

TO: Dr. O. E. Kurt

DATE: November 15, 1946

FROM: E. W. Brignac

SUBJECT: TS 46-42V, Respirator Filter Tests at
Schuylkill Products Company

Tests on two MSA "comfo-metal" respirator filter units to determine their efficiency in removing lead fumes from the atmosphere gave about 95% removal of lead from air to give an average exit air analysis of 0.004 mg./cu.ft. or less over a period equivalent to four days breathing time. This is within the allowable limits of lead concentration for inorganic lead.

The test method consisted of drawing air through the filter which was sealed into a funnel. The funnel was connected to two iodine scrubbers in series followed by a meter to measure the air flow. A standard air sampler was connected in parallel to determine the lead content of the ambient atmosphere. Poor agreement was obtained between the ambient air analysis and the total lead collected in the filter units and train, probably because of varying effect of air currents on the quantity of dust collected by the two types of collection openings. The ambient air was collected through a small glass tube and the filter air was collected through a comparatively large area opening. Consequently, only results of analyses obtained on the filter train are used in the determination of filter efficiency.

The first unit was tested at a height of approximately eight feet above ground level in an area of dense fumes near the Schuylkill Products Company lead smelter. The second unit was tested at a height of approximately 5-1/2 feet above ground level at the same location. Results of the two tests are summarized in the attached table.

During the first test, lasting approximately 120 hours, 1,461 cu.ft. of air was drawn through the filter and 53.4 mg. of lead was retained on the filter, or an average of 0.0359 mg./cu.ft. was collected. The total lead collected in the iodine scrubbers and on the filter averaged 0.0373 mg./cu.ft. to give a lead removal efficiency of 94% for the filter. The lead concentration in the air leaving the filter remained at less than 0.002 mg./cu.ft. throughout the test period equivalent to over four days breathing time. The initial concentration of dust in air leaving the filter was larger than the concentration at the end of the test indicating an increase in filter efficiency as a dust layer builds up on the filter.

During the second test, lasting approximately 190 hours, 2,252 cu.ft. of air was drawn through the filter and 206.7 mg. of lead was retained on the filter, or an average of 0.0917 mg./cu.ft. was collected. The total lead collected in the iodine scrubbers and on the filter averaged 0.0958 mg./cu.ft. to give a lead removal efficiency of 96% for the filter. The lead concentration in the air leaving the filter remained at less than 0.002 mg./cu.ft. during the initial period equivalent to 4 days breathing time, with the exception of one 0.4-day period in which abnormally high analyses were obtained on both the ambient air and filtered air streams. These results cannot be explained from the information available. The increased efficiency with time of use noted in the first test filter was not obtained with the second. Rather a decrease in efficiency was observed with an increase in lead concentration to 0.007 mg./cu.ft. at the end of the test. This is probably due to differences in filter units. Pressure drop measurements taken during the second test showed an insignificant increase in pressure drop through the filter unit (less than 0.05 inches of water) during the test period.

These tests indicate the filter units provide adequate protection against lead dust; however, additional tests should be made to determine the variation that might exist between filter units.

Notebook Reference: 1060.

E. W. Brignac

EWB/mew

KE 0007869

RESPIRATOR FILTER TEST RESULTS

		Lead Content of Air at Sample Point			Lead Content of Air After Filter			
Sample	Date	Sample	Mg. Pb	Mg. Pb	Sample	Mg. Pb	Mg. Pb	Cumulative Days of Breaking
		Volume	in	per	Volume	in	per	
	1946	cu.ft.	Scrubber	cu.ft.	cu.ft.	Scrubber	cu.ft.	
Test No. 1								
1	8/28	102	0.154	0.0015	224	0.388	0.0017	0.6
2	8/29	154	1.500	.0097	107	.134	.0013	.9
3	8/30	66.0	2.500	.0379	375	.446	.0012	2.0
4	9/4	12.8*	0.792	.0621	418	.032	.00008	3.2
5	9/5	14.2*	.856	.0603	337	.064	.00019	4.2
Total or Avg.		349.0	5.802	0.0343	1,461	1.064	0.0009	4.2

<u>Test No. 2</u>								
1	9/25	156	1.840	0.0118	381	0.280	0.0007	1.1
2	9/26	37.1	6.410	.1727**	136	2.686	.0197**	1.5
3	10/1	--	--	---***	315	0.600	.0019	2.4
4	10/2	141	0.780	.0055	275	.312	.0011	3.2
5	10/3	98.7	.034	.0004	262	.367	.0014	3.9
6	10/7	91.2	.620	.0068	285	1.244	.0043	4.7
7	10/8	111.6	2.466	.0221	311	1.710	.0054	5.6
8	10/9	118.5	1.070	.0090	287	2.040	.0071	6.4
Total or Avg.		754.1	13.220	0.0326	2,252	9.239	0.0052	6.4

*Vacuum cut off before end of run. The resulting small sample size makes results unreliable.

**Abnormal results which cannot be explained from the data obtained.

***Air meter not working.

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