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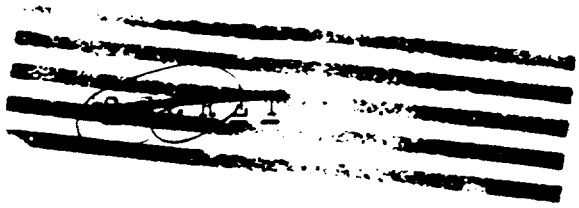

Air Activity During RaLa Runs #30 and 30A (2-14 to 2-27-49)

by

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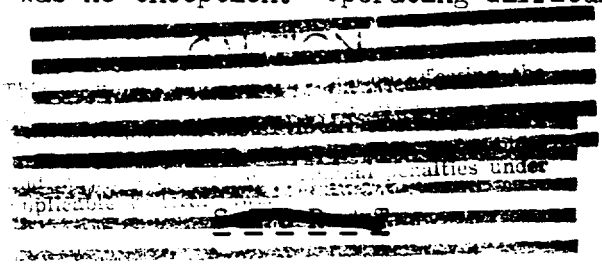
The comparison of air sampling data obtained during the RaLa run of January 10-16, 1949 (cell ventilation air filtered) with those obtained during previous runs (cell ventilation air unfiltered) showed a great improvement in particle incidence and general area contamination, as a result of the filter installation. Air monitoring instruments in the immediate vicinity of, and inside, 706-C and D buildings, however, gave evidence that significant amounts of airborne contamination were still being produced by the RaLa operation, the largest amount of which was believed to be coming from inside 706-D. Because of this it was decided to monitor the next run, with greater attention being paid to the amount of contamination being produced inside the building, and to determine if possible what specific operations were the greatest contributors.

The complexity of RaLa operations is such that seldom, if ever, are two runs exactly similar. The run of February 14 to February 27, 1949 was no exception. Operating difficulties were



experienced which necessitated a double run, therefore conditions existing during this run are considered extreme rather than representative.

Air activity in 706-D and 706-C commenced rising noticeably on 2-16, two days after the start of RaLa run #30, remaining higher than normal until the completion of Run #30A on 2-27-49. The highest periods of activity obtained on 2-18, 2-22, 2-26 and 2-27 when it became necessary to evacuate the buildings for periods of from 10-35 minutes. The air activity associated with RaLa operations during these runs may be considered not primarily a particle problem although the difference seems to be a fine point of definition of a particle. Radio-autographs of filters from constant air monitors within 706-D and 706-C buildings, during the runs, gave a pattern of diffuse activity over the entire surface of the filter paper, as differentiated from spots of localized activity which are recorded as separate particles. Localized spots of activity were in evidence on these filters, but in some instances the density due to the diffuse activity was such as to make the detection of less intense localized areas impossible. Such diffuse activity has been noticed in the past and had been associated with chemical operations. The physical form of the activity is unknown, but thought possibly to be due to fumes, or vapor.

The data comprising results obtained from radio-autographing constant air monitor filters from inside 706-D and 706-C buildings are presented in Tables I and II respectively. All filters were exposed to film for 24 hours, and in some instances counts were obtained, using a standard β-γ counter, prior to filming. Where counts were obtained the value in μc/sample is given at the time of counting plus the value of μc/cc of air based on an air flow of 300 ft /hour. Total particle counts are listed, being the number of spots of localized activity discernible on the radio-autograph of the filter.

Table III gives the results of radio-autographing filters from a constant air monitor sampling cell ventilation air from 706-D stack. Sampling of the stack effluent was not started until 2-25, and then to determine if the activity in 706-D was coming from the stack. Negative indications obtained by this method were further substantiated by sampling done by the Technical Division, whose samples showed no greater amount of activity passing through the cell ventilation air filter than had been experienced in the January RaLa run.

Table IV lists various operations in progress during each day of the runs. No elaborate effort was made to break the operations down more accurately, as the operating difficulties experienced would not make such a breakdown any more valuable in the interpretation of results.

Table V lists the results obtained from radio-autographing filters from 3 outside constant air monitors bracketing 706-D building. Some diffuse activity was evident on these filters, indicating a moderate amount of dispersal of contamination about the area.

