and quieter in operation than the others, and offers a rate range of 20 to 80 milliliters/minute. At arbitrarily selected rates of 25 and 50 milliliters/minute, we have found good results (no break-through) with these pumps, using the standard cartridge, for sampling times from ten to forty minutes. Mr. Ketterer is refining the analytical method and establishing test accuracy, but it appears that this pump will meet the requirements of the OSHA emergency standard. At the present time, we have two of these pumps, with an additional four pumps expected before April 20. An additional twenty-four pumps have been ordered to allow complete coverage of our resin and compound plants, and to support Nixon, Newton and customer processing operations. These pumps are expected in early May.

Residual Monomer in Resin

The original estimates of residual VCM concentration in homopolymer resins, as reported last month, were found to be somewhat optimistic. Homopolymer "as shipped" averages between about 350 ppm and 1300 ppm in VCM content, dependent upon resin type. Copolymers "as shipped" averaged from 110 ppm to 150 ppm in residual VCM, while plastisol resins averaged from 8 to 35 ppm. The residual monomer content of blending resin has been significantly reduced through process changes.

Although we do not know what levels of residual monomer will ultimately be tolerated in the resins we produce, considerable effort has been made in both plants to reduce these levels in all products. Improved stripping techniques continue to be developed in both plants, with extended time under vacuum and higher stripping temperatures the major variables. At Flemington, stripper jacket heating is being explored. Varied drying techniques (higher temperatures, longer residence time) are being tried at both plants. Finally, the effect of air purging of resin bins is being investigated at both plants and on a bench scale in Piscataway R&D.

The impact of these efforts on plant productivity has not yet been fully assessed. Based upon preliminary data, productivity of BR-501, when run in the entire Homopolymer Plant, will be reduced by 1 - 1½ batches/day because of extended stripping cycles. If BR-501 is run in two reactors in either the Homopolymer or Copolymer Plants, thus tying up one stripper, the productivity of 10R or 315 would suffer.

Table V gives the residual VCM data for the Flemington Plant. The VCM content of PVC 200-2 is higher than desirable, but this may be resolved by heating of the stripper jacket. The residual VCM in PVC 225 averages 600 ppm, mainly because of the poorer efficiency of "A" dryer compared with "B" dryer. This dryer difference has been noted on almost a daily basis, and probably reflects the lower temperatures encountered in the fluid bed "A" line. It is hoped that this will be resolved by increased temperatures and efficient use of antistats. PVC 250 and PVC 250-3 appear lower in residual VCM than PVC 225, but there is insufficient data to draw firm conclusions.

At Burlington (Table VI), residual VCM content is generally similar to that in Flemington for the same product types. The steam-stripped resins (PVC

175, 10R) show lower residual monomer concentrations than would be expected from their molecular weights. Extensive efforts to reduce the VCM content in 10R for Nixon to below its current level of 500 ppm "as shipped" are underway. A lot employing high temperature steam stripping and containing about 125 ppm of VCM has been prepared for evaluation at Nixon, where the effect of this stripping technique on heat stability will be determined. A steam-stripped lot of PVC 200-2, also prepared for evaluation at Nixon as part of an effort to eliminate trichlorethylene as a chain transfer agent, had much lower VCM content (217 ppm) than similar product produced without steam stripping (900 - 3000 ppm).

The data for PVC 225 and 250-3, produced in limited quantity at Burlington, show these resins to be generally similar to Flemington production.

Blending resin, which was identified as a particular problem area last month, has been significantly improved. Longer stripping times and increased dryer temperatures led to a drop in the average VCM content from over 2800 ppm in the first half of March to about 600 ppm in the second half.

The data for residual monomer in copolymer and plastisol resins may be found in Tables VII and VIII, respectively. These product types do not appear to represent a problem area. In addition to analysis of product, as produced and shipped, studies were made to determine the effects of aging and bin air purging on residual VCM content. The data for various product types aged in a fiber container in the laboratory are presented in Table IX. These data show that, for most products, residual VCM is reduced by 50% or more after five days of aging.

In the resin plants, bins containing various resin types were set aside and purged with approximately 10 cfm of ambient air for up to eighteen days. Tables X through XII show the results of bin purging and static storage (in bags) of PVC 200-2, PVC 225 and PVC 250. For the PVC 200-2, the monomer content was halved within one day in both bin and bags. After nine days, the monomer content was about 220 ppm in the bin and about 360 ppm in the bags. For the PVC 225, starting at a lower average residual VCM concentration, the 50% reduction was not reached until the fifth day in the bin. In bags, the 50% reduction level occurred in the second day. By the ninth day, the monomer concentration was about 30 ppm in the bin, 165 ppm in the bags. The 250 gave a faster reduction, with monomer content reduced by half in the first day in both bin and bags. After four days' aging, the monomer content of the resin in the bin was <100 ppm.

At Burlington, a bin containing 10R was air purged for eighteen days. As shown in Table XIII, this process had no measurable effect.

An R&D program has been initiated to further study the effects of purging on resin. Preliminary results indicate the positive effect of higher air through-put rates and elevated temperatures.

As a reference point, competitive resins purchased for use in our Compound Plant and at Nixon were analyzed for residual VCM. A comparison with similar Tenneco products showed:

<u>Competitive Resin</u> <u>(no. of samples)</u>	<u>Average VCM, ppm</u>	<u>Tenneco Type</u>	<u>Average VCM, ppm</u>
Firestone 9300(5)	635	225	607
Hooker 282 (1)	2600	200-2	1281
Airco (1)	519	315	110
Stauffer 608 (2)	579	10R	505

Burlington Compound Plant

Continued OVA area monitoring during March showed low operator exposures, as can be seen from Table XIV. Analysis of air samples taken in the blender area show a high 43 ppm VCM during preparation of a blend utilizing high monomer content Hooker resin (2500+ ppm VCM). All other air samples analyzed in this area, as well as in other parts of the Compound Plant, showed 5 ppm or less.

