57 William Street,
New York, N.Y.

February 24, 1927.

Mr. C. V. Drew, 2nd Vice-Pres.,
Cerro de Pasco Copper Corporation,
44 Wall Street, New York, N. Y.

Dear Sir:

In accordance with instructions from your Vice-President, Mr. Edward H. Clark, I submit herewith my report of the estimated costs of constructing and operating an electrolytic lead refinery. These estimates are for a plant with a monthly capacity of 1500 tons of lead bullion of approximately the following analysis:-

Bismuth	1.25	per cent
Arsenic	0.50	" "
Antimony	0.50	" "
Silver	200	ounces per ton.

A summary of the report follows on the next pages and does not include the land value.

TOTAL COST OF PLANT EXCLUDING LAND

	Building.	Equipment.	Total.
Office	$26,750	$ 11,054	$ 37,813
Tank House and Casting Building	79,004	171,033	250,037
Annexes to above	16,658	23,235	39,893
Silver Refinery Plant	26,670	47,709	74,379
Parting Plant	23,123	20,211	43,334
Hydrofluoric Acid Plant	7,986	10,203	18,189
Hydrofluosilicic Acid Plant	5,099	6,530	11,629
Stores Building	9,305	777	10,082
Shops Building	11,614	8,972	20,586
Blast Furnace Plant	2,543	17,858	20,401
Flue and Cottrell System	10,085	35,000	45,085
Misc. Buildings, sewers, pipe lines	57,670		57,670
Power Plant	24,544	124,756	149,300
Dock and Industrial Track	14,053	18,010	32,063
Tank House Electrolyte		26,981	26,981
Parting Plant Electrolyte		4,980	4,980
Fire Sprinkler Equipment		12,140	12,140
Totals	$315,113	$539,449	$854,562
Contingencies 10%			85,456
Total			$940,018
Consulting Engineer's Services,			40,000
Engineering Field Force,			20,000
Grand Total,			$1,000,018
Say			$1,000,000

SUMMARY OF OPERATING COSTS.

1500 Tons Bullion Monthly

	Total,	Cost per Ton of Bullion
Anode Casting	$ 1,683	$ 1.122
Tank House	9,341	6.227
Silver Refinery	6,105	4.070
Parting Plant	1,304	.870
Refined Bar Casting	1,700	1.133
General Expense	3,185	2.123
Laboratory Expense	891	.594
Yard, Stores and Shops	1,350	.900
Blast Furnace Antimonial	442	.295
Industrial Transportation	790	.527
Direct Operating Cost	$26,791	$ 17,861
Taxes	2,125	1.417
Fire Insurance	115	.077
Compensation Insurance	355	.236
Metal Loss	1,308	.872
Metal Inventory Expense	500	.333
Depreciation	4,167	2.778
Indirect Operating Cost	$ 8,570	$ 5.713
Total Cost of Refining	$ 35,361	$23.574

If Credits are Applied to Operating Costs

Credits: Assume 10,000 pounds of Bismuth could be sold at $1 per pound	$10,000	$ 6.667
Cost of Refining would be	$24,641	$16.427

METAL RECOVERIES: Lead 99.25 per cent yielding 1408 tons Refined Lead and 33.9 tons in Antimonial Lead. Silver 100 per cent recovery on uncorrected assay basis. Antimony and Bismuth each 80 per cent recovery yielding 12000 pounds of Antimony and 30000 pounds of Bismuth.

CONCLUSIONS: The plant investment is large due to a Power Plant of small output, to the receiving and delivering of products via lighters, and to various buildings and equipment which could handle the work of a large plant without a material further increase in investment. The investment would be considerably less if low cost power were available, and if the plant were operated in conjunction with another plant so that joint use could be made of office, shops, stores, industrial tracks and other facilities.

The direct operating costs are as to be expected for a plant of this size, and would be less for a larger plant practically only in the matter of supervision. The indirect operating costs on the other hand would be materially decreased with a larger plant on account of a lesser proportionate increase in the investment. The cost of power is the direct cost and amortization is included in the depreciation charge.

The electrolytic refining of the bullion resulting from smelting your fluedust seems the proper procedure to recover its lead, silver, and bismuth contents and, depending upon the amount of bismuth which can be sold and upon its sales price, it might prove to be low cost refining.

Respectfully submitted,

(Signed) Frank F. Colcord.

CONSTRUCTION DATA.

Wage Scale for 8 Hour Day.

Carpenters,	$11.20
Electricians,	12.00
Masons,	14.00
Masons Helpers	9.00
Painters,	11.00
Plumbers,	14.00
Helpers from	7.00
to	9.00
Rough Labor,	5.40

Raw Material Prices.

