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MANUFACTURING DEPARTMENT - DEVELOPMENT SECTION

OUTLINE OF DEVELOPMENT SECTION WORK
SINCE THE COMMITTEE MEETING OF JUNE 17, 1947

For Discussion at
Lead Contamination Advisory Committee Meeting
Wilmington, Delaware
September 18, 1947

ANALYTICAL METHODS

DP 46-5TC, Determination of TEL in Air - A Continuous Recorder

The completed design of an improved dithizone recorder for field use has been presented in DSM 47-35.

The medium quartz spectrograph (basic component of the electronic spectrograph) has been received from Eausch and Lomb and construction of the electronic spectrograph for TEL lead detection is in progress at LSU.

M 47-1TC, Determination of Lead in Urine

Arrangements have been made with the local Medical Department to collect urine samples for comparative analyses by the routine method and the visual comparator method. On a current trip, Mr. Snyder is stopping at Kettering Laboratory to develop further plans.

SURVEYS

DP 46-5TC, Air Contamination in TEL Manufacturing Buildings

Measurement of flow rates and lead concentrations in most TEL area exhaust streams has been completed. Work nears completion on the remaining, less important, streams. In agreement with previous reports, the results to date show that the major contamination sources are the main exhausts and copper ducts from the manufacturing buildings and the exhausts from the furnace buildings. About 95% of the lead discharged to the air comes from these sources.

<u>Stream</u>	<u>1947 Survey</u>		<u>1945 Survey</u>
	<u>Ag. Pb/Cu.St. (Lb. Pb/Day)</u>		<u>(Lb. Pb/Day)</u>
"E" Furnace	3.094	17.0	24.5 ^b
"E" Copper Dust	.32	8.6	48.1 ^b
"E" Building Main Exhaust	.02	8.4	24.7 ^b
Blender Main Exhaust	.02	4.6	18.5
Alley	.015	2.3	7.8
Blender Filter Room Exhaust	.005	0.3	2.0
Tank Car Clean-Out House	.03	.2	--
Melt Pot	.004	.1	2.1
"E" Wash House Main Exhaust	.004	.1	
"E" Wash House Filter Room	.001	.0	
Total for Area		178.0 ^a	409.3 ^c

- ^a Assumes that each of other four buildings wash houses and furnaces contributes the same contamination as "E".
^b Average of five buildings.
^c Actual total for area since duplicating units were separately measured.

The 1947 survey indicates that less than half as much lead is being exhausted to the air as in 1945. While operating and housekeeping improvements are considered to be the principal contributors to this reduced contamination figure, it must be recognized that differences in the analytical method used on the survey may also contribute. The method used in 1947 is an improvement over that employed in 1945 and therefore the results are more dependable.

PROTECTIVE EQUIPMENT

DP 46-39TC, Impermeable Gloves

Tests of Elastomer 105-coated gloves in the TEL area continue favorable. Supplies of the gloves have been sent to Deepwater and Detroit for independent evaluation. Meanwhile, two outside companies (Midwest Rubber Company, Detroit, Michigan; Edmont Manufacturing Company, Coshocton, Ohio) have submitted preliminary samples of this type glove for our evaluation prior to placing an order for test supplies.

TEL-penetration tests on elastomer-coated gloves (with portions of fingers continuously submerged in liquid TEL) showed no penetration for 7.5 hours. A sample taken at 17 hours showed that detectable penetration had begun, and this was confirmed by a sample at 24 hours. The average penetration during the 24 hours was only six micrograms per sq. cm. of exposure area per hour. These results are in agreement with previously reported

bottle-test permeability data on elastomer films. The test conditions are considered much more severe than conditions of actual use, and the results indicate that the elastomer-coated gloves provide ample protection against TEL contamination.

Tests are in progress to select suitable materials for the fabrication of ventilated protective clothing. Tentative specifications for the clothing articles have been submitted to MSA and Hodgman Rubber Company, who will design and fabricate the clothing.

DECONTAMINATION

DP 46-1TC, Decontamination of TEL-in-Air Streams - Lab. Studies

Laboratory tests on the adsorption of TEL by activated charcoal show that no detectable temperature rise occurs when passing TEL-saturated air through the charcoal bed under normal conditions. However, when the charcoal is partially saturated with TEL, autoignition occurs if the inlet air stream is heated to approximately 100°C.

Tests to determine whether TEL is adsorbed as such or undergoes a reaction during contact with charcoal gave some evidence that reaction takes place. Exit air from the scrubber has an odor characteristic of hydrocarbons rather than of TEL. No TEL could be recovered from the charcoal by treatment with steam or vacuum. Analyses of the lead content of the charcoal showed that about two-thirds of the weight of material adsorbed was accounted for as metallic lead.

In order to test the relative performance of various charcoals, five samples from various sources were tested for TEL removal capacity and efficiency with results as tabulated. The results show the first three charcoals listed are comparably satisfactory.

Mean Micrograms Pb/cu.ft. in Effluent from Charcoals Contacting TEL-Air Mixtures at Normal Breathing Rate			
	% Wt. Increase Due to TEL	3 Hours 20,000 Micrograms Pb/cu.ft. in Inlet	120 Hours 80 Micrograms Pb/ cu.ft. in Inlet
Columbia .	40	4	2
GMA	46	4	5
GMC*	18	7	2
All-Service*	15	200	3
Sample A**	7	470	17

* A mixture of charcoal with other adsorbents.

**Experimental sample secured through Dr. Kehoe

Air samples taken before and after the air filters (oiled Fiberglass) in the Development Section Laboratory show that the air to the filters contains a maximum of 0.5 microgram of particulate lead per cubic foot and that the filters have a removal efficiency approximating 50%. The amount of particulate lead penetrating the similar filters in the new laboratory will be much less because the building is further from the TEL area. Furthermore, there will be a reduction of atmospheric contamination at the source when the Pease-Anthony scrubber installation is complete.

DP 46-2TC, Removal of Lead Dust from Smelter Flue Gases

The Pease-Anthony scrubber continues to operate with a high service factor and satisfactory performance. Following a series of tests on the unit and several contacts with Mr. Anthony, an equipment design was prepared for the new units to be installed on the other furnaces. To provide more efficient dust removal, the new units will be different from the present one in four principal respects: (1) the scrubber will be smaller, (2) the fan will be larger, (3) the size of the scrubber inlet will be fixed, and (4) the entry of dilution air will be minimized by an automatic damper actuated by the furnace draft. This project is now in the hands of the Engineering and Maintenance Section for preparation of detailed design and preparation of project papers. It is estimated that the proposed new Pease-Anthony scrubbers will be installed and operating within six to eight months.

GWB/np
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