Decay curves were run on two of the filtron samples taken during this run. One was a 42 hr. sample taken on the East loading platform of 706-D taken off at 0835 2-23. The other was a 30 minute sample taken immediately thereafter on the North Side of 706-D. A graphical analysis of the decay curves indicated an 8 day fraction, a 22 hr. fraction and some shorter-lived material. As would be expected, the short sample had the smaller percentage of the longer-lived activity. Any longer-lived fraction that may have been present was not distinguishable in a 14 day decay period.

Table I
Constant Air Monitors (Inside 706-D)

2nd Level (NW)				2nd Level (SE)					3rd Level (Center)				
ection Period (hrs)	Particles	µc/sample x 10^{-2}	µc/cc x 10^{-12}	Collection Time	Period (hrs)	Particles	µc/sample x 10^{-2}	µc/cc x 10^{-12}	Collection Time	Period (hrs)	Particles	µc/sample x 10^{-2}	µc/cc x 10^{-12}
.20	110												
.46	6								~0800	---	0		
.48	42	2.0	49	0520	~18	8	0.5~	~32.6	0820	~48	58	0.9	~22.1
21.	33	4.1	230	0800	26.5	12	2.9	129.	0430	23	6	4.0	205
2.5	10	3.3	1710										
25	8	>9.8	>462	0900	25	30	2.9	126	0900	28.5	26	3.9	161
3.5	26			1200	3	5			1205	3	30		
21	34			0845	21	42			0845	21	58		
24	143			0835	24	18			0830	24	18		
24	61	>9.8	>481	0815	24	15	0.6	29.4	0815	24	50	2.4	118
24	290	>9.8	>481	0815	24	116	3.5	172	0815	24	128	8.1	395
19	1	8.8	431	0300	19	24	5.7	279	0305	19	36	6.8	332
1	4	>9.8	>11500	0830	6.5	32			0405	1	12	6.1	7180
7.5	20			1130	3	36			0525	1.3	28	5.7	5060
8.5	8								1130	6	49		
									2000	8.5	10		
5.5	---			0820	21	3			0130	5.5	3		
5.3	2								0825	7	2		
1.75	4								1115	~3	14		
2.5	18												
1.3	30			0810	24	44			0815	21	26		
7	36	>9.8	>680	0115	17	39	3.4	237	0115	17	30	4.2	292
0.6	---	>9.8	>1090						1145	10	70	>9.8	>1153
4	58			0145	14.5	36	>9.8	>797	0145	14	57		
7.25	19	**		0900	7.25	60			0900	7.25	80		
1.5	---	>9.8	>7720	1030	1.5	0	>9.8	>7720	1100	2	38	>9.8	>5760
	59			0830		10			0845		77		
									2210		136		

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ove values of µc/cc were calculated using 300 ft3/hr as the air flow for the constant air monitors. Recent measure- indicate this air flow value to be inaccurate, consequently values as noted show a greater divergence between stations ctually exists.

Table II
Constant Air Monitors (Inside 706-C)

Date	1st Level (W) Collection Time	Period (hrs)	Particles	µc/sample x 10^{-2}	µc/cc x 10^{-12}	2nd Level (S) Collection Time	Period (hrs)	Particles	µc/sample x 10^{-2}	µc/cc x 10^{-12}	2nd Level (N) Collection Time	Period (hrs)	Particles	µc/sample x 10^{-2}	µc/cc x 10^{-12}
2-14	~0800	~48	1			~0800	~48	2			~0800	~48	83		
2-16	0800	48	5	0.2	4.6	0800	48	6	0.07	1.8	0800	48	60	0.63	15.2
2-17	0800	24	11	0.31	15.2	0800	24	2	0.013	0.64	0800	24	7	3.3	162
2-18	0800	24	27	3.3	162	1230	~28.5	65	0.95	280	0800	24	74	>9.8	>480
											~1230	~4	10		
2-21	1035	~74	235	1.9	30	1045	~70	77	.97	16	1040	~70	206	3.5	59
											1415	3.5	176		
2-22	0800	21.5	140	1.2	65	0800	21.5	123	1.43	79	0800	19	171	7.5	466
2-23	0800	24	15			0800	24	36			0800	24	12		
	2100	13	8												
2-24	0800	11	0			0800	24	0			0800	24	0		
2-25	0800	24	10			0800	24	25			0800	24	22		
	----	--	12												
2-26						1930	35.5	45	>9.8	>325					
2-28						0800	36.5	60			0800	72	--	>9.8	>161
3-1						0800	24	14			0800	24	13		

Note: The above values of µc/cc were calculated using 300 ft^3/hr as the air flow for the constant air monitors. The divergence in values noted between stations is subject to verification pending new air flow measurements.