Prices F.O.B. Location

Hard burned red brick,	$17 per M.
Yellow Pine #1 Carloads from Mill	$40 to $70 per M.B.F.
Cement	62¢ per sack.
Graded Sand	$2.25 per Cu. Yd.
Graded Gravel,	3.00 per Cu. Yd.
Steel Structure	5¢ per pound.

OFFICE-LABORATORY-COMFORT STATION-RESTAURANT.

Two Story Brick Building
120' long X 32' wide X 25' high

Building.	Labor.	Material.	Total.	Units.
Excavation	$ 144	$ --	$ 144	144 cu.yds
Foundation	355	524	879	71 " "
Concrete Floor	633	396	1029	3600 sq.ft.
Steel Structure	---	---	---	
Masonry	5765	2560	8325	140 M.
Carpentry & Plastering	2058	4153	6211	
Heating	268	2325	2593	
Plumbing	625	2365	2990	
Electric Wiring and Painting	470	628	1098	
Totals,	$10.318	$12,951	$23,269	
Contractor's Profit 15%.			3,490	
Total,			$26,759	

Equipment

Office,	$3,365
Laboratory,	3,200
Comfort Station,	2,625
Restaurant,	1,338
Total,	$10,528
Contractor's Profit 5%	526
Total,	$11,054

Total Building and Equipment, $37,813

TANK HOUSE & CASTING BUILDING.

One Story Steel and Brick Building.
324' long X 72' wide X 34' high-Oart Cellar.

Building.	Labor.	Material.	Total.	Units.
Excavation	$ 4,453	$ ---	$ 4,453	5393 cu.Yds.
Foundation	2,822	4,240	7,062	574 " "
Concrete Floor	2,338	3,480	5,818	20476 Sqft
Steel Structure	---			
Masonry	15,045			
Carpentry	1,748			
Heating				
Plumbing	1,486			
Electric Light Wiring and				
Painting	910			
Totals	$28,802	$39,897	$68,699	
Contractor's Profit 15%.			10,305	
Total			$79,004	

Equipment Tank House

Brick and Tar Floor,	$ 1,084	$1,833	$ 2,917	45 M.
Concrete Electrolytic Sections	4,209	26,506	30,715	32
Lining	5,760	2,531	8,291	32
Bus and Triangular Bars and Cross Rods	3,864	19,888	23,752	87870 lbs.
Anode, Cathode and Pump Tanks	1,132	4,011	5,143	
Pumps and Piping	672	6,635	7,307	
Aisles and Walks	1,106	1,139	2,245	
10 Ton Crane	302	7,366	7,668	
Miscellaneous	---	3,950	3,950	
~~Contractor's Profit 5%~~. Total,	$18,129	$73,859	$91,988	
Contractor's Profit 5%.			4,599	
			$96,587	

Equipment Casting Building

Kettles and Setting	$ 3,280	$11,354	$14,634	3
Anode Casting Wheel	1,504	16,276	17,780	1
Refined Lead Casting Wheel	2,596	12,108	14,704	1
Scales	435	7,665	8,100	3
10 Ton Crane	302	7,366	7,668	1
Miscellaneous	804	7,211	8,015	
Totals,	$ 8,921	$61,980	$70,901	
Contractor's Profit 5%.			3,545	
Total			74,446	

Total Building and Equipment $250,037

TANK HOUSE ELECTROLYTE CIRCULATION BUILDING.

One 2 Story Brick Building

80' long X 23' wide X 28' high-With Cella r

Building	Labor.	Material.	Total.	Units.
Excavation	$ 678	$ --	$ 678	848 cu.Yds
Foundation	469	723	1,192	98 " "
Concrete Floor	329	202	531	1980 sq.ft.
Steel Structure		331	331	1624 lbs.
Masonry	2,276	959	3,235	54 M
Carpentry	135	516	651	
Heating	25	50	75	
Plumbing	--	--	--	
Electric Light Wiring and Painting	52	40	92	
Totals,	$3,964	$2,821	$6,785	

Equipment

Brick and Tar Floor,	$ 191	$ 366	$ 557	8.7 M
Tanks abd Trestles,	1,457	3,766	5,223	
Pumps and Piping,	1,047	4,122	5,169	
Totals,	$ 2,695	$8,254	$10,949	

Included in Tank House and Casting Building Annexes.

