MISCELLANEOUS LEAD PRODUCTS
AP-42 Section 7.17
Reference Number 5

73-CCC-1
(REPORT NUMBER)

65069

AIR POLLUTION EMISSION TEST

GENERAL ELECTRIC COMPANY
(PLANT NAME)
WIRE AND CABLE DEPARTMENT

1285 BOSTON AVENUE
(PLANT ADDRESS)
BRIDGEPORT, CONNECTICUT

06602

U. S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Water Programs
Office of Air Quality Planning and Standards
Emission Standards and Engineering Division
Emission Measurement Branch
Research Triangle Park, N. C. 27711

EMISSIONS SAMPLING REPORT
EMB PROJECT REPORT NUMBER 73-CCC-1

Emissions From Cable Covering Facility

at

General Electric Company
Wire and Cable Division
Bridgeport, Connecticut

on

June 26-28, 1973

by

E. P. Shea
Midwest Research Institute
Kansas City, Missouri 64110

Reviewed by

John W. Snyder and Susan Wyatt
Office of Air Quality Planning and Standards
Environmental Protection Agency
Research Triangle Park
North Carolina 27711

EPA Contract No. 68-02-0228 Task No. 31

MRI Project No. 3585-C

PREFACE

The work reported herein was conducted by Midwest Research Institute (MRI), pursuant to a Task Order issued by the Environmental Protection Agency (EPA) under the terms of EPA Contract No. 68-02-0228. Mr. E. P. Shea served as the Project Chief and directed the MRI Field Team consisting of: Messrs. Reid Flippin, Henry Moloney, Douglas Weatherman, Kevin Cline, Harold Branine, and Frank Hanis. Mr. Fred Bergman, assisted by Mr. Mike Hammons and Mrs. Carol Green, performed the pollutant analyses at the MRI laboratories. Miss Christine Guenther coded the data for the computer calculations. Mr. E. P. Shea prepared this final report.

Approved for:

MIDWEST RESEARCH INSTITUTE

Paul C. Constant, Jr.
Program Manager

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II. INTRODUCTION

This emission test is a part of a comprehensive study to determine a regulatory strategy for lead emissions from stationary sources. The entire project is referred to as the preferred standards path analysis on lead. The purpose of this preferred standards path analysis is to recommend a statutory and regulatory course of action for the control of stationary sources of lead emissions. The recommendations must be based on a thorough assessment of the pollutant effects and emissions as related to the Clean Air Act of 1970, as amended. If it is decided that a regulatory program is desirable, there are three available options for developing standards: Section 109-110, "Ambient Air Quality Standards," Section 111, "New Source Performance Standards," accompanied by state standards for existing sources, and Section 112, "Hazardous Pollutant Standards."

A well defined emission inventory, which is not at this time available, is vital to the development of a regulatory strategy for lead. Such an inventory will define the extent of the problem by identifying the major lead emitters, quantifying the emissions from these sources, and determining the extent and effectiveness of presently employed general particulate control technology for lead.

— A preliminary emission inventory of lead sources was developed through EPA contract to determine from the literature and plant data the nature, magnitude and extent of industrial lead emissions to the atmosphere in the United States in 1970. However, only a small amount of the data was

supported by emission testing. A listing of industries for emission testing has been compiled by EPA, based on information supplied by the emissions inventory. Cable covering plants are on this list. The emission data gathered during the testing program will be used to determine the nature and extent of lead emissions from stationary sources, i.e., whether a problem exists in the industry, and if so, the nature and extent of the problem. The data will also be used to help determine the degree to which particulate standards are effective in controlling lead emissions. Finally, emission data can be used in conjunction with other information on number and location of plants, trends in lead usage, growth rates, and affected populations, to determine which industries are of highest priority for regulation.

This report presents the results of the emission testing which was performed by Midwest Research Institute at the General Electric wire and cable facility in Bridgeport, Connecticut. The tests were 2-hr particulate emission tests using the equipment conforming with the Federal Register, Volume 36, No. 159 (17 August 1971). The wire and cable facility was not operating to capacity during the week of emission testing. However, the plant coordinated its production with the emission tests. During testing, both lead presses were operating. When the test was over at least one of the presses was shut down so that the plant would have cable to process the next day. Three stacks were sampled simultaneously for all tests.

At the General Electric wire and cable plant, twisted cable is covered with rubber or synthetic coatings, then passed through one of two lead presses, where a lead coating is applied for curing purposes.

If the coating is rubber, the rubber is vulcanized by heating the lead-covered cable to 350°F. The lead serves two purposes; it acts as a conductor of heat and also as an applier of pressure during vulcanization. After vulcanization or polymerization of the coating, the cable is cooled and the lead removed in a continuous cutter. The lead is recycled back to the lead pots where it is remelted and applied to fresh cable. The ventilation system consists of three ducts with in-line fans to remove the particulate and lead vapors from the lead pots, presses and associated equipment. Measured pollutant emissions from the lead press operation consist of particulates, lead, lead oxide, and carbon dioxide.