Flexible pellet samples analyzed just after production showed 0 - 4 ppm of VCM. A single sample of record compound contained 105 ppm.

Foam and Plastics Division

Air monitoring and product and air analysis surveys were made at both the Nixon and Newton Plants of the Foam and Plastics Division. The results generally paralleled those found in our Compound Plant: operator breathing zone exposure was low (≤ 16 ppm VCM), while flexible (Newton) product contained no detectable VCM and rigid (Nixon) product contained 140-200 ppm VCM. Detailed reports on these visits are appended.

Environmental Considerations

In an effort to ascertain the quantity of VCM which may be leaving our plant site in the air, samples of air were taken for analysis at the plant perimeter at both sites. A second consideration for this work was to identify points of low VCM concentration where an intake for breathing air could be placed. As shown in Figures I - IV, as high as 3 ppm at Flemington and 3.7 ppm at Burlington were detected at the perimeter fence.

Water samples from our final effluent at both plants were also analyzed. The maximum detected concentration of VCM in these samples was 1 ppm.


W.C. Champion

Attachments.

WCC/jst

TABLE I

FLEMINGTON RESIN PLANT VCM MONITORING SUMMARYFebruary & March, 1974⁽¹⁾

<u>Monitoring Point</u>	<u>OVA Reading, ppm</u>			
	<u>February</u>		<u>March</u>	
	<u>Maximum</u>	<u>Average</u>	<u>Maximum</u>	<u>Average</u>
<u>Reactor Building - Ground Floor</u>				
1. Slurry Basket Area	20	10	20	6
2. Slurry Basket During Cleaning	-	-	Air Required	
*3. Slurry Sample from Stripper	-	7	40	10
4. Methocel Make-Up Area	11	7	10	6
5. Center Aisle	10	7	10	6
*6. Recovery Comp. Room - Between Comp.	30	8	100	21
<u>Reactor Building - Second Floor</u>				
7. Center Aisle	15	8	12	6
8. Open Reactor Area	100	34	70	9
*9. Charge Meter Area	15	10	50	14
10. Stripper Platform	20	9	25	7
*11. Foreman's Desk	30	10	80	22
12. Operator's Desk	30	11	20	9
13. Panel Board	25	10	40	9
*14. Stairwell Anteroom	30	10	60	20
*15. Lavatory	30	10	50	17
. Hamer Blind Area	-	-	10	6
17. Reactor Opening	-	-	Air Required	
<u>Recovery Tanks</u>				
18. Recovery Tank Area	-	-	10	5
19. Recovery Tank Draining Operation	10,000	2,172	Air Required	
20. Walkway Near Bunker	8	5	6	4
21. Catalyst Weigh House	7	5	5	4
22. Settling Ponds	7	5	6	4
<u>Boiler House</u>				
23. North End	7	6	6	4
24. South End	15	6	6	4
<u>Underground VCM Storage Tanks</u>				
25. Tank Farm Area	-	-	10,000	500
26. Checking Tank Level	10,000	4,675	Air Required	
27. Checking Blend Tank LEL and O ₂	200	90	Air Required	
28. Compressor Shack	150	79	200	28
29. Walkway Between Tank Farm & Blend Tank	-	-	12	5
<u>VCM Rail Car Unloading</u>				
30. Platform Area	-	-	10	5
31. VCM Rail Car Hook-Up	-	-	Air Required	
32. VCM Rail Car Disconnect	-	-	Air Required	
. VCM Rail Car Sampling	-	-	Air Required	

⁽¹⁾February 2 - 25 and March 4 - 29

*Monitoring Points Showing an Increased Average in March

Monitoring Point	OVA Reading, ppm			
	February		March	
	Maximum	Average	Maximum	Average
<u>Dryer Area/Warehouse</u>				
34. Slurry Transfer Hook-Up	12	9	18	8
35. Dryer Monitoring Desk	9	7	12	6
36. Dryer Panel Board	-	-	15	6
37. Wet Cake Sampling	-	-	17	8
38. Maintenance Office	-	-	10	6
39. Maintenance Shop	30	13	12	8
*40. Foreman's Office	8	6	10	7
41. Bagging Room	-	-	12	7
*42. Bagging Machine - Operator's Station	30	15	100	17
43. Warehouse	7	6	10	6
44. Warehouse Office	7	6	9	6
<u>Bulk Loading Areas</u>				
45. Tower Area	-	-	15	6
46. Transfer Line Hook-Up	15	8	7	5
47. Bulk Truck Hook-Up	-	8	-	-
*48. Bulk Truck Sampling	-	6	30	13
49. Bulk Rail Car Hook-Up	-	-	-	-
50. Bulk Rail Car Sampling	-	-	-	-
<u>Quality Control Laboratory</u>				
51. Laboratory 1	15	9	10	6
52. Laboratory 2	20	13	40	13
Laboratory 2 Desk	22	13	40	12
54. Office	25	13	40	10
55. Lunch Room	10	8	10	6
56. Black Top Area Adjacent to Warehouse	-	-	6	4
57. Up-Wind Plant Location	-	-	6	5
58. Down-Wind Plant Location	-	-	7	4
<u>Pilot Plant</u>				
59. Reactor Area - First Floor	8	6	7	5
60. Reactor Area - Second Floor	10	8	11	5
61. Reactor Dumping	-	6	-	-
62. Reactor Cleaning	11	10	-	-
63. Finishing Area	6	5	5	4