TANK HOUSE AND CASTING BUILDING ANNEXES

Buildings.	Labor.	Material.	Total.
Electrolyte Circulation	$3,964	$ 2,821	$ 6,785
Refrigerating	659	562	1,221
Heating	653	498	1,151
Loading Dock and Shed	935	1,245	2,180
Open Storage Shed	432	1,094	1,526
Dross Furnace	971	651	1,622
Totals	$7,614	$ 6,871	$14,485
Contractor's Profit 15%			2,173
Total.			$16,658

Equipment	Labor.	Material.	Total.
Electrolyte Circulation,	$2,695	$ 8,254	$10,949
Refrigerating	865	4,150	5,015
Heating,		5,240	5,240
Dross Furnace,		925	925
Totals,	$3,560	$18,569	$22,129
Contractor's Profit 5%			1,106
Total,			$23,235

Total Building and Equipment, $39,893

SILVER REFINERY BUILDING AND PART OF FLUE

One Storey Brick Building
120' long X 50' wide X 22' high.

One Story Brick and Steel Building
40' long X 26' wide X 20' high.

One Brick and Tile Flue
70' long x 12' wide X 12' high.

Buildings.	Labor.	Material.	Total.	Units.
Excavation	$ 182	$ ----	182	182 cu.yds.
Foundation	522	783	1,305	106 " "
Concrete Floors	1,373	877	2,250	7880 Sq.ft.
Steelwork		1,627	1,627	28299 lbs.
Masonry	8,332	5,638	13,970	139 M
Carpentry	654	1,578	2,232	
Heating	141	460	601	
Plumbing	208	489	697	
Electric Light Wiring and Painting	181	146	327	
Totals,	$11,593	$11,598	$23,191	
Contractor's Profit 15%			3,479	
Total,			$26,670	
Equipment	$ 8,338	$37,099	$45,437	
Contractor's Profit 5%			2,272	
Total,			$47,709	

Total Buildings and Equipment $74,379

PARTING PLANT BUILDING

One Story Brick Building
100' long X 50' wide X 10' high

Building.	Labor.	Material.	Total.	Units.
Excavation	$ 111	$ --	$ 111	111 cu.yds.
Foundation	353	533	886	72 " "
Concrete Floor	873	550	1,423	5000 sq.ft.
Steel Structure	---	2,100	2,100	42000 lbs.
Masonry	4,439	3,067	7,506	92 M
Carpentry	1,005	4,921	5,926	
Heating	150	1,350	1,500	
Plumbing	205	295	500	
Electric Light Wiring and Painting	80	75	155	
Totals,	$7,216	$12,891	$20,107	
Contractor's Profit 15%			3,016	
Total,			$23,123	

Equipment				
Cells	$ 1,809	$ 2,093	$ 3,902	48
Electrial	1,015	3,964	4,979	
Tanks	510	1,070	1,580	
Gold Room	375	2,799	3,174	
Silver Furnace	150	430	580	
Miscellaneous	1,225	3,809	5,034	
Totals	$5,084	$14,165	$19,249	
Contractor's Profits 5%.			962	
Total			$20,211	

Total Building and Equipment, $43,334

HYDROFLUORIC ACID PLANT BLDG& DOCK.

One Story Brick Bldg.
65' long X 30' wide X 22' high

Building.	Labor.	Material.	Total.	Units.
Excavation	$ 71	$ --	$ 71	71 cu.yds.
Foundation	311	465	776	63 " "
Concrete Floor	425	286	711	2500 sq.ft.
Steel Structure	---	424	424	8476 lbs.
Masonry	2,757	1,125	3,882	66 M
Carpentry	257	669	926	
Heating	--	--	--	
Plumbing	22	37	59	
Electric Wiring and Painting	46	49	95	
Totals,	$3,889	$3,055	$6,944	
Contractor's Profit 15%			1,042	
Total,			$7,986	

Equipment

Retorts and Condensers,	$ 747	$3,813	$4,560
Sulphuric Acid Tank, etc.	109	950	1,059
Bins, Elevator and Miscellaneous	745	3,353	4,098
Totals,	$1,601	$8,116	$9,717
Contractor's Profit 5%			486
Total,			$10,203

Total Building and Equipment $18,189

HYDROFLUOSILICIC ACID STORAGE BUILDING

One Storey Brick Building
42' long x 35' wide x 17' high.

Building.	Labor.	Material.	Total.	Units.
Excavation	$ 43	$ --	$ 43	43 cu.yds.
Foundation	161	244	405	33 " "
Concrete Floor,	170	250	420	1470 " "
Steel Structure	---	346	346	6912 lbs.
Masonry	1792	714	2506	42 M
Carpentry	152	448	600	
Heating	---	---	---	
Plumbing	8	14	22	
Electric Light Wiring and Painting	48	44	92	
Totals,	$2374	$2060	$4434	
Carpenter's Profit 15%			665	
Total			$5099	

Equipment				
Wood and lead tanks, pumps, pipes, trestle, etc.,	$ 1316	$4903	$6219	
Totals,	$ 1316	$4903	$6219	
Contractor's Profit 5%			311	
			$6530	

Total Building and Equipment $11,629

STORES BUILDING.