The three stacks and the equipment they vent are shown in Figure 1. Stack A (20-in. diameter) vents both presses, one lead pot, the dross kettle, and the hopper and feeder for lead; Stack B (14-in. diameter) vents the pot for the Perrille press; and Stack C (12-in. diameter) vents the pit under the Perrille press. The purpose of this pit is to catch any lead that leaks out of the Perrille press and also to catch floor debris. A hopper and feeder is located above each lead pot and the dross kettle. The hoppers and feeders were intentionally omitted from the drawing.

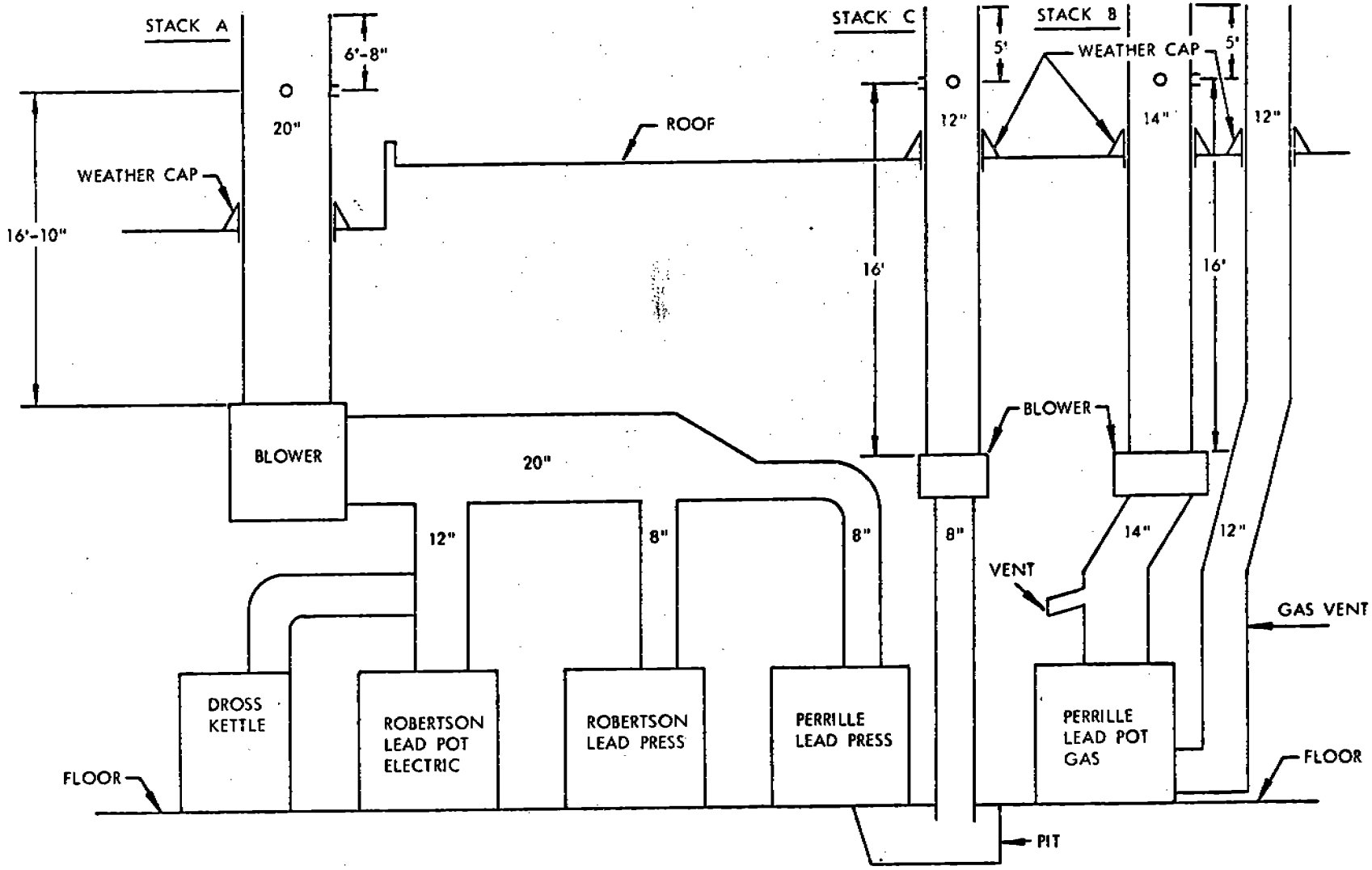


Figure 1 - Location of Sampling Points in Lead-Press Ventilating System

The following sections of the report treat: (1) the summary and discussion of results; (2) description and operation of the process; and (3) sampling and analytical procedures.