*Monitoring Points Showing an Increased Average in March

W.C. Champion
April 9, 1974

COLORITE 012779

TABLE II

BURLINGTON RESIN PLANTS VCM MONITORING SUMMARY

February & March, 1974⁽¹⁾

Monitoring Point	OVA Reading, ppm			
	February		March	
	Maximum	Average	Maximum	Average
<u>Copolymer Plant, Ground Floor</u>				
1. Copolymer Drag-Out, Outside	15	10	15	5
2. Copolymer Slurry Pumphouse	7	5	7	4
3. Blacktop, Outside Near DMW Tank	6	4	4	4
4. South-East Stairwell	24	11	18	5
*5. Recovery Area, Outside	30	16	300	30
6. Draining Recovery Receivers	-	-	Air Required	
7. Draining Master Mix Tanks	-	-	Air Required	
8. Draining Recovery Pumps	-	-	Air Required	
9. Recovery Compressor Area	40	14	35	7
10. Center Aisle	70	18	12	4
11. Reactors, Clean-Out Valve Open	50	29	5	4
12. Solution Make-Up Tank Area	20	10	5	4
13. Dry Chemical Weighing Area	-	-	5	4
14. Weigh Scale Area	-	-	5	4
<u>Copolymer Plant, Second Floor</u>				
15. Lavatory	20	12	32	7
16. Panel Board/Desk Area	30	12	22	7
17. Center Aisle	25	12	8	5
18. Weigh Scale Area	22	13	8	5
19. Reactors, Opening 6" Access Hole	-	-	20	14
20. Reactors, Opening Manway	-	-	Air Required	
21. Reactors, Manual Cleaning	-	-	Air Required	
22. Chemical Hoist, Outside	15	7	9	4
23. Blend Tanks, Catwalk	15	11	40	7
24. Blend Tanks, Sampling for O ₂	-	-	Air Required	
25. Walkway to Homopolymer	-	-	50	15
<u>Homopolymer Plant, Second Floor</u>				
26. Panel Board/Desk Area	55	30	50	15
27. Center Aisle	50	21	27	11
28. Opening Reactor Lenape Cover	200	81	100	31
29. Reactor Washout	-	-	Air Required	
30. Manual Reactor Cleaning	-	-	Air Required	
31. Sampling Blend Tanks for O ₂	-	-	Air Required	
<u>Homopolymer Plant, Ground Floor</u>				
32. Slurry Pumphouse	15	10	20	8
33. Recovery Area, Outside	50	25	30	11
34. Recovery Compressor Area	700	130	500	76
35. Weigh Scale Area	70	32	50	18
36. Center Aisle	100	23	15	8
37. Reactors, Clean-Out Valve Open	25	18	80	17
38. North-West Stairwell	17	10	18	6

(1) February 2 - 25 and March 4 - 29

*Monitoring Points Showing an Increased Average in March

Monitoring Point	OVA Reading, ppm			
	February		March	
	Maximum	Average	Maximum	Average
<u>Dispersion Plant "A", Ground Floor</u>				
39. "A" Plant Drag-Out, Outside	18	7	7	3
40. North-East Stairwell	25	9	13	5
41. In-Line Mixer Area	100	48	65	17
42. Moyno Pump Area	150	54	45	16
43. Dryer Panel Board Area	120	50	55	20
44. Under Tower, Opening Hammer Blind	60	36	100	21
45. Under Tower, Water Cleaning	-	-	100	21
46. Under Tower, Manual Cleaning	-	-	100	21
<u>Dispersion Plant "A", Second Floor</u>				
47. North-East Stairwell	20	10	23	7
48. Stripper #1 Area	150	55	50	17
49. West Cake Bin Area	500	160	90	28
50. Latex Blend Tank Area	4000	923	1800	240
51. Homo System Area	110	60	50	18
<u>Dispersion Plant "A", Third Floor</u>				
52. Panel Board/Desk Area	300	116	64	18
53. Catwalk, Filter #1	2000	226	100	22
54. Back of Filter #1	-	-	100	22
55. Back of Filter #2	-	-	100	22
56. Catwalk, Filters #2 and #3	-	-	100	22
57. Back of Filter #3	-	-	100	22
58. Batch Mix Tank, Back	500	194	65	22
59. Batch Mix Tank, Weigh Scale	-	-	65	22
60. Catalyst Charge Pot	-	-	65	22
61. Cake Breakers	4000	390	35	19
62. Elevator	15	7	22	5
<u>Dispersion Plant "A", Penthouse</u>				
*63. Center Aisle	100	16	2000	94
64. Opening Tower Manway	-	-	Air Required	
65. Water Cleaning Tower	-	-	100	38
66. Manual Cleaning Tower	-	-	100	38
67. North-East Stairwell	25	10	60	9
<u>Dispersion Plant "B", Penthouse</u>				
68. Center Aisle	100	16	30	8
69. Opening Tower Manway	-	-	Air Required	
70. Water Cleaning Tower	-	-	15	9
71. North-West Stairwell	100	29	12	5
<u>Dispersion Plant "B", Third Floor</u>				
72. North-West Stairwell	90	17	13	6
73. Back of Filter #6	600	80	25	11
74. Back of Filter #5	-	-	25	11
75. Catwalk, Filters #5 and #4	-	-	25	11
76. Back of Filter #4	-	-	25	11
77. Catwalk, Filter #6	-	-	25	11
78. Cake Breaker Area	750	149	17	10
79. Batch Mix Tank, Back	200	70	25	11

