Report on

Dust Survey of Paint Manufacturing Plant
of The Lowe Brothers Company, Dayton, Ohio.

Recommendations

After thorough study of data derived from samples obtained in this plant, the following specific recommendations are made:

1. Installation of a properly designed exhaust ventilation system in the mixing room of Building 4.

2. Requirement that men working in dusty freight cars wear dust respirators.

With regard to the first of these, it is important, if sole dependence is placed upon the ventilation system, that hoods be properly placed relative to mixers and that hood entrance velocities be such as to insure collection of all highly concentrated dusts given off by the operation of charging the mixers. The appended blueprint shows location of sampling points in the mixing room and analyses of the corresponding samples. A careful study of these data should give some idea as to the parts of the room where ventilation is most needed. It seems advisable to locate hoods near each mixer in such a way that all dust generated by charging mixers would be drawn into the system and away from the operators. If it proves to be impractical to do this for all mixers, it definitely should be done for all those in which lead or silica paints are mixed and those paints should never be mixed in other machines.

In addition to hoods located near the mixers, there should be exhaust ventilators located in all parts of the room where dry dusts are stored and handled. Two such places are indicated on the drawing by samples number 28 and number 4. It may be stated in

general that any operation involving the handling of dry, dusty materials, either openly or contained in paper bags, is potentially a generator of hazardous dust concentrations in the surrounding air. Any means of collecting this dust at its source may be the means of maintaining low dust concentrations in the surrounding air.

There is considerable difference between conditions in the plant as a whole in summer and those in winter. A comparison of samples taken in summer (July) with those taken in winter is tabulated in Table I, giving average results of all samples taken in the mixing room at each time except that samples taken near mixers during operation of charging are omitted.

TABLE I

Comparison of Average Dust Samples Taken in Mixing Room

	Summer	Winter	% Increase
Dust Concentration, particles per cu. ft.	1,283,500	6,729,800	424
Lead Concentration, mg. per 10 cu. M.	0.193	0.882	356

These data are easily accounted for by observation of ventilation conditions during the two extreme seasons of the year. In summer the plant is operated with most windows open and natural ventilation gives rapid changes of air within the plant. In winter the windows are all closed and with a change of air occurring very seldom, concentrations of dust and other contaminants continually increase throughout the working day. This is particularly true of the most minute particles which remain in suspension indefinitely, instead of settling out as do the larger particles. Since these

small particles do not settle, the only means of eliminating them is by ventilation.

TABLE II

Special Samples Showing Acute Exposure (July, 1940)

Sample No.	Location	Operation	Dust Count Particles/cu.ft.	Lead Conc. Mg./10 cu.m.
1	Mixing Room	Charging Mixer No. 6 for Paint No. 782, Mellow Gloss White	2,746,800	0.165
2	Mixing Room	Charging Mixers 1 and 3 for Paint No. 1003, High Standard, Stock White	6,840,000	1.53
11	Receiving Department	Unloading freight car of Leaded Zinc Oxide	20,145,600	25.7
12	Receiving Department	Unloading freight car of Titanium Oxide	12,053,200	2.25

Table II shows analyses of four samples taken under unusual conditions. Samples 1 and 2 were taken near mixers during the charging operation in summer. The analyses show that the men engaged in these operations are subject to hazardous concentrations of dust for the short time required for charging the mixers. Continuous exposures to such concentrations would constitute a dangerous hazard. However, the chief significance of these data is that they indicate the principal origin of hygienic dust in the mixer room, namely the operation of charging the mixers with dry powdered materials.

Samples 11 and 12 were taken inside freight cars which were being emptied of leaded zinc oxide and titanium oxide respectively. Both doors of each car were open but neither was ventilated by any artificial method. The materials were contained in paper bags. The bags were moved by hand from the floors of the cars to skids upon

which they were moved and stored until used. The time required for unloading a car is approximately three hours depending upon the number of men working. For that length of time, exposure to air containing 25.7 milligrams of particulate lead per ten cubic meters is an extreme exposure which definitely should be eliminated. Fortunately such lead concentrations are met only in cars loaded with dusts whose lead content is very high. These do not occur often enough to have caused serious exposures of the men in the past.