III. SUMMARY AND DISCUSSION OF RESULTS

Tables I, II, III, and IV present a summary of particulate and lead emission results from the emission testing on the lead press operation. Total particulate emissions were sampled, and the samples analyzed for lead content. Table I contains the results of the three tests on the A stack and also shows the moisture and Orsat analysis for the stack. The particulate emissions total catch vary from 0.135 lb/hr (0.0612 kg/hr) to 0.231 lb/hr (0.105 kg/hr), with an average for all three tests of 0.179 lb/hr (0.0813 kg/hr).

The Orsat and moisture analysis for A stack show an average of 2.1% water, 0.4% CO_2 and 20.8% O_2 with no detectable CO. The lead emissions for the three tests averaged 0.0192 lb/hr (0.00872 kg/hr) with 0.00177 lb/hr (0.000804 kg/hr) for Test 1, 0.0291 lb/hr (0.0132 kg/hr) for Test 2, and 0.0266 lb/hr (0.0121 kg/hr) for Test 3.

The dross kettle which is vented by Stack A did not operate during the first test. The lead is drossed once each shift for about 1 to 2 hr. Drossing was finished before we started Test No. 1. The effect of the dross kettle on lead emissions is pronounced. Both Tests 2 and 3 showed a large increase (a factor of 15) in lead emissions over Test No. 1.

TABLE I

SUMMARY OF RESULTS - STACK A

NAME	DESCRIPTION	UNITS	A1	A2	A3	UNITS	METRIC VALUES A1	A2	A3
	DATE OF RUN		06-26-73	06-27-73	06-28-73				
QS	STK FLOWRATE, DRY,STD CN	DSCFM	4818	4987	4961	DNM3/M	136.3	141.1	140.4
QA	ACTUAL STACK FLOWRATE	ACFM	5202	5333	5405	M3/M	147.2	150.9	152.9
PMOS	PERCENT MOISTURE BY VOL		1.9	2.1	2.3				
PCO2	PERCENT CO2 BY VOL, DRY		.4	.4	.4				
PO2	PERCENT O2 BY VOL, DRY		20.8	20.8	20.6				
PCO	PERCENT CO BY VOL, DRY		0.0	0.0	0.0				
PARTICULATES -- PARTIAL CATCH									
MF	PARTICULATE WT-PARTIAL	MG	20.91	13.20	13.08				
CAN	PART. LOAD-PTL,STD CN	GR/DSCF	.00383	.00227	.00232	MG/NM3	8.77	5.20	5.31
CAT	PART. LOAD-PTL,STK CN	GR/ACF	.00354	.00213	.00213	MG/M3	8.11	4.88	4.88
CAW	PARTIC EMIS-PARTIAL	LB/HR	.158	.0972	.0985	KG/HR	.0717	.0441	.0447
PARTICULATES -- TOTAL CATCH									
MT	PARTICULATE WT-TOTAL	MG	30.55	23.12	17.90				
CAO	PART. LOAD-TTL,STD CN	GR/DSCF	.00559	.00390	.00317	MG/NM3	12.8	9.11	7.26
CAU	PART. LOAD-TTL,STK CN	GR/ACF	.00518	.00372	.00291	MG/M3	11.9	8.52	6.66
CAX	PARTIC EMIS-TOTAL	LB/HR	.231	.170	.135	KG/HR	.105	.0771	.0612
IC	PERC IMPINGER CATCH		31.6	42.9	26.9				
LEAD	-- PARTIAL CATCH								
MF	LEAD WT-PARTIAL	MG	.22	3.95	3.53				
CAN	LEAD LOAD-PTL,STD CN	GR/DSCF	.00004010	.000680	.000625	MG/NM3	.0918	1.56	1.43
CAT	LEAD LOAD-PTL,STK CN	GR/ACF	.0000371	.000636	.000573	MG/M3	.0849	1.46	1.31
CAW	LEAD EMIS-PARTIAL	LB/HR	.00165	.0291	.0266	KG/HR	.000749	.0132	.0120
LEAD	-- TOTAL CATCH								
MT	LEAD WT-TOTAL	MG	.23	3.95	3.54				
CAO	LEAD LOAD-- TTL,STD CN	GR/DSCF	.0000428	.000682	.00627	MG/NM3	.0980	1.56	1.44
CAU	LEAD LOAD-TTL,STK CN	GR/ACF	.0000397	.000637	.000575	MG/M3	.0909	1.46	1.32
CAX	LEAD EMIS-TOTAL	LB/HR	.00177	.0291	.0266	KG/HR	.000803	.0132	.0121
IC	PERC IMPINGER CATCH		6.4	.2	.4				
	PERCENT LEAD PTL. PARTIC.		1.05	29.9	26.99	AVE 19.3			
	PERCENT LEAD TTL. PARTIC.		.75	17.1	19.78	AVE 12.5			