*Monitoring Points Showing an Increased Average in March

Monitoring Point	OVA Reading, ppm			
	February		March	
	Maximum	Average	Maximum	Average
<u>Dispersion Plant "B", Third Floor (cont'd)</u>				
80. Batch Mix Tank, Weigh Scale	-	-	25	11
81. Catalyst Charge Pot	-	-	25	11
82. Panel Board/Desk Area	-	-	14	9
83. Latex Blend Tank - Tween 20 Funnel	-	-	-	-
84. South-Center Stairwell	60	17	17	7
<u>Dispersion Plant "B", Second Floor</u>				
85. Latex Blend Tank #6	350	174	400	60
86. Stripper Area	150	42	24	11
87. Wet Cake Bin Area	120	43	18	11
88. Homo System Area	100	36	30	12
89. Lavatory	50	14	8	4
<u>Dispersion Plant "B", Ground Floor</u>				
90. North-West Stairwell	20	10	8	4
91. "B" Plant Drag-Out, Outside	15	8	6	4
92. Dryer Panel Board Area	35	22	20	8
93. In-Line Mixer Area	150	43	25	11
94. Moyno Pump Area	150	47	20	10
95. Vacuum Pump Area	40	23	20	10
96. Under Tower, Opening Hamer Blind	100	29	18	8
97. Under Tower, Water Cleaning	-	-	18	8
98. Under Tower, Manual Cleaning	-	-	-	-
<u>Tank Farm</u>				
99. Unloading Station, Outside	-	-	3	2
100. Tank Car, Sampling	500	213	Air Required	
101. Tank Car, Connecting Lines	-	-	Air Required	
102. Storage Tank Level Check	-	-	Air Required	
103. Compressor House #1	180	71	15	3
104. Compressor House #2	50	16	12	4
105. Refrigeration Building	-	-	8	3
<u>Classification Building</u>				
106. Atomizer Room	15	6	7	3
107. Plastisol Bagger	30	19	9	5
108. Syntrons	30	16	7	5
109. Merchan Feeder Area	200	50	6	5
<u>Suspension Dryer Building</u>				
110. Dryer Panel Board	50	24	7	5
111. Operator's Desk	-	-	8	5
112. Dryer Area	60	22	10	6
113. Copolymer Bagging Station	18	16	7	5
114. 10MM and 40MM Bagging Station	-	-	10	6
115. Cleaning Copolymer Dryer	-	-	-	-
116. Cleaning 40MM Dryer	-	-	-	-
117. Cleaning 10MM Dryer	-	-	-	-
118. Centrifuge Deck	40	20	12	5
119. 40MM and 10MM Line Magnets	20	20	25	8

Monitoring Points	OVA Reading, ppm			
	February		March	
	Maximum	Average	Maximum	Average
120. 10MM Sifter	-	-	20	7
121. 40MM Sifter	-	-	18	7
122. 10MM and 40MM Line Palletizing	20	20	15	6
123. Copolymer Palletizing	27	16	15	7
124. Dispersion Palletizing	50	24	9	6
125. Lunch Room-East End	22	12	9	4
126. Lunch Room-West End	-	-	6	4
127. Maintenance Shop-North End	20	10	7	4
128. Maintenance Shop-South End	-	-	9	5
129. Maintenance Shop-Welding Well	18	9	17	6
<u>Production and Maintenance Offices</u>				
130. Maintenance General Foreman's Office	-	-	9	4
131. Maintenance Foreman's Office	22	12	10	4
132. Engineer's Office	-	-	10	4
133. Safety Supervisor's Office	30	14	10	4
134. Production Foreman's Office	30	15	11	4
<u>Warehouse</u>				
135. West Aisle	50	15	15	6
136. West-Center Aisle	150	50	50	12
137. Checker's Desk Area	35	14	7	4
138. Shipping Office	25	13	8	5
139. Receiving Office	30	10	6	4
140. East-Center Aisle	150	54	18	9
141. East Aisle	20	9	13	6
142. Bass Office	-	-	5	3
<u>Copolymer Bulk Station</u>				
143. Sifter Desk	5	4	8	3
144. Second Desk	5	3	10	3
145. Tailing Hopper, Outside	4	3	8	3
<u>Loading Area</u>				
146. Homopolymer Transfer House	-	-	6	3
147. Bulk Truck	-	-	2	2
148. Hopper Car	-	-	2	2
149. Initiator Freezer	-	-	9	3
150. Initiator Weigh House	-	-	4	3
<u>Effluent Plant</u>				
151. Ground Floor-South	4	4	4	3
152. Ground Floor-North	-	-	4	3
153. Laboratory	-	-	3	3
154. Second Floor-North	5	5	4	3
155. Second Floor-South	-	-	4	3
156. Catwalk, Outside	-	-	15	4
157. Boiler House-North	4	3	3	3
158. Boiler House-South	-	-	3	2

<u>Monitoring Point</u>	<u>OVA Reading, ppm</u>			
	<u>February</u>		<u>March</u>	
	<u>Maximum</u>	<u>Average</u>	<u>Maximum</u>	<u>Average</u>
<u>ARDO Building</u>				
159. Operator's Desk Area	15	6	4	3
160. Panel Board	-	-	5	2
161. Latex Blend Tank	-	-	6	3
<u>Quality Control Laboratory</u>				
162. Hood Area	85	28	35	14
163. Desk Area	75	28	26	15
164. Constant Temperature Room	-	-	18	9
165. Analytical Laboratory	90	27	22	14
166. Vent Area	-	-	-	-
167. Reception Area	35	13	7	5
168. Office Hallway	-	-	7	5
169. Outside Plant-Upwind	-	-	3	2
170. Outside Plant-Downwind	-	-	3	2