One Story Brick Building
120' long x 30' wide x 15' high.

Building.	Labor.	Material.	Total.	
Excavation,	$ 83	$	$ 83	83 cu.yd
Foundation	246	369	615	50 " "
Concrete Floor	627	393	1,020	3600 sq.ft
Steel Structure	--	795	795	15900 lbs.
Masonry	2,698	1,095	3,793	64 M
Carpentry	275	944	1,219	
Heating	25	222	247	
Plumbing	36	128	164	
Electrical Wiring and Painting	85	70	155	
Totals,	$ 4,075	$4,016	$8,091	
Carpenter's Profit 15%			1,214	
Total			$9,305	

Equipment				
Racks, bins office, etc.	$ 200	$ 540	$ 740	
Totals,	$ 200	$ 540	$ 740	
Contractor's Profit 5%			37	
Total			$ 777	

Total Building and Equipment $10,082

SHOPS BUILDING.

One Story Brick Building.
140' long x 30' wide x 15' high.

Building	Labor.	Material.	Total.	Units
Excavation	$ 101	$ --	$ 101	101 cu.Yds
Foundation	287	428	715	58 " "
Concrete Floor	759	479	1,238	4200 sq.ft.
Steel Structure	--	936	936	18720 lbs.
Masonry	3,114	1,268	4,382	75 M
Carpentry	314	1,112	1,426	
Heating	336	500	836	
Plumbing	50	185	235	
Electrical Wiring and	47	73	120	
Painting	70	40	110	
Totals,	$5,078	$5,021	$10,099	
Contractor's Profit 15%			1,515	
Total,			$11,614	

Equipment

Lathe, Shaper, Drill Presses				
Pipe Machines, Wood-working				
Machines, etc.	$960	$7,585	$8,545	
Totals,	$960	$7,585	$8,545	
Contractor's Profit 5%			427	
Total			$8,972	

Total Building and Equipment $20,586

BLAST FURNACE BUILDING

Two Story Structural Steel and Galvanized Iron Building - 30' long x 26' wide x 24' high.

Building.	Labor.	Material.	Total.	Units.
Excavation	$ 11	$ --	$ 11	11 cu.yds.
Foundation	14	22	36	3 " "
Concrete Floor	272	172	444	1170 sq.ft.
Steel Structure	--	697	697	13550 lbs.
Carpentry	324	527	851	
Heating	--	--	--	
Plumbing	10	17	27	
Electric Wirong	40	30	70	
Painting	45	30	75	
Totals	$ 716	$1,495	$2,211	
Contractor's Profit 15%			332	
Total			$2,543	

Equipment				
Blast Furnace	$ 1,190	$ 6,000	$ 7,190	
Blower and Motor	150	950	1,100	
Skip with Motor	319	2,359	2,678	
Kettles, Slag Pots, etc.	286	3,972	4,258	
Bins and Runways	748	669	1,417	
Tools and Misc.		365	365	
Totals,	$ 2,693	$14,315	$17,008	
Contractor's Profit 5%			850	
Total			$17,858	

Total Building and Equipment $20,401

SILVER REFINERY AND BLAST FURNACE FLUE and COTTRELL INSTALLATION.

Flue 240' long, bee-hive type, steel stack 100' high and Cottrell Installation.

Flue and Stack	Labor.	Material.	Total.
Flue, Dust Blocks, Stack, etc.,	$ 2,821	$5,949	$8,770
Totals,	$ 2,821	$5,949	$8,770
Contractor's Profit 15%			1,315
Total,			$10,085

Equipment.	
Cottrell installed	$35,000
Total	$35,000

Total Building and Equipment	$45,085

MISCELLANEOUS BUILDINGS, SEWERS, PIPE LINES, ETC.

Building	Labor.	Material.	Total.
Lumber Shed	$ 105	$ 245	$ 350
General Laboratory	280	401	681
Oil Tanks and Piping	1,085	4,869	5,954
Compressed Air and Lines	748	3,863	4,611
Fire Protection System	1,410	7,755	9,165
Steam Lines	252	1,427	1,697
Power Distribution Lines	383	817	1,200
Sewers	3,484	2,492	5,976
City Water Lines,	547	514	1,061
Salt Water Lines	385	705	1,090
Water Cooling Pond,	2,069	1,294	3,363
Pond Pump and Lines	220	1,392	1,612
Concrete Walks	1,326	858	2,184
Fence	611	2,299	2,910
Broad Gauge Track Excluding Power House Track	775	2,537	3,312
General Grading	5,000	--	5,000
	$18,680	$31,468	$50,148
Contractor's Profit 15%			7,522
Total,			$57,670

Total Buildings and Equipment $57,670

PURCHASED POWER BUILDING AND EQUIPMENT.