TABLE II

SUMMARY OF RESULTS - STACK B

NAME	DESCRIPTION	UNITS	B1	B2	B3	METRIC UNITS	METRIC B1	METRIC B2	METRIC B3
	DATE OF RUN		06-26-73	06-27-73	06-28-73				
QS	STK FLOWRATE, DRY,STD CN	DSCFM	1903	2175	2047	DNM3/MIN	53.9	61.6	57.9
QA	ACTUAL STACK FLOWRATE	ACFM	2040	2322	2208	M3/MIN	57.7	65.7	62.5
PMOS	PERCENT MOISTURE BY VOL		1.1	2.4	2.4				
PCO2	PERCENT CO2 BY VOL, DRY		.4	.4	.4				
PO2	PERCENT O2 BY VOL, DRY		20.8	20.8	20.8				
PCO	PERCENT CO BY VOL, DRY		0.0	0.0	0.0				
PARTICULATES -- PARTIAL CATCH									
MF	PARTICULATE WT-PARTIAL	MG	25.78	16.07	26.89				
CAN	PART. LOAD-PTL,STD CN	GR/DSCF	.00560	.00320	.00567	MG/NM3	12.8	7.33	12.98
CAT	PART. LOAD-PTL,STK CN	GR/ACF	.00522	.00300	.00525	MG/M3	11.9	6.87	12.02
CAW	PARTIC EMIS-PARTIAL	LB/HR	.0913	.0597	.0994	KG/HR	.0414	.0271	.0451
PARTICULATES -- TOTAL CATCH									
MT	PARTICULATE WT-TOTAL	MG	36.07	24.07	31.97				
CAO	PART. LOAD-TTL,STD CN	GR/DSCF	.00784	.00480	.00674	MG/NM3	17.9	10.99	15.4
CAU	PART. LOAD-TTL,STK CN	GR/ACF	.00730	.00449	.00625	MG/M3	16.7	10.3	14.3
CAX	PARTIC EMIS-TOTAL	LB/HR	.128	.0894	.118	KG/HR	.0581	.0406	.0535
IC	PERC IMPINGER CATCH		28.5	33.2	15.9				
LEAD	-- PARTIAL CATCH								
MF	LEAD WT-PARTIAL	MG	4.80	4.86	10.73				
CAN	LEAD LOAD-PTL,STD CN	GR/DSCF	.00104	.000969	.00226	MG/NM3	2.38	2.22	5.17
CAT	LEAD LOAD-PTL,STK CN	GR/ACF	.000971	.000907	.00210	MG/M3	2.22	2.08	4.81
CAW	LEAD EMIS-PARTIAL	LB/HR	.0170	.0181	.0397	KG/HR	.00771	.00821	.0180
LEAD	-- TOTAL CATCH								
MT	LEAD WT-TOTAL	MG	4.81	4.88	10.75				
CAO	LEAD LOAD-TTL,STD CN	GR/DSCF	.00104	.000973	.00227	MG/NM3	2.38	2.23	5.20
CAU	LEAD LOAD-TTL,STK CN	GR/ACF	.000973	.000911	.00210	MG/M3	2.23	2.09	4.81
CAX	LEAD EMIS-TOTAL	LB/HR	.0170	.0181	.0398	KG/HR	.00771	.00821	.0180
IC	PERC IMPINGER CATCH		.2	.3	.2				
	PERCENT LEAD PTL.		18.6	30.2	39.97	AVE	29.6		
	PERCENT LEAD TTL.		13.3	20.3	33.6	AVE	22.4		