W.C. Champion
April 9, 1974

TABLE III

FLEMINGTON PLANT OPERATING PERSONNELTIME-WEIGHTED VCM EXPOSURES

February & March, 1974

<u>Employee Classification</u>	<u>TWA, ppm</u>	
	<u>February</u>	<u>March</u>
1. Polymerization Foreman	75*	13
2. Shift Foreman	159*	38
3. Reactor Operator/Charger	15	10
4. Reactor Operator/Dumper	13	8
5. Reactor Operator/Relief	24	9
6. Utility Operator (2)	30	5
7. Dryer Operator	11	6
8. Warehouseman (2)	8	6
9. Bagger (3)	16	10
10. Boiler Operator	6	4
11. Lead Boiler Man	6	4
12. Guard	9	8
13. Laboratory Technician/Day	9	9
14. Laboratory Technician/4-12	10	8
15. Laboratory Technician/Shift	10	17

*Over 50 ppm TWA

Data for Periods: February - 2/7/74 - 2/27/74
 March - 3/4/74 - 3/29/74

W.C. Champion
 3/30/74

TABLE IV

BURLINGTON RESIN PLANTS' OPERATING PERSONNELTIME-WEIGHTED VCM EXPOSURES

February & March, 1974

<u>Employee Classification</u>	<u>TWA, ppm</u>	
	<u>February</u>	<u>March</u>
<u>Suspension Area</u>		
1. Area Foreman	27	10
2. Homopolymer Reactor Operator/Charger	56*	13
3. Homopolymer Reactor Operator/Dumper	44	15
4. Copolymer Reactor Operator/Charger	13	6
5. Copolymer Reactor Operator/Dumper	17	6
6. Dryer Operator	22	6
7. Bagger/Cleaner	44	7
8. Labor Pool/Bagger	18	6
<u>Plastisol Area</u>		
9. Area Foreman	69*	11
10. Shift Foreman	39	6
11. "A" Plant Tower Operator/Charger	103*	19
12. "A" Plant Tower Operator/Dumper	114*	27
13. "B" Plant Tower Operator/Charger	45	9
14. "B" Plant Tower Operator/Dumper	69*	12
15. Laborer/Cleaner (Jet)	25	41
16. Laborer/Cleaner (Manual)	21	37
17. Bagger	18	5
18. Atomizer Dryer Operator	17	5
19. Additive Dryer Operator	7	3
<u>Laboratory</u>		
20. Quality Control Laboratory Supervisor	13	8
21. Analytical Chemist	25	14
22. Colorist	26	14
23. Quality Control Technician/Day	26	11
24. Quality Control Technician/Shift	24	12
<u>Warehouse and Miscellaneous</u>		
25. Warehouse Supervisor	16	4
26. Warehouse Clerk	10	4
27. Warehouse Receiving Clerk	11	4
28. Warehouseman - Outside	15	3
29. Warehouseman - Inside	17	4
30. Effluent Operator	7	3
31. Boiler Operator	4	3
32. Lead Operator/Boiler-Effluent	10	3
33. Utility Man - Outside	11	3
34. Utility Man - Inside	26	6
35. Yard and Service Man - Outside	3	3
36. Yard and Service Man - Inside	9	4

*Over 50 ppm TWA

Data for Periods: February - 2/11/74 - 2/25/74
 March - 3/4/74 - 3/29/74

W.C. Champion
 3/30/74

TAB 1

FLEMINGTON HOMOPOLYMER - RESIDUAL VCM

March 5, 1974 - April 4, 1974

<u>Type</u>	DRYER "A"			DRYER "B"			BULK SHIPMENTS		
	<u>No. of Samples</u>	<u>Average VCM, ppm</u>	<u>Range VCM, ppm</u>	<u>No. of Samples</u>	<u>Average VCM, ppm</u>	<u>Range VCM, ppm</u>	<u>No. of Samples</u>	<u>Average VCM, ppm</u>	<u>Range VCM, ppm</u>
PVC 200-2	2	2325	1540,3110	5	1213	901-1390	8	1281	315-2740
PVC 225	14	694	126-1108	6	405	63-721	38	607	220-1010
PVC 250	2	412	369,454	3	259	196-340	12	427	130-613
PVC 250-3	1	457	-	1	688	-	1	398	-

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TABLE VI

BURLINGTON HOMOPOLYMER - RESIDUAL VCM

February 26, 1974 - April 4, 1974

<u>Type</u>	<u>DRYER SAMPLES</u>			<u>BULK SHIPMENTS</u>		
	<u>No. of Samples</u>	<u>Average VCM, ppm</u>	<u>Range VCM, ppm</u>	<u>No. of Samples</u>	<u>Average VCM, ppm</u>	<u>Range VCM, ppm</u>
PVC 150 *	1	290	-	-	-	-
PVC 175 *	-	-	-	3	503	440-569
PVC 10R *	8	538	310-790	23	505	121-741
PVC 200-2 *	9	217	160-305	-	-	-
PVC 200/12R	1	1685	-	-	-	-
PVC 225	4	681	270-1210	7	343	64-920
PVC 250-12S	1	525	-	-	-	-
PVC 250-3	3	538	430-650	5	542	386-615
BR-501	28	1638	195-5550	-	-	-
2/16 - 3/15	13	2828	550-5550	-	-	-
3/16 - 3/31	15	606	195-1535	-	-	-

*Steam stripped. The 200-2 was an experimental trial of this technique.