One Story Brick Building
60' long x 26' wide x 20' high
Primary 4150 volts.

Building	Labor.	Material.	Total.	Units
Excavation	$ 54	$ --	$ 54	54 cu.yds
Foundation	178	244	422	33 " "
Concrete Floors	280	172	452	1560 sq.ft.
Steel Structure	---	318	318	6360 lbs.
Masonry	2,500	1,020	3,520	60 M
Carpentry	122	446	568	
Plumbing	60	105	165	
Electric Light Wiring and Painting	42	42	84	
Totals	$3,236	$2,347	$5,583	
Contractor's Profit 15%			838	
Total			$6,421	

Equipment

Primary Transformers	$ 10,373	$ 10,373	
Switch House	1,760	1,760	
Transmission Line,etc.	625	625	
Total	$ 12,758	$ 12,758	
Contractor's Profit 5%		638	
Total Primary Transformers		$ 13,396	
Total Electrical Equipment from Previous page		$ 23,600	
Boiler for Plant Heating		$ 1,975	1-60 HP
		$ 45,392	
Total Building and Equipment		$ 45,392	
Contingencies 10%		$ 4,539	
Total for Comparison of Power Costs		$ 49,931	

POWER HOUSE.
One Two Story Brick and Steel Building
100' long x 36' wide x 42' high.

Building.	Labor.	Material.	Total.	Units.
Excavation	$ 87	$ --~~xx~~	$ 87	87 cu.yds
Foundation	325	459	784	32 " "
Concrete Floor	872	1,254	2,126	8310 sq.ft.
Steel Structure	--	2,517	2,517	50367 lbs.
Masonry	8,938	3,791	12,729	223 M
Carpentry	420	1,665	2,085	
Plumbing	250	465	715	
Electric Light Wiring and Painting	200	100	300	
Totals,	$11,092	$10,251	$21,343	
Contractor's Profit 15%			3,201	
			$24,544	

Equipment.

Boilers, Stokers, Superheaters, Stack, etc.	$52,730	2-300 HP
B. G. Track and Trestle	6,600	
Miscellaneous	1,400	
Total	$60,730	
Contractor's Profit 5%	3,036	
Total Boiler Room	$63,766	
Turbine-Generator	$17,800	1-500 KW
Condensor and Accessories	12,700	
Crane	3,000	
Miscellaneous	2,110	
Total	$35,610	
Contractor's Profit 5%	1,780	
Total Turbo-Generator	$37,390	
Motor-Generator Set	$11,600	1-300 KW
Switchboard	3,945	
Switches and Oil Breakers	2,424	
Transformers	995	3-50 KVA
Transformer	199	1-7 1/2 KVA
Miscellaneous	3,313	
Total	$22,476	
Contractor's Profit 5%	1,124	
Total Electrical Equipment	$23,600	
Total Cost Power House	$149,300	
Contingencies 10%	14,930	
Total for Comparison of Power Costs,	$164,230	

DOCK, INDUSTRIAL TRACK, AND EQUIPMENT.

Dock 40' long x 20' wide
Track 1840' length and 36" gauge.
30 pound rails.

Building.	Labor.	Material.	Total.	Units.
Dredging	$ --	$ 2,000	$ 2,000	4000 cu.yds
Dock and Approaches	--	5,840	5,840	
Track	662	2,606	3,268	
Round House	396	716	1,112	
Totals,	$ 1,058	$11,162	$12,220	
Contractor's Profit,			1,833	
			$14,053	

Equipment				
Hoist and Jib Crane	$ 380	$ 3,505	$ 3,885	
Storage Battery Locomotive	--	6,600	6,600	
Trucks	--	5,176	5,176	
Totals,	$ 380	$15,281	$15,661	
Contractor's Profit 15%			2,349	
Total			$18,010	

Total Building and Equipment $32,063

TANK HOUSE ELECTROLYTE.

106450 lbs. of 100% Hydrofluosilicic Acid at 14.7 ¢ per lb.	=	$15,648
93155 lbs. of White Lead at 10.35¢ per pound	=	9,642
Apparatus and Labor,	=	1,691
		$26,981

White Lead at 10.35¢ based on 8¢ lead price.

PARTING PLANT ELECTROLYTE.