TABLE III

SUMMARY OF RESULTS - STACK C

NAME	DESCRIPTION	UNITS	C1	C2	C3	UNITS	METRIC VALUES C1	C2	C3
	DATE OF RUN		06-26-73	06-27-73	06-28-73				
QS	STK FLOWRATE, DRY,STD CN	DSCFM	356	479	398	DNM3/MIN	10.1	13.6	11.3
QA	ACTUAL STACK FLOWRATE	ACFM	374	472	409	M3/MIN	10.6	13.4	11.6
PMOS	PERCENT MOISTURE BY VOL		.7	2.0	2.2				
PCO2	PERCENT CO2 BY VOL, DRY		0.0	0.0	0.0				
PO2	PERCENT O2 BY VOL, DRY		20.8	20.8	20.8				
PCO	PERCENT CO BY VOL, DRY		0.0	0.0	0.0				
PARTICULATES -- PARTIAL CATCH									
MF	PARTICULATE WT-PARTIAL	MG	12.90	7.33	6.65				
CAN	PART. LOAD-PTL,STD CN	GR/DSCF	.00265	.00131	.00127	MG/NM3	6.07	3.00	2.91
CAT	PART. LOAD-PTL,STK CN	GR/ACF	.00253	.00133	.00123	MG/M3	5.79	3.05	2.82
CAW	PARTIC EMIS-PARTIAL	LB/HR	.00808	.00538	.00433	KG/HR	.00367	.00244	.00196
PARTICULATES -- TOTAL CATCH									
MT	PARTICULATE WT-TOTAL	MG	20.09	16.82	9.58				
CAO	PART. LOAD-TTL,STD CN	GR/DSCF	.00413	.00301	.00183	MG/NM3	9.46	6.89	4.19
CAU	PART. LOAD-TTL,STK CN	GR/ACF	.00393	.00306	.00178	MG/M3	9.00	7.01	4.08
CAX	PARTIC EMIS-TOTAL	LB/HR	.0126	.0124	.00624	KG/HR	.00571	.00562	.00283
IC	PERC IMPINGER CATCH		35.8	56.4	30.6				
LEAD	-- PARTIAL CATCH								
MF	LEAD WT-PARTIAL	MG	.02	.40	.16	MG/NM3	.00943	.166	.0687
CAN	LEAD LOAD-PTL,STD CN	GR/DSCF	.00000412	.0000726	.0000300	MG/M3	.00895	.169	.0666
CAT	LEAD LOAD-PTL,STK CN	GR/ACF	.00000391	.0000737	.0000291	KG/HR	.00000572	.000135	.0000463
CAW	LEAD EMIS-PARTIAL	LB/HR	.0000126	.000298	.000102				
LEAD	-- TOTAL CATCH								
MT	LEAD WT-TOTAL	MG	.04	.41	.17				
CAO	LEAD LOAD-TTL,STD CN	GR/DSCF	.00000741	.0000744	.0000317	MG/NM3	.0170	.170	.0726
CAU	LEAD LOAD-TTL,STK CN	GR/ACF	.00000705	.0000755	.0000308	MG/M3	.0161	.173	.0705
CAX	LEAD EMIS-TOTAL	LB/HR	.0000226	.000305	.000108	KG/HR	.0000103	.000138	.0000490
IC	PERC IMPINGER CATCH		44.4	2.4	5.4				
	PERCENT LEAD PTL.		.155	5.46	2.44	AVE	2.685		
	PERCENT LEAD TTL.		.199	2.44	1.77	AVE	1.47		

Table II contains the emission, moisture, and gas data for the B stack. This stack vents the Perrille lead melt pot, which is gas-fired and operates at a temperature of 800°F. The particulate emissions averaged 0.112 lb/hr (0.0508 kg/hr) with an emission rate of 0.128 lb/hr (0.0581 kg/hr) for Test 1, 0.0894 lb/hr (0.0406 kg/hr) for Test 2, and 0.118 lb/hr (0.0535 kg/hr) for Test 3. The process rate applicable to the B and C stacks was 1.02 tons/hr (0.925 metric ton/hr), Test 1; 1.23 tons/hr (1.12 metric tons/hr), Test 2; and 0.68 ton/hr (0.617 metric ton/hr), Test No. 3. (See Section IV and Appendix B for details.) The particulate emissions per ton of lead processed were 0.125 lb/ton (0.0628 kg/metric ton) for Test No. 1, 0.0727 lb/ton (0.0363 kg/metric ton), Test No. 2; and 0.173 lb/ton (0.0867 kg/metric ton) for Test No. 3, with an average of 0.124 lb/ton (0.0619 kg/metric ton). The Orsat and moisture analysis for B stack show an average of 1.97% water, 0.4% CO_2, and 20.8% O_2, with no detectable CO.

The lead emissions for the three tests average 0.0250 lb/hr (0.0113 kg/hr) with the following emissions: Test 1, 0.0170 lb/hr (0.00771 kg/hr); Test 2, 0.0181 lb/hr (0.00821 kg/hr); Test 3, 0.0397 lb/hr (0.0180 kg/hr). The lead emissions per ton of lead processed averaged 0.0299 lb/ton (0.0150 kg/metric ton) with the following lead emissions: Test 1, 0.0167 lb/ton (0.00834 kg/metric ton); Test 2, 0.0147 lb/ton (0.00733 kg/metric ton); and Test 3, 0.0584 lb/ton (0.0293 kg/metric ton).