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TABLE VII

BURLINGTON COPOLYMER. - RESIDUAL VCM

March 4, 1974 - April 4, 1974

<u>Type</u>	<u>DRYER SAMPLES</u>			<u>BULK SHIPMENTS</u>		
	<u>No. of Samples</u>	<u>Average VCM, ppm</u>	<u>Range VCM, ppm</u>	<u>No. of Samples</u>	<u>Average VCM, ppm</u>	<u>Range VCM, ppm</u>
315	15	173	95-410	21	110	57-585
389	2	183	140,225	1	115	-
390	4	414	140-705	10	152	73-340

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TABLE VIII

PLASTISOL RESIN - RESIDUAL VCM

March 4, 1974 - April 4, 1974

<u>Type</u>	<u>No. of Samples</u>	<u>Average VCM, ppm</u>	<u>Range VCM, ppm</u>
1730	5	21	4-46
1738	4	35	12-100
1755	1	23	-
0565	3	8	4-15

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TABLE IX

VCM LOSS WITH TIMEFlemington Plant

<u>Type</u>	<u>Lot Number</u>	<u>Dryer</u>	<u>Initial</u>	<u>1 Day</u>	<u>2 Days</u>	<u>3 Days</u>	<u>5 Days</u>	<u>6 Days</u>	<u>9 Days</u>	<u>10 Days</u>
225/16R	224118	A	1108	463	358	-	67	-	26	-
"	224119	B	323	154	150	-	71	-	17	-
200-2	184059	B	1390	911	690	516	-	331	-	287
"	184063	A	3110	2305	1428	1105	898	-	574	-
"	184065	B	1343	967	826	653	590	-	378	-

Burlington PlantHomopolymer

<u>Type</u>	<u>Lot Number</u>	<u>Initial</u>	<u>1 Day</u>	<u>2 Days</u>	<u>5 Days</u>	<u>6 Days</u>
10R	494003	471	348	306	239	-
"	"	430	-	280	244	-
2-12	394006	526	96	73	39	-
225/16R	234026	960	386	171	59	-
"	234028	1210	539	161	80	-
250-3	334027	650	390	80	20	-
"	334029	430	375	246	-	95

Copolymer

<u>Type</u>	<u>Lot Number</u>	<u>Initial</u>	<u>1 Day</u>	<u>2 Days</u>	<u>5 Days</u>
315	614009	141	104	71	57
"	614010	400	372	320	212
"	"	150	130	128	99
"	614011	243	141	-	105
390	754009	570	410	380	330
"	754011	240	-	173	129
389	694003	138	95	96	76

Blending Resin

<u>Type</u>	<u>Lot Number</u>	<u>Initial</u>	<u>1 Day</u>	<u>2 Days</u>	<u>5 Days</u>
501	454011	3592	1981	1621	794
"	454012	550	-	345	99
"	"	547	385	286	136

Dispersion Resin

<u>Type</u>	<u>Lot Number</u>	<u>Initial</u>	<u>1 Day</u>	<u>2 Days</u>	<u>5 Days</u>
1730	804008	4	<1	<1	<1
"	804009	46	5	<1	<1
0565	854014	4	2	<1	1
1755	834019	23	6	1	2

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TABLE X

FLEMINGTON BIN AIR PURGING STUDY*

PVC 200-2, Lot 184066

March 28		<u>Dryer Samples</u>	<u>Residual VCM, ppm</u>	
		3 hours	1753	
		6 hours	1300	
		9 hours	1487	
<u>Date</u>		<u>Truck Samples</u>		<u>Pallet Samples</u>
		<u>Residual VCM, ppm</u>		<u>Residual VCM, ppm</u>
March 29	2nd Blow	708	Pallet 1	833
	5th "	821	" 2	682
March 30	2nd Blow	526	Pallet 1	614
	5th "	605	" 2	633
March 31	2nd Blow	482	Pallet 1	606
	5th "	576	" 2	614
April 1	2nd Blow	330	Pallet 1	519
	5th "	400	" 2	601
April 2	2nd Blow	372	Pallet 1	530
	5th "	344	" 2	559
April 3	2nd Blow	277	Pallet 1	410
	5th "	96	" 2	403
April 4	2nd Blow	221	Pallet 1	411
	5th "	170	" 2	417
April 5	2nd Blow	205	Pallet 1	331
	5th "	91	" 2	295
April 6	2nd Blow	185	Pallet 1	363
	5th "	252	" 2	360

* 10cfm Air Purge

W.C. Champion
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COLORITE 012793

TABLE XI

FLEMINGTON BIN AIR PURGING STUDY*

PVC 225, Lot 224152

March 27		<u>Dryer Samples</u>		<u>Residual VCM, ppm</u>	
		3 hours		357	
		6 hours		378	
		9 hours		926	
<u>Date</u>		<u>Truck Samples</u>		<u>Pallet Samples</u>	
		<u>Residual VCM, ppm</u>		<u>Residual VCM, ppm</u>	
March 27	Truck	2nd Blow	364	Pallet 1	374
		5th "	427	" 2	350
March 28	Truck	2nd Blow	237	Pallet 1	211
		5th "	287	" 2	217
March 29		2nd Blow	285	Pallet 1	201
		5th "	373	" 2	242
March 30		2nd Blow	269	Pallet 1	222
		5th "	331	" 2	282
March 31		2nd Blow	131	Pallet 1	142
		5th "	237	" 2	209
April 1		2nd Blow	195	Pallet 1	240
		5th "	170	" 2	120
April 2		2nd Blow	104	Pallet 1	187
		5th "	223	" 2	175
April 3		2nd Blow	50	Pallet 1	129
		5th "	103	" 2	113
April 4		2nd Blow	40	Pallet 1	162
		5th "	25	" 2	170