Since it might be impractical to attempt to ventilate the cars in a way that would effectively eliminate the hazard, the use of respirators has been previously and is again recommended in the unloading of all freight cars containing powdered materials.

Table III contains results of analyses of all samples taken in the plant. Those which are indicative of particular hazards have been discussed above. In general, it may be stated that all those which show lead concentrations below 1.0 milligram per 10 cubic meters and dust counts of less than 1,500,000 particles per cubic foot indicate conditions that are safe from those hazards. The dust count of 2,105,000 shown for the grinding room is not a dangerous condition but is simply higher than normal due to poor winter ventilation in that part of the plant.

The analyses of dust scrapings from the mixing room indicate that over a long period of time the lead content of atmospheric dusts in the mixing room is about 2.7% by weight. This was determined by analyzing samples of the dust which has settled over such things as pipes near the ceiling and motor starter boxes on the walls.

Finally it is suggested that a thorough final check be made on whatever remedial measures are taken to eliminate the dust hazard from this plant. Samples of air-borne dust should be taken at the breathing point of mixer operators and also in parts of the room where no dust is generated to see if the permanent overall hazard as well as the local acute hazard have been removed.

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TABLE III

Summary of Data

Sample No.	Location	Date	Amount of Sample	Pb Found Mg.	Mg. Pb per 1000 Cu.Ft.	Mg. Pb per 10 Cu.M.
1	Mixing Room	7-23-40	15 cu.ft.	0.007	0.467	0.165
2	Mixing Room	7-23-40	30 cu.ft.	0.130	4.332	1.530
3	Mixing Room	7-23-40	53 cu.ft.	0.020	0.377	0.130
4	Mixing Room	7-23-40	60 cu.ft.	0.072	1.200	0.420
6	Roof Bldg. 4	7-23-40	33 cu.ft.	0.004	0.121	0.043
7	Maintenance	7-23-40	45 cu.ft.	0.014	0.311	0.110
8	Mixing Room	7-23-40	48 cu.ft.	0.020	0.416	0.150
9	Mixing Room	7-23-40	30 cu.ft.	0.006	0.200	0.071
10	Bldg. 3, Base't.	7-24-40	60 cu.ft.	0.004	0.067	0.023
11	Freight Car	7-24-40	33 cu.ft.	2.400	72.727	25.700
12	Freight Car	7-24-40	30 cu.ft.	0.190	6.333	2.250
13	Mixing Room	7-23-40	0.419 gm.	6.500		
14	Mixing Room	7-23-40	1.3445 gm.	60.000		
15	Mixing Room	7-23-40	1.741 gm.	36.000		
16	Mixing Room	7-23-40	1.698 gm.	28.000		
17	Mixing Room	7-23-40	0.271 gm.	10.000		
24	Mixing Room	12-11-40	32.5 cu.ft.	0.165	5.077	1.79

TABLE III continued

Sample No.	Location	Date	Amount of Sample	Pb Found Mg.	Mg. Pb per 1000 Cu.Ft.	Mg. Pb per 10 Cu.M.
25	Mixing Room	12-11-40	48.75 cu.ft.	0.052	1.065	0.40
26	Mixing Room	12-11-40	48.75 cu.ft.	0.082	1.682	0.63
27	Mixing Room	12-11-40	48.75 cu.ft.	0.020	0.411	0.15
28	Mixing Room	12-11-40	32.5 cu.ft.	0.130	4.000	1.44
30	Grinding Room	12-11-40	32.5 cu.ft.	0.010	0.308	0.11
31	Test Room	12-11-40	65.0 cu.ft.	0.072	1.107	0.39

ANALYSIS OF SAMPLES TAKEN

Sample Number	Location	Date
1	As Indicated	7-26-4
2	As Indicated	7-26-4
3	As Indicated	7-26-4
4	As Indicated	7-26-4
8	As Indicated	7-26-4
9	As Indicated	7-26-4
24	As Indicated	6-11-4
25	As Indicated	6-11-4
26	As Indicated	6-11-4
27	As Indicated	6-11-4
28	As Indicated	6-11-4
13	As Indicated (Dust Sample)	7-26-4
14	As Indicated (Dust Sample)	7-26-4
15	As Indicated (Dust Sample)	7-26-4
16	As Indicated (Dust Sample)	7-26-4
17	As Indicated (Dust Sample)	7-26-4