Table III contains the results of the three emission tests on C stack and also shows the moisture and Orsat analysis. The average

moisture was 1.63% and the Orsat analysis of C stack showed an average of 20.8% O_2 with no detectable CO_2 or CO. The particulate emissions are: Test 1, 0.0126 lb/hr (0.00571 kg/hr). Test 2, 0.0124 lb/hr (0.00562 kg/hr); Test 3, 0.00624 lb/hr (0.00283 kg/hr); and the average of all three tests, 0.0104 lb/hr (0.00472 ~~0.00459~~ kg/hr). The lead emissions for C stack are: Test 1, 0.0000226 lb/hr (0.0000103 kg/hr); Test 2, 0.000305 lb/hr (0.000138 kg/hr); Test 3, 0.000108 lb/hr (0.0000490 kg/hr); and the average, 0.000145 lb/hr (0.0000659 kg/hr).

Table No. IV contains the total emissions for all three tests. The total particulate emissions are: Test No. 1, 0.372 lb/hr (0.169 kg/hr); Test No. 2, 0.272 lb/hr (0.123 kg/hr); and Test No. 3, 0.259 lb/hr (0.117 kg/hr). The total lead emissions for each test are: Test No. 1, 0.0188 lb/hr (0.0085 kg/hr); Test No. 2, 0.0475 lb/hr (0.0215 kg/hr); and Test No. 3, 0.0665 lb/hr (0.0302 kg/hr). The lead processed was: Test No. 1, 0.896 ton/hr (0.813 metric ton/hr); Test No. 2, 1.061 tons/hr (0.963 metric ton/hr); and Test No. 3, 1.009 tons/hr (0.915 metric ton/hr). The total particulate emissions per ton of lead processed are: Test No. 1, 0.415 lb/ton (0.208 kg/metric ton); Test No. 2, 0.256 lb/ton (0.128 kg/metric ton); and Test No. 3, 0.257 lb/ton (0.128 kg/metric ton). The total lead emissions per ton of lead processed are: Test No. 1, 0.0210 lb/ton (0.0105 kg/metric ton); Test No. 2, 0.0448 lb/ton (0.0223 kg/metric ton); and Test No. 3, 0.0658 lb/ton (0.0329 kg/metric ton). The percent lead in the partial particulate catch for all three tests is: Test No. 1, 7.19%

TABLE IV

TOTAL EMISSIONS FOR EACH TEST

Description	Units	Tests 1	Tests 2	Tests 3	Metric Units	Tests 1	Tests 2	Tests 3
Particulate PTL	lb/hr	0.257	0.162	0.202	kg/hr	0.117	0.0735	0.0916
Particulate TTL	lb/hr	0.372	0.272	0.259	kg/hr	0.169	0.123	0.117
Lead PTL	lb/hr	0.0187	0.0475	0.0664	kg/hr	0.00848	0.0215	0.0301
Lead TTL	lb/hr	0.0188	0.0475	0.0665	kg/hr	0.00853	0.0215	0.0302
Lead Usage	tons/hr	0.896	1.061	1.009	metric tons/hr	0.813	0.963	0.915
Particulate PTL	lb/ton	0.287	0.153	0.200	kg/metric ton	0.144	0.0763	0.100
Particulate TTL	lb/ton	0.415	0.256	0.257	kg/metric ton	0.208	0.128	0.128
Lead PTL	lb/ton	0.0209	0.0448	0.0658	kg/metric ton	0.0104	0.0223	0.0329
Lead TTL	lb/ton	0.0210	0.0448	0.0658	kg/metric ton	0.0105	0.0223	0.0329
Lead PTL	%	7.19	28.9	32.6	-	--	--	--
Lead TTL	%	4.99	17.2	25.6	-	--	--	--

Avg. Part. PTL	lb/ton	0.213	kg/metric ton	0.107
Avg. Part. TTL	lb/ton	0.309	kg/metric ton	0.155
Avg. Lead PTL	lb/ton	0.0438	kg/metric ton	0.0219
Avg. Lead TTL	lb/ton	0.0439	kg/metric ton	0.0219

Test No. 2, 28.9%, and Test No. 3, 32.6%. The percent lead in the total particulate catch is: Test No. 1, 4.99%, Test No. 2, 17.2%, and Test No. 3, 25.6%.

The average particulate emission factors for all three tests are: partial, 0.213 lb/ton (0.107 kg/metric ton); total, 0.309 lb/ton (0.155 kg/metric ton). The average lead emissions for all three tests are: partial, 0.0438 lb/ton (0.0219 kg/metric ton); total, 0.0439 lb/ton (0.0219 kg/metric ton).

Total lead processed for the four days, Monday through Thursday, amounted to 184,300 lb, or 92.15 tons--an average production of 23 tons/day. Approximately 1% of this figure, or 1,843 lb, was used for center check starts, etc. The center check starts and other wasted lead are collected and returned to the lead pots for reuse.