* 10 cfm Air Purge

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COLORITE 012794

TABLE XII

FLEMINGTON BIN AIR PURGING STUDY *

PVC 250, Lot 264098

March 27	<u>Dryer Samples</u>	<u>Residual VCM, ppm</u>
	3 hours	467
	6 hours	454
	9 hours	445

<u>Date</u>		<u>Truck Samples</u>		<u>Pallet Samples</u>
		<u>Residual VCM, ppm</u>		<u>Residual VCM, ppm</u>
March 28	2nd Blow	341	Pallet 1	351
	5th "	280	" 2	359
March 29	2nd Blow	188	Pallet 1	279
	5th "	382	" 2	344
March 30	2nd Blow	200	Pallet 1	286
	5th "	210	" 2	340
March 31	2nd Blow	105	Pallet 1	210
	5th "	81	" 2	284
April 1	2nd Blow	44	Pallet 1	130
	5th "	70	" 2	200
April 2	2nd Blow	74	Pallet 1	236
	5th "	109	" 2	274
April 3	2nd Blow	59	Pallet 1	149
	5th "	68	" 2	159
April 4	2nd Blow	55	Pallet 1	139
	5th "	17	" 2	163
April 5	2nd Blow	46	Pallet 1	113
	5th "	108	" 2	53

* 10cfm Air Purge

W.C. Champion
April 9, 1974

COLORITE 012795

TABLE XIII

BURLINGTON BIN AIR PURGING STUDY *

PVC 10R, Lot 494003

March 16, 1974 Dryer Sample - 550 ppm VCM

<u>Date</u>	<u>VCM, ppm</u>
March 19	340
March 21	584
March 21	899
March 22	490
April 1	340
April 2	495
April 2	307
April 3	659

* 10 cfm Air Purge

W.C. Champion
April 9, 1974

COLORITE 012796

TABLE XIV

BURLINGTON COMPOUND PLANT AIR MONITORING SURVEY

<u>Monitoring Point</u>	<u>Average OVA Reading, ppm</u>	
	<u>February</u> ⁽¹⁾	<u>March</u> ⁽²⁾
Mixer Floor - Operator Room	4	6
Hoist	9	5
Lead Room	10	6
Mixer #1 (closed)	13	7
Mixer #2 (closed)	11	8
Mixer #3 (closed)	9	6
Panel Board	10	6
CM Belt Feeder	35	6
Ground Floor - Between Panel and CM	17	5
Incline from CM to Mill	60	12
Cooling Trough - East End	5	4
Cooling Trough - West End	4	4
Dicer Room	10	5
Shaker	6	5
Packing Area	7	5
Foreman's Office	4	4
Lunch Room	3	4
Locker Room	3	4
Maintenance Shop - West End	63 (solvent)	6
East End/Welding Area	50 (solvent)	5
Color Room	3	4
Laboratory	4	5
Laboratory - CT Room	5	8
Warehouse - NW Aisle	3	4
Warehouse - SW Aisle	3	4
Warehouse - Office	3	4
Outside Building (North)	3	3