7716 ounces of Silver	at	60¢	$4629
529 pounds of Copper	at	14¢	74
3546 pounds of Nitric Acid	at	5¢	177
Labor			100
			$4980

SPRINKLER FIRE PROTECTION SYSTEM.

Maximum 745 Heads at $12	$8940
Water Mains,	3200
Total	$12140

OPERATING COSTS.

The departmental costs are based on the units treated, and in the General Summary of Costs on the tons of bullion treated. Work done by one department for another department, is included in the latter's costs. For instance, the cost of making starting sheets is charged to the tank house. The treatment of drosses or by-products is charged to the department in which they originate. Departments whose costs do not appear in the summary are called subsidiary departments.

A list of the Main and Subsidiary Operating Departments follows:-

Main Departments.	Subsidiary Departments.
Anode Casting	Power Plant
Silver Refinery	Starting Sheets
Parting Plant	Hydrofluosilicic Acid.
Refined Bar Casting	
General Expense	
Laboratory	
Yard, Stores and Shops	
Blast Furnace.	
Industrial Transportation	

TAXES AND INSURANCE: These items cover taxes on property, and fire and compensation insurance, and consequently would vary with the location in which the plant is situated.

METAL LOSSES: The lead loss is taken at 15 pounds per ton of lead in bullion at a price of six cents per pound for foreign lead. The United States government would fix a wastage loss

for the plant so that no duty would have to be paid on the lead lost in process. There should be a gain in silver if the assaying is done on an uncorrected basis, while on a corrected basis there might be a slight loss. No value has therefore been given to metal loss or gain on silver. Gold should show neither loss nor gain. The whole question of metal loss and gain depends greatly upon sampling and assaying methods, and can be only determined accurately by actual practice.

METAL INTEREST: Refined lead should be produced in 30 days time and silver and gold in 70 days time, unless large stocks of bullion are carried on hand to provide against interruptions in the delivery of bullion. A regularity of bullion shipments has been assumed and, therefore, there is no metal interest item.

INVENTORY EXPENSE: This covers the cost of taking a careful metal inventory each year and is especially important in the first year of operation, to check metallurgical work.

DEPRECIATION: A period of 20 years for amortization of the plant has been taken, giving an annual charge of 5% of the investment.

SUMMARY: This shows the cost per ton of treating bullion of the analysis given and includes the cost of producing refined bismuth. Credits to the operating costs may be made for the amountsrealized in the sale of refined bismuth and of antimony in antimonial lead. The policy of the company will determine whether these items should be credited or not, but it seems that they should be, as only by this process can bismuth be recovered

and a good grade of lead be produced from such a bullion. Likewise, antimony should be a credit, as the cost of its production is charged to operating costs.

METALLURGICAL DATA:

METAL BALANCE

	Lead Tons.	Silver Ounces.	Antimony Pounds.	Bismuth Pounds.
Contents of 1500 tons Bullion	1452.8	300,000	15,000	37,500
Contents lost	10.9		3,000	7,500
Contents recovered	1441.9	300,000	12,000	30,000
As Refined Lead	1408.0			
In Antimonial Lead	33.9			

Lead loss 0.75 per cent on lead contents.

TANK HOUSE.

Acid Loss 10 pounds of 100 per cent Hydrofluosilicic Acid per ton of Cathodes.

Production of Lead in Tank House, 14 pounds per kilowatt-hour.

OPERATING DATA:

Coal 1¢ buys 60,000 BTU in coal as received			
Coke	per ton	$7.60	delivered
Oil 28/32 deg.Baumè	per gal.	.062	"
Fluorspar ground	per ton	38,00	
Sulphuric Acid 66 deg.	per ton	15.00	
Water	per M. cu. ft.	1.70	
Labor 9 hrs-yard	per day	4.50	
Semi-skilled	per day	4.95	
to		6.30	
Mechanics 8 hrs.	per day	6.00	
to		6.40	
Firemen 8 hrs.	per day	5.20	
Oilers 8 hrs.	per day	4.80	
Engineers 8 hrs.	per day	6.64	

ANODE CASTING DEPARTMENT COSTS.

Cover unloading Bullion at Casting Building Dock, Weighing, Sampling, Melting, Drossing, Remelting Scrap Anodes and Casting.

	Labor.	Material.	Total.
Labor and Supervision	$ 850	$ --	$ 850
Supplies	--	205	205
Repairs	101	480	581
Steam, Power, Light, Misc.	--	437	437
Fuel	--	283	283
Totals,	$ 951	$1405	$2356

Basis of Cost 2100 tons Anodes = $1.122 per ton.

Charged to -
Tank House 600 tons = $ 673
Summary 1500 " = 1683

TANK HOUSE DEPARTMENTAL COSTS.

