Background Report Reference

AP-42 Section Number: 12.11

Background Chapter: 2

Reference Number: 25

Title: Letter

Leiby, R.A.

PES

June 1992

TWX 510-651-3297

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EAST PENN manufacturing co., inc.

MAIN OFFICE
LYON STATION, PA. 19536
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June 19, 1992

Mr. Brahim Richani
Pacific Environmental Services, Inc.
3708 Mayfair Street, Suite 202
Durham, North Carolina 27707

Dear Sir:

In response to your request of June 5, 1992, to Mr. Robert Steinwurtzel of Andrews & Kurth, East Penn Manufacturing is supplying the following data as it relates to our secondary lead operations. This information is being supplied for your work in updating EPA's emission factors referred to as AP-42.

The attached flow sheet and process description are of our present operations and have been modeled after the descriptions presently contained in AP-42. Also, attached is recent stack testing performed on our facility.

Since the reverberatory and blast furnace gases are combined prior to the air pollution control equipment, our description is a reverb/blast combination. Initial testing of the system while employing acrylic bags in the process baghouse yielded the results contained in Item 1. Since that time, we have installed goretex membrane on goretex fabric bags in this baghouse. We have done this for bag cleaning purposes since the dust produced is very "sticky" in nature. We have not tested the lead emission rates for these new bags. We would expect to obtain similar results to the change in the emission rates for the kettles (as shown in Item 3), one order of magnitude.

Item Number 2 details the particulate and SO_2 emissions data from the scrubber which is in series after the baghouse. The particulate data does not correlate to the operation of the baghouse, but to the operation of the scrubber. We employ ammonia for SO_2 removal in order to produce a saleable product, ammonium bisulfite. This process has the draw back of producing finely divided particulate and requires the addition of mist elimination elements after the scrubbing. Our particulate discharge therefore

is inordinately high when compared to the lead emissions. The process does, however, exhibit excellent scrubbing efficiencies.

Item Number 3 details the emission rates for lead from the ventilation of refining kettles adjacent to the reverberatory furnace. As can be seen, the change from polyester to gortex membrane on polyester fabric bags resulted in a decrease in emissions by more than one order of magnitude.

We do not have any other emissions data with regards to pollutants listed under Title III of the Clean Air Act Amendments.

If I can answer any questions or be of further assistance, please contact me at the above phone number.

Sincerely,

R.A. Leiby, Jr.
Manager Metals Division

RAL/pn

cc: K. Pike
D. Wojton\T. Greiss
R. Steinwurtzel - Andrews & Kurth

East Penn Manufacturing Co., Inc.
Secondary Lead Processing
Process Description

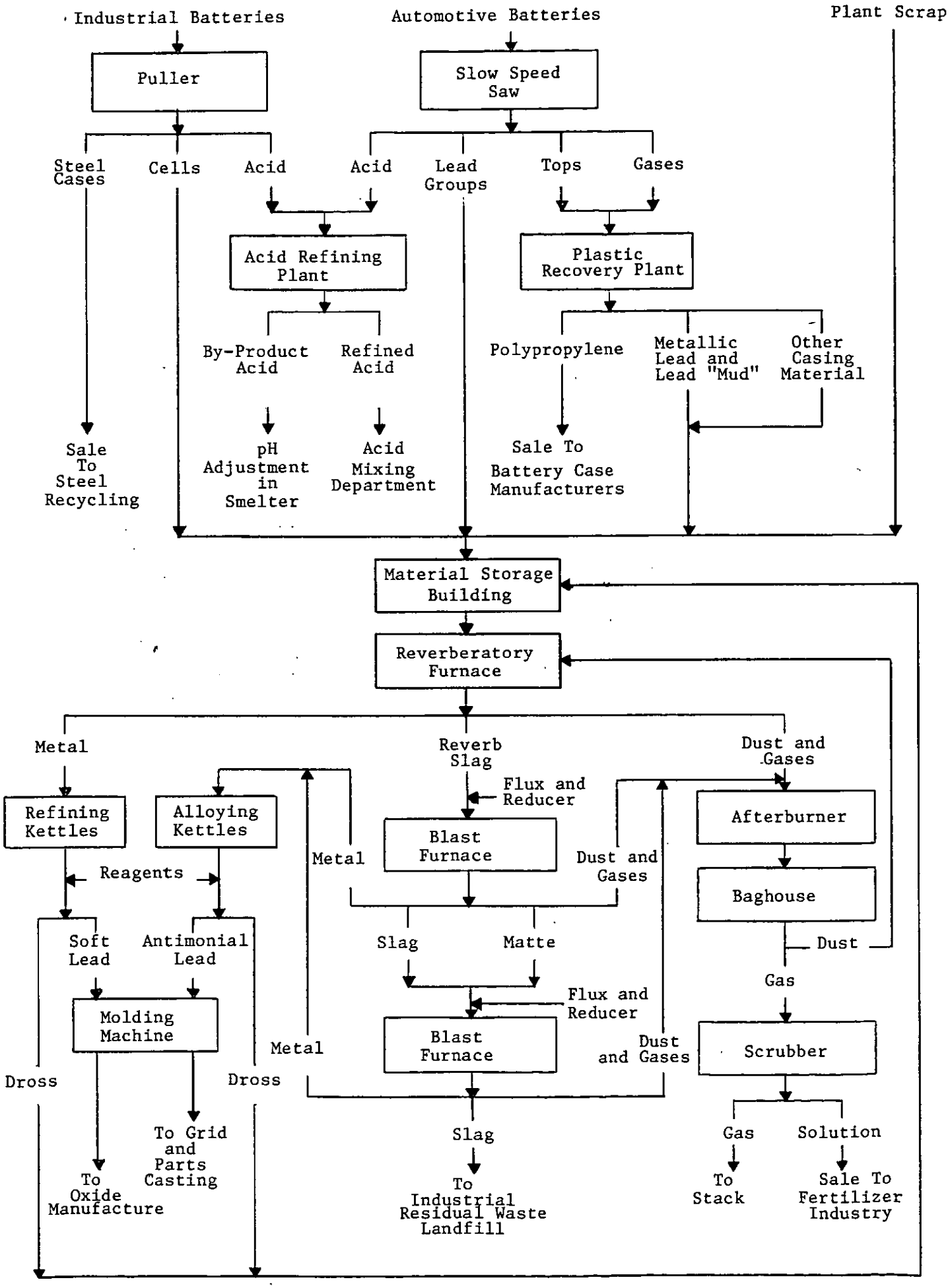
East Penn's secondary lead smelter processes a variety of lead bearing scrap and residue to produce lead and lead alloys for the manufacture of battery lead oxide and battery parts.