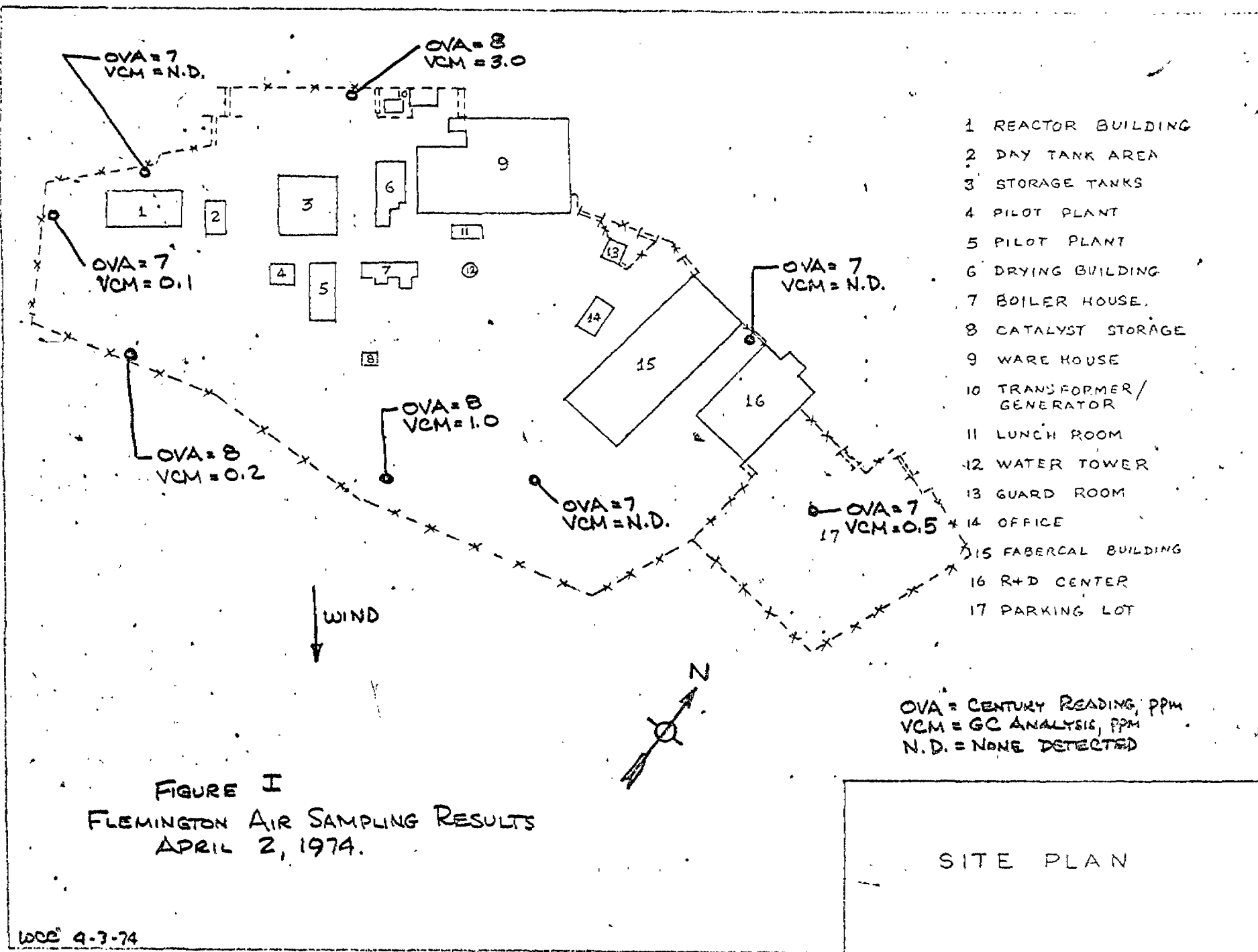
(1) February 26 and 27

(2) March 21 - 28, April 1, 2, 5

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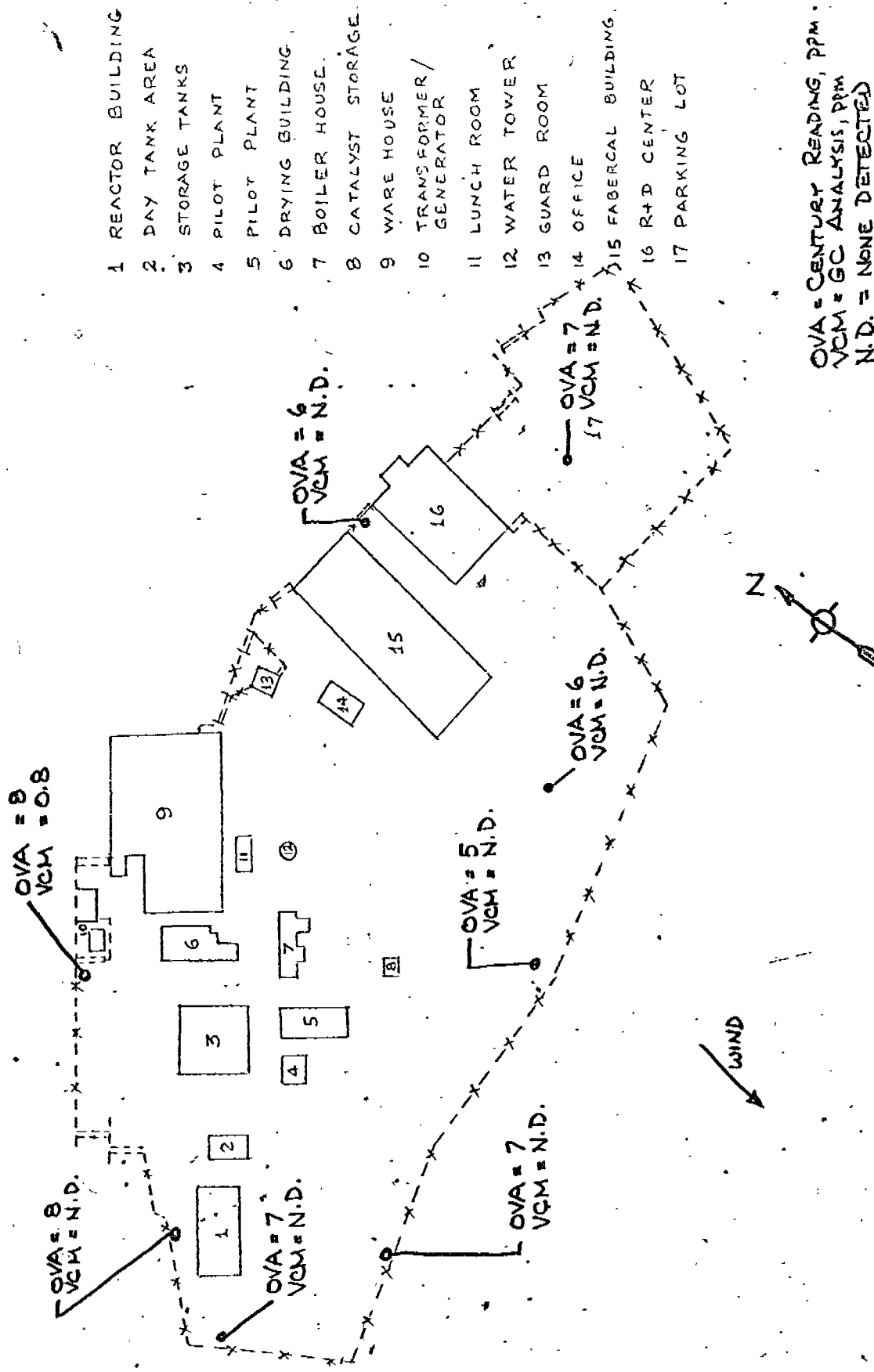


Figure II
 FLEMINGTON AIR SAMPLING RESULTS
 APRIL 5, 1974.

SITE PLAN