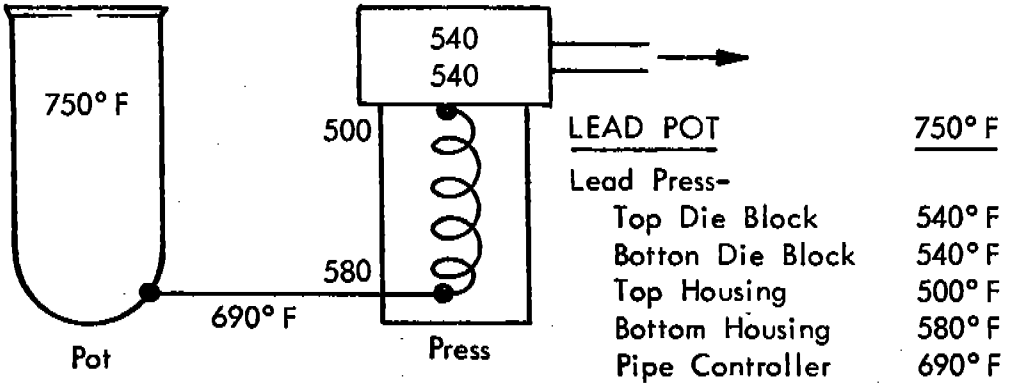
The production figures for the preceding week showed that 223,202 lb or 111.6 tons of lead were processed in 5 days, yielding about the same daily average of 23 tons/day of lead processed.

IV. PROCESS DESCRIPTION AND OPERATION

The lead press process is designed to use a lead covering for curing insulation on wire and cable. Twisted or stranded cable is covered with either rubber or polymer coatings for insulation. In order to assist in vulcanizing the rubber or completing the cross-linking of the polymer, a lead covering is continuously extruded onto the cable. The cable is on

large cable reels and is fed into the lead press continuously. Figure 2 shows the temperature profiles in both lead melting pots and both lead presses. As can be seen from this figure, the Perrille press requires a higher operating temperature as well as a higher melt pot temperature than the Robertson press. The Perrille press has a different screw with closer clearances and requires the higher temperature to maintain a softer lead until extrusion is complete.

After the lead sheath is applied, the cable is rerolled on reels and then put into a live steam oven for heating. If the covering is rubber, the oven temperature is 350°f for vulcanization. When polymer insulation is used the oven temperature is 210-250°F. When the insulation is cured, the lead covered cable is cooled to water (70°F) temperature and the lead sheath removed in a continuous stripping machine. The temperature of the lead is maintained at 70°F during stripping by spraying cooling water directly on the lead as it is being stripped. The stripped lead is recycled back to the hopper, which feeds the lead melting pots. A hooded belt-conveyor system, vented to the outside through a separate stack which was not tested, carries the lead from the stripping machines to the hoppers. Once each shift the melt pots are drossed, material skimmed off the top, and the dross is put into a dross kettle. When enough dross has been collected, it is sent to a lead refiner that custom refines the lead for a fee and returns pure lead to the lead-press operation. The dross kettle did not operate during Test No. 1. The dross kettle did operate during Tests Nos. 2 and 3 and contributed a significant lead emission.



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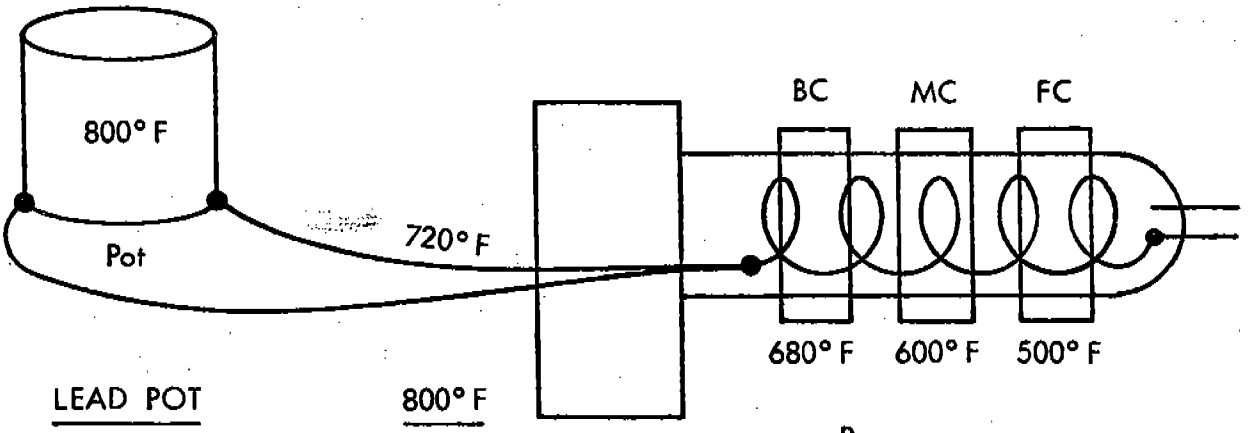

PERRILLE

Figure 2 - Temperature Distribution in Lead Presses

The ventilating system at this plant is very good. No lead vapors have been observed or caught in State Board of Health sampling in the press building.