Scrap pretreatment is battery breaking which consists of the automated sawing and dumping of automatoive batteries to segregate the batteries into the components of acid, lead groups, and cases. The acid is settled and reclaimed via a patented process. The cases are crushed, washed, and sink floated to yield polypropylene for recycling into new battery cases and lead bearing materials which are commingled with the lead groups for processing in a reverberatory furnace. Industrial batteries are manually dismantled into cases, acid, and lead groups. This acid is also reclaimed and the groups become feed stock for the furnaces.

The lead groups and other lead bearing materials (i.e. kettle drosses and plant scrap) are smelted in a reverberatory furnace which is a rectangular steel shell lined with refractory. It is direct fired by 4 oxyfuel American Combustion burners fired by propane to a temperature in excess of 2300°F. The smelting process melts the metallic lead and reduces the lead sulfate present to either metallic lead or lead oxide.

The furnace can produce approximately 150 tons of metal bullion per day. Approximately 33% of the charge is recovered as slag (principally lead oxide) and later smelted in the blast furnace. Approximately 7% escapes as dust or fume to be returned directly to the reverb furnace in a closed loop. The balance (60%) is recovered as soft lead containing less than 0.5% antimony.

The blast furnace smelts reverberatory slag, drosses, and other lead bearing materials into antimonial or hard lead bullion containing anywhere from 1 to 8% antimony dependent upon the feed stocks. The furnace utilizes scrap cast iron (about 8% of the charge), coke (about 4%), limestone (about 3%), and returned siliceous slag (about 4%) as fuel and flux. Our processing capacity is 75 to 100 tons per day dependent upon feed materials. Similar to an iron cupola, the blast furnace is a water jacketed steel shell with a refractory lined crucible for a bottom. Combustion air in the range of 1000 ACFM at 1.875 to 2.5 pounds per square inch is introduced through tuyeres at the bottom of the furnace. The carbon present in the coke serves to both melt the charge and reduce the lead compounds to metallic lead. The iron serves to combine with some of the sulphur and to reduce lead loses in the slag. Limestone serves to control the pH of the resultant slag and the iron-silica-calcium levels are maintained to produce a low melting, fluid discard slag.


Industrial Batteries
Automotive Batteries
Plant Scrap
Puller
Slow Speed Saw
Steel Cases
Cells
Acid
Acid
Lead Groups
Tops
Gases
Acid Refining Plant
Plastic Recovery Plant
By-Product Acid
Refined Acid
Polypropylene
Metallic Lead and Lead "Mud"
Other Casing Material
Sale To Steel Recycling
pH Adjustment in Smelter
Acid Mixing Department
Sale To Battery Case Manufacturers
Material Storage Building
Reverberatory Furnace
Metal
Reverb Slag
Dust and Gases
Flux and Reducer
Refining Kettles
Alloying Kettles
Blast Furnace
Afterburner
Metal
Dust and Gases
Reagents
Baghouse
Soft Lead
Antimonial Lead
Slag
Matte
Dust
Gas
Flux and Reducer
Molding Machine
Blast Furnace
Scrubber
Metal
Dust and Gases
Dross
Dross
To Grid and Parts Casting
To Oxide Manufacture
Slag
Gas
Solution
To Industrial Residual Waste Landfill
To Stack
Sale To Fertilizer Industry

Approximately 15% of the total weight of metal bullion recovered from the reverberatory and blast furnace is the amount of slag produced. The weight of dust and fume generated from the blast furnace is approximately 5% of the weight of bullion produced by the blast furnace.