Cover receiving Anodes, Electrolytic work, Delivering Cathodes to Refined Bar Department and Slimes to Silver Refinery.

	Labor.	Material.	Total.
Labor and Supervision,	$2862	$ --	$2862
Supplies,	--	215	215
Repairs,	274	263	537
Steam, Power, Light, Misc.	10	412	422
Electrolytic Power,		2213	2213
Acid Loss		2072	2072
Starting Sheets,		347	347
Recasting Scrap Anodes,		673	673
Totals,	$3146	$ 6195	$9341

Basis of Cost 1408 tons Cathodes = $6.634 per ton

Charged to Summary ## $9341

SILVER REFINERY DEPARTMENTAL COSTS.

Cover treatment of Slimes and Operation of Cottrell, producing Dore, Antimonial Lead Slag and Refined Bismuth.

Total Cost $6105 = $4.07 per ton bullion

Charged to Summary $6105.

PARTING PLANT DEPARTMENTAL COSTS.

Cover Treatment of Dore, Producing Refined Silver and Gold.

SILVER REFINING

	Labor.	Material.	Total.
Labor and Supervision,	$ 550	$ --	$ 550
Supplies	--	144	144
Repairs	100	95	195
Steam, Power, Light, Misc.	--	181	181
Fuel	--	60	60
Totals,	$ 650	$480	$1130

Basis of Cost 300,000 ounces silver = $3.766 per M ounces Delivered F. O. B. Plant.

GOLD REFINING.

	Labor.	Material.	Total.
Labor,	$ 54	---	$ 54
Supplies	--	49	49
Repairs	25	23	48
Steam, Power, Light, Misc.	--	23	23
Totals,	$ 79	$ 95	$174

Basis of Cost 2000 ounces Gold = 8.7¢ per ounce Delivered F. O. B. Plant.

Total Cost of Parting Plant Charged to Summary $1304

REFINED BAR CASTING DEPARTMENTAL COSTS.

Cover Melting of Cathodes, Drossing, Casting, Weighing and Loading Lead at Casting Building, Dock.

	Labor.	Material.	Total.
Labor and Supervision	$ 754	--	$ 754
Supplies,	--	65	65
Repairs,	53	240	293
Steam, Power, Light, Misc.	--	329	329
Fuel	--	259	259
Totals,	$ 807	$ 893	$1700

Basis of Cost 1408 tons Refined Lead = $1.207 per ton

Charged to Summary $1700

GENERAL EXPENSE COSTS.

Cover Wages and Supplies of Office, Management, Comfort Station, Restaurant, First Aid, Employees Service, Repairs to Building, etc.

	Labor.	Material.	Total.
Office,	$980	$ 45	$1025
Management	1333	--	1333
Comfort Station, Restaurant	--	--	--
First Aid, Employees Service	--	--	--
Repairs, Misc., etc.	450	283	733
Steam, Power and Light	--	94	94
Totals,	$2763	$422	$3185

Basis of Cost 1500 tons Bullion = $2.123 per ton

Charged to Summary $3185

LABORATORY COSTS.

Cover Wages, Supplies, Repairs, etc.

	Labor.	Material.	Total.
Labor and Supervision,	$ 675	$ 162	$837
Miscellaneous	--	42	42
Heat Power and Light	--	12	12
Totals,	$ 675	$ 216	$891

Basis of Cost 1500 tons Bullion = $0.594 per ton

Charged to Summary $891.

YARD, STORE AND SHOPS COSTS.

Covers Watching, Store and Shop Expense, General Plant Repairs, Loading Refined Lead from Storage, etc.

	Labor.	Material.	Total.
Watching	$ 400	$ --	$ 400
Store Expense,	170	25	195
Shop Expense,	156	44	200
Repairs and Miscellaneous	425	100	525
Loading Storage Lead,	30	--	30
Totals,	$1181	$169	$1350

Basis of Cost 1500 tons Bullion = $0.900 per ton

Charged to Summary $1350

BLAST FURNACE DEPARTMENTAL COSTS.

Covers Smelting of Antimonial Lead Slag and Silver Bearing By-Products and Part of Cottrell Costs.

ANTIMONIAL LEAD SLAG RUN.

	Labor.	Material.	Total.
Labor and Supervision,	$1784	$ --	$1784
Supplies,	--	68	68
Fluxes,		238	238
Repairs,	119	114	233
Steam, Power, Light, Misc.		112	112
Totals,	$1903	$ 1392	$3295

One run every 6 months.

Basis of Cost 342 tons Antimonial Lead Slag and Dross = $9.63 p.ton.