The process operations applicable to the operation of the lead press are:

1. Feeding of lead from hopper to melt pot.[1/]
2. Lead melting in either a gas or electric fired pot.[1/]
3. Pumping of molten lead to a continuous press.[1/]
4. Feeding of insulated cable to the lead press.
5. Continuous coating of the cable with a lead sheath.[1/]
6. Cooling of lead sheath by water sprays.
7. Vulcanization of rubber or polymerization of synthetic insulation by heating in an oven.
8. Cooling of lead-covered insulation with water sprays to 70°F.
9. Stripping of lead from cable in a continuous stripper which[2/] is water cooled.
10. Recycling lead to storage hopper.[1/]
11. Drossing of lead in dross kettle.[1/]

1/ The above operations were vented to the atmosphere through the three stacks that we tested.

2/ The stripping machine operating at 70°F has a separate exhaust to the roof. We did not sample this stack because there was no visible particulate emission coming from this stack during the presurvey or while testing proceeded. Examination of the stack showed that there was no buildup of particulate on the sides. There was such a visible buildup on the three stacks we sampled.

There are two complete installations at this plant. One line uses a Robertson press and the other line a Perrille press. The operation results for the week we tested are in Appendix B.

V. SAMPLING AND ANALYTICAL PROCEDURES

A. Location of Sampling Points

Figure 1 (p. 4) shows the location of the sampling points for this task. There were two ports (3-in. holes) at 90 degrees in each of the three stacks. The sampling ports for all three stacks were located about 10-12 diameters from the nearest upstream disturbance and over 4 diameters from the outlet to the atmosphere or the nearest downstream disturbance. The stacks exhausted through the roof of the wire and cable plant.

The ductwork and stacks were made of galvanized steel with a thickness of 1/16 in., and each stack had an inline exhaust fan.

B. Sampling Procedures

Twelve points were calculated from the traverse point chart, but because all stacks were less than 2 ft in diameter, two thirds of the calculated number or eight points were sampled in each stack, four points on a diameter.[1/] Each point was sampled for 15 min with readings taken every 5 min.

Table V shows the recalculated points for each stack and were the points used in this emission testing program.

1/ Federal Register, 36, 247, 23 December 1971.

TABLE V

LOCATION OF SAMPLING POINTS

Stack	Diameter (in.)	Point No.	Distance (in.)	Wall Thickness (in.)	Use (in.)
A	20	1	1- 3/8	1/16	1- 7/16
		2	5	1/16	5- 1/16
		3	15	1/16	15- 1/16
		4	18- 5/8	1/16	18-11/16
B	14	1	1	1/16	1- 1/16
		2	3- 1/2	1/16	3- 9/16
		3	10- 1/2	1/16	10- 9/16
		4	13	1/16	13- 1/16
C	12	1	1	1/16	1- 1/16
		2	3	1/16	3- 1/16
		3	9	1/16	9- 1/16
		4	11	1/16	11- 1/16

For the particulate and lead sampling, the Research Appliance Company[1/] Model 2343 "Staksamplr" equipment was used. The sampling train meets the specifications of the Federal Register, 36, 159 (17 August 1971). Three stacks, A, B, and C were sampled simultaneously for 2 hr for each test. Preliminary measurements were made on each stack to determine approximate temperature and velocity profiles. Due to processing conditions, 2% moisture was assumed for each stack.

The Orsat samples were taken by using a stainless-steel probe which contained a glass wool filter. The probe was inserted to point 2 of each stack, and gas samples were pumped directly into the Orsat analyzer for 5 min to purge the probe line and Orsat. Three analyses were made on each stack for each test, and each analysis lasted 5 min.

C. Analytical Procedures

The particulate analysis was accomplished using the procedures in the Federal Register, 36(159), 15,715-15,716 (17 August 1971).

After the samples were analyzed for particulates, the solid residue was digested in 10 ml boiling Aqua Regia for 1-3 hr with reflux. The liquid was cooled, diluted to 50 ml with distilled water and analyzed for lead on the atomic absorption spectrophotometer. The filters were handled in the same manner.

The stack gases were withdrawn from the stack into the Orsat analyzer. A 24-in. stainless-steel probe with a glass wool filter was placed in one port of each of the three stacks at sample point No. 2. The probe and

1/ Mention of a specific company or product does not constitute endorsement by EPA.

lines as well as the analyzer were purged with stack gas before analysis was started. Three analyses were taken from each stack on each test. All three stacks were sampled during the emission test by using the port at 90 degrees from the port into which the emission probe was inserted. Three analyses for oxygen, carbon dioxide, and carbon monoxide were run on each stack.