Table III
706-D Stack Samples

Date		Time	Particles	C/M	Remarks
2-25	(1)	1130 - 1330		1497	
	(2)	1330 - 1430		600	
	(3)	1430 - 1530		736	
	(4)	1530 - 1730	7		
	(5)	1730 - 1930	23		
	(6)	1930 - 2130	58		
	(7)	2130 - 2330	85		
2-26	(8)	2330 - 0130	202		
	(9)	0130 - 0330	262		
	(10)	0330 - 0530	211		
	(11)	0530 - 1130	56		
	(12)	1130 - 1330	111		
	(13)	1330 - 1530	199		
	(14)	1530 - 1730	302		
	(15)	1730 - 1930	114		
	(16)	1930 - 2130	13		* large amount
	(17)	2130 - 2330	95		diffuse activity
2-27	(18)	2330 - 0130	86		
	(19)	0130 - 0530	66		
	(20)	0530 - 0730	183		
	(21)	0730 - 0930	94		
	(22)	0930 - 1130	58		* hot spots
	(23)	1130 - 1330	104		
	(24)	1330 - 1530	268		* hot spots
	(25)	1530 - 1730	191		
	(26)	1730 - 1930	167		
	(27)	1930 - 2130	169		
	(28)	2130 - 2330	95		
2-28	(29)	2330 - 0130	85		
	(30)	0130 - 0330	79		
	(31)	0330 - 0530	76		
	(32)	0530 - 0730	56		
	(33)	0730 - 1030	46		
	(34)	1030 -			
3-1	(34)	1300	52		* Diffuse activity

Table IV
706-D Operations (RaLa Run)
2-14 to 2-28-49

2-14 2-15 2-16 2-17	Loading slugs, coating removal, transfer operations, extraction, settling and waste neutralization.	
2-18	Extraction cake washes 0320 - 1025 Metastasis - (1020 - 2015) Metastasis washes 2000 to 0200 (2-19)	
2-19	(0120) Transfer to Cell B Electrolysis (0150 to 1150) 6 ℘ sample at 1300 B-6 volume reduction (1300 - 1715) In glassware 1700 to 1230 (2-20)	Various recovery operations in progress from 1400 to 2330
2-20	Product dried (1300 - 1700) Pb removal 2100 - 0045 (2-21)	
2-21 2-22 2-23 2-24	Loading, coating removal, dissolving, transfers, waste neutralization, metastasis washes, metastasis.	
2-25	Transfer to Cell B (2240) Electrolysis 2130	
2-26	Electrolysis ended (0740) Sample 6 ℘ (very high air activity - evacuation) 0935-1230 (B-6 volume reduction) Hot samples taken Pb removal	
2-27	0400 Out of glassware 1615 - 2015 Product evaporation and drying Product in Cell B 2015 (2-27 to 0900 2-28) Product shipped 100 2-28	

Table V
Outside Constant Air Monitors

Date	#1 125' East 706-D Total Particles	#2 200' NNW 706-D Total Particles	#5 600' SW 706-D Total Particles
2-14	3	1	0
2-18	20	7	
2-21	4	12	53
2-22		4	
2-23	13	4	34
2-24		0	
2-28	10	23	16
3-7	4	5	2

Summary

Due to the variable factors inherent in RaLa operations the data presented are of qualitative significance only. However, an examination of these data allows for the following generalizations to be made.

(1) Air activity does not seem to be confined to any one particular operation in the process.

(2) Highest air activity seems to come in sudden increases, although a gradual rise frequently occurs before the increase.

(3) A moderate amount of activity is still passing through the cell ventilation air filter, however, the magnitude of the activity is less than that being detected inside the building.

(4) Some phases of the operation when the product is in glassware contribute to high activity of the cell ventilation air.

(5) Taking of "Skyshine" readings and the removal of the product carrier from Cell B seems to result in the dispersal of particles of very high specific activity, especially

on the 3rd level. During this period similar particles were detected in the filtered cell ventilation air.

(6) No distinguishable 300 hr. activity was present during the period of highest air activity in the course of the run.

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