Refining and casting is the use of kettle type furnaces for remelting, alloying, and refining. These furnaces are propane fired and operate at temperatures ranging from 650 to 950°F. Alloying is done by additions of antimony, arsenic, tin, copper, sulfur, and calcium to meet certain specifications. Refining is the process of removing elements such as antimony, copper, nickel, tellurium and other elements to produce soft lead. Specific fluxes and reagents such as sodium nitrate, sodium hydroxide, or sulfur may be used to create dresses containing the element desired to be removed.

Air Pollution Controls:

The battery breaking operations are locally ventilated by a Xerxes Corporation 738-M packed bed scrubber with a Heilex-EB mist eliminator capable of handling 27,000 ACFM @2.5" of water. This unit is used to control acid mist emissions from the battery breaking process.

The blast furnace and reverberatory furnace gases are commingled at the exit from the reverberatory furnace and enter an afterburner chamber. The afterburner is maintained at a minimum of 1400°F with a retention time of 2.5 secs and is equipped with a 7.0 million Btu/Hr burner to operate if the temperatures go below 1400°F. The design volume is for 30,000 ACFM at 1400°F.

The gases are then evaporatively cooled to 1200°F and radiantly cooled to approximately 500°F. Local ventilation gases from around the furnace are introduced and the gases are cooled to 250°F, prior to entering the baghouse.

The baghouse is a Wheelabrator Model 171 Series 5S eight module dust tube dust collector size 1622. It will filter 89,000 ACFM @250°F assuming one cell is off line for cleaning. The baghouse has 6 cells dedicated to filtering process gases and two cells dedicated to filtering refinery gases. The process cells are equipped with goretex membranae on goretex fabric bags while the refining cells are equipped with goretex membranae on woven polyester bags. The air to cloth ratio is approximately 1.5:1. All dust collected from the baghouse is conveyed directly back to the reverberatory furnace in closed screw conveyors.

In series after the baghouse is a fiberglass scrubber for the removal of SO_2. The scrubber utilizes ammonia for the production of ammonium bisulfite as a saleable product.

The scrubber gases then pass through a Monsanto Enviro-Chem Mist Eliminator Series HE+ designed to handle 61,000 ACFM @120°F. This fiberglass unit employs 60 polyester media elements equipped with polyropylene prefilters to remove any particulate generated by the scrubber prior to discharge of the gases.

SO_2 emissions are continuously monitored by a TECO Model 40 Analyzer equipped with a model 900 sample conditioner. The unit is equipped with data logging capabilities for computation of hourly averages.

EAST PENN MANUFACTURING CO. INC
LYONS, PA

SECONDARY LEAD PROCESSING
STACK TESTING RESULTS

1. REVERB/BLAST FURNACE COMBINATION
CONVENTIONAL BAGS (ACRYLIC) AND AMMONIA SCRUBBING

LEAD EMMISIONS: (2-8-90)

DSCFM	ACFM	TEMP	% MOIST	GR/DSCF	LBS/HR
39628	47767	129	5.2	0.00011	0.036
34284	46790	130	15.9	0.00019	0.055
34460	46478	134	14.2	0.00019	0.056

REVERB PERFORMANCE 4.5 TONS/HR
BLAST PERFORMANCE 3.2 TONS/HR

2. REVERB/BLAST FURNACE COMBINATION
AMMONIA SCRUBBING AND MIST ELIMINATORS

PARTICULATE, VISIBLE, AND SO2 (8-1-91 AND 8-2-91)

DSCFM	ACFM	TEMP	% MOIST	PARTICULATE GR/DSCF	PaDER GR/DSCF	VISIBLE	SO2 PPM INLET	PPM OUTLET	LBS/HR INLET	LBS/HR OUTLET	% REMOVAL EFFICIENCY
28191	35599	132	11.2	0.0059	0.020	0.0	1247	117	356.69	32.89	90.8
29283	38458	138	14.0	0.0037	0.027	3.0	1516	10	435.72	2.95	99.3
31594	39933	131	11.6	0.0103	0.015	1.0	1456	31	444.04	8.39	98.1

8-1-91
REVERB PERFORMANCE 8.1 TONS/HR
BLAST PERFORMANCE 3.0 TONS/HR

8-2-91
REVERB PERFORMANCE 7.8 TONS/HR
BLAST PERFORMANCE 3.7 TONS/HR

3. REVERB KETTLES VENTILATION
CONVENTIONAL BAGS (POLYESTER)

LEAD EMMISSIONS: (2-8-90)

DSCFM	ACFM	TEMP	% MOIST	GR/DSCF	LBS/HR
11391	12311	97	0.9	0.00028	0.028
9515	12603	202	2.9	0.00070	0.057
10314	13760	204	3.2	0.00261	0.054

GORTEX MEMBRANE ON POLYESTER BAGS

LEAD EMMISSIONS: (6-7-90)

DSCFM	ACFM	TEMP	% MOIST	GR/DSCF	LBS/HR
15171	19811	209	2.8	0.000035	0.0046
16252	20064	202	2.3	0.000017	0.0024
14758	18558	178	3.9	0.000030	0.0038