DUST SURVEY OF THE DAYTON POWER AND LIGHT COMPANY GARAGE

February 26, 1941

The purpose of this survey is to study the methods of instrumentation to be used in a dust survey of atmospheres polluted by exhaust gases from automobile engines.

The main question involved in instrumentation is the question of whether or not some lead exhausted from engines might be in the form of organic vapors which would not be collected by the electrostatic precipitator. In order to check this question, atmospheres in the garage, which were known to contain high concentrations of exhaust gases, were sampled by an electrostatic precipitator in series with an activated charcoal absorber. Simultaneously with this series of samples, another precipitator sample was taken without the charcoal absorber. In several instances simultaneous impinger samples were taken also.

In processing the samples, those which were taken in the precipitator in series with the charcoal absorber were washed from the tubes with dilute nitric acid (5%). The other precipitator samples were intended to be washed with absolute alcohol, to be used for the purpose of making dust counts for comparison with dust counts made on the impinger samples. The latter purpose, however, was not fulfilled because the work was delayed so long after collection of the samples that it was thought the impinger samples might have been dissolved to such an extent as to make the count worthless.

The actual procedure involved was the washing of one set of precipitator tubes with nitric acid as planned, the analysis of these washings and of the charcoal from the absorber for lead, the washing of the other set of precipitator samples in alcohol, and the making of dust counts on these washings.

The samples were taken in locations as follows.

Samples #41C1, 2, 3, and 4 were taken at the edge of the driveway through the first floor midway between front and rear doors. The room in which these samples were taken was the repair shop; and at the time they were taken (7:30 to 8:00 a.m.) traffic was limited to one or two trucks passing through on the way in or out. Samples #40C1 and #40C2 were precipitator samples. #40C3 was a charcoal sample taken in series with sample #41C1. #40C4 was an impinger sample. All four samples were taken simultaneously.

Samples #40C5, 6, and 7 were taken on the second floor of the garage in the passage way between the two rooms of the storage garage. At the time these samples were taken (8:30-9:00 a.m.) most of the cars stored in the garage had been removed, but there was an occasional car moved during the sampling process and these cars passed within six feet of the sampling instruments. #40C5 and #40C6 were precipitator samples and #40C7 was a charcoal sample taken in series with #40C5.

Samples #40C8 and 9 were two precipitator samples taken at the same locations as #40C5, 6, and 7 immediately following (9:00-9:30 am.).

Samples #40C10, 11, and 12 were taken near the window in front of the lubrication rack on the west side of the first floor. At this time (9:45-10:15 a.m.) the only engines running in the shop were those under repair which were merely being run at short intervals for test. #40C10 and 11 were precipitator samples and #40C12 was an impinger sample taken simultaneously.

Samples #40C13, 14, and 15 were taken in the stock room on the first floor which is east of the repair shop mentioned above. The sampling point was midway between front and rear doors and at the end of the driveway. Traffic during the time of sampling (10:20-10:50 a.m.) consisted of three large trucks which drove through the room in succession, each stopping for a few minutes to be loaded. #40C13 and 14 were precipitator samples and #40C15 was an impinger sample, all taken simultaneously.

Samples #40C16 and 17 were simultaneous precipitator samples taken on the second floor at the same location as #40C5, 6, and 7 (3:50-4:10 p.m.). Sample #40C16 was taken in a specially coated glass tube, which was an experimental tube obtained from the Mine Safety Appliances Company. The other sample was taken in an aluminum tube, the purpose of these two samples being to check the glass tube against the aluminum tube for quantitative collection of lead dust.

Samples #40C18, 19, 20, and 21 were taken at the same location as #40C5, 6, and 7, at a time (4:20-4:50 p.m.) when the cars to be stored in the storage garage were being returned for the night. There was a steady flow of traffic within six feet of

the instruments. #41C18 and 19 were precipitator samples. #41C20 was a charcoal sample in series with #41C18. #41C21 was an impinger sample.

#41C22, 23, and 24 were taken at the same location again as #41C5, 6, and 7, and at this time (4:50-5:20 p.m.) traffic was still flowing passed the instruments steadily but with slightly diminished rate. #41C22 and 23 were precipitator samples and #41C24 was a charcoal sample taken in series with #41C22.

The results of lead analysis for precipitator and charcoal samples are summarized in Table I. The results of dust counts made on the other precipitator samples are given in Table II.

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TABLE I

Sample Number	Total Pb Found Mg.	Total Vol. of air cu. ft.	fraction of 10 cubic Cu. ft. Sample	Pb Concentration Mg./10 Cu. M.	Remarks
40C-1	0.325	92.70	0.2625	1.2380	
40C-3	0.375	12.15	0.0344	~~10.9012~~ 1.09	Charcoal Sample
40C-5	0.275	108.15	0.3063	0.8978	
40C-7	0.030	14.40	0.0408	0.7353	Charcoal Sample
40C-9	0.088	92.70	0.2625	0.3352	
40C-11	0.033	92.70	0.2625	0.1257	
40C-14	0.073	92.70	0.2625	0.2781	
40C-16	0.034	61.80	0.1750	0.1943	Glass tube
40C-17	0.035	61.80	0.1750	0.2000	Check on glass tub
40C-19	0.0825	92.70	0.2625	0.3143	
40C-20	0.220	8.77	0.0248	8.8710	Charcoal Sample
40C-22	0.0675	92.70	0.2625	0.2571	
40C-24	0.240	9.57	0.0271	8.8561	Charcoal Sample

TABLE II

Sample Number	Dust Count Millions Particles per 10 Cu. M.	Dust Count Millions Particles per Cu. Foot	Remarks
40C-2	3547	10.0453	
40C-4			Impinger Sample
40C-6	1039	2.9425	
40C-8	133	0.3767	
40C-10	183	0.5183	
40C-12			Impinger Sample
40C-13	61	0.1728	
40C-15			Impinger Sample
40C-18	478	1.3537	Results invalid; see Analysis/ Sheet
40C-21			Impinger Sample