Charged to

Refined Bar Casting	per month	$107
Summery	per month	442

SILVER REFINING By-PRODUCTS RUN.

	Labor.	Materil.	Total.
Labor and Supervision	$1688	--	$1688
Supplies	--	95	95
Fluxes	--	222	222
Repairs	112	102	214
Fuel, Coke and Oil		808	808
Steam, Power, Light, Misc.		120	120
Totals,	$1800	$1347	$3147

One Run every Six months.

Basis of Cost 316 tons By-Products = $9.96 per ton

Charged to

Silver Refinery	per month	$202
Anode Casting	per month	323

INDUSTRIAL TRANSPORTATION TO AND FROM TIDE-WATER DOCKS COSTS.

Cover cost of Loading and Unloading Lighters and Transportation to and from Casting Building Loading Dock.

	Labor.	Material.	Total.
Labor and Supervision	$691	$ --	$691
Supplies,	--	8	8
Repairs to all Equipment	85	94	179
Steam, Power, Light, Misc.	-	23	23
Totals,	$776	$ 125	$901

Basis of Cost 1500 tons Bullion and 1440 tons Lead and Antimonial Lead = 30.6¢ per ton.

Rate of Loading and Unloading Lighters 167 tons per day.
This cost based on Loading and Unloading as separate operations, but it is assumed that 500 tons will be loaded during one unloading period without direct labor cost which is 22.1¢ per ton

Total	2940 tons	=	$901
Less	500 tons	=	111
	2440 tons	=	$790

Charged to Summary $790

PURCHASED POWER COSTS.

Data:- Demand 586.8 kw say 800 HP; Energy 373,392 KWH; Switchboard 317088 KWH.

Power Bill

Demand Charge

200 HP at $1.50		$300
200 HP at 1.35		270
400 HP at 1.20		480
		$1050

Energy Charge

3000 KWH at 3¢		$ 90
7000 KWH at 2¢		140
363392 KWH at 1¢		3634
Coal factor	373392 KWH at .056¢	209
		4073
Total		5123
Less 5%		256
		$4867

Cost AC per KWH 1.303¢

Operating.	Labor.	Material.	Total.
Labor and Supervision	$ 670	$ -	$670
Supplies,		40	40
Repairs,	25	25	50
Power	--	4867	4867
Totals,	$695	$ 4932	$5627

Cost - Switchboard per KWH 1.774¢

Alternative Power Proposition not used in Operating Costs.

STEAM GENERATED POWER COSTS.

Data:- 1¢ buys 60000 B.T.U. as received; Water $1.70 per 1000 cu. ft.; Boiler efficiency 75% without economizers; AC output per month 373,392 KWH; Switchboard output 317,088 KWH.

Boiler Room

	Labor.	Material.	Total.
Labor and Supervision,	$563	--	$ 563
Supplies	--	90	90
Repairs	105	110	215
Power		195	195
Fuel		1522	1522
Totals	$668	$1917	$2585

Basis of Cost 6,925 M pounds Steam = 37.33¢ per M.

Engine Room

	Labor.	Material.	Total.
Labor and Supervision	$1102	--	$1102
Supplies	--	40	40
Repairs,	55	60	115
Steam	--	2424	2424
Totals,	$1157	$2524	$3681
Less to Boiler Room,			194
			$3487

Cost AC	per KWH	.934¢
Cost Switchboard	per KWH	1.100¢

Basis of Cost 317,088 KWH = 1.100¢ per KWH

Power Plant Costs charged to other Departments and do not appear in the Summary.

REFINED BAR DROSS FURNACE COSTS.

Cover treatment of Refined Bar Dross.

	Labor.	Material.	Total.
Labor,	$ 45	$--	$ 45
Supplies, Repairs, Misc.,	5	22	10
Fuel		67	84
	$ 50	$ 89	$ 139

(3) E.7.B.

Basis of Cost 43.7 tons Dross = $3.18 per ton

Charged to Refined Bar Casting.

STARTING SHEETS COSTS.

Cover Cost of making Starting Sheets.

	Labor.	Material.	Total.
Labor and Supervision	$260	$ --	$260
Supplies, Repairs, Misc.	14	30	44
Fuel	--	43	43
	$274	$ 73	$347

Basis of Cost 19715 Sheets = $1.76 per 100 Sheets.

Charged to Tank House.

HYDROFLUOSILICIC ACID COSTS.

Covers cost of making Hydrofluoric Acid and converting it to Hydrofluosilicic Acid.

	Labor.	Material.	Total.
Labor and Supervision,	$602	$ --	$ 602
Supplies,	--	201	201
Fluorspar	--	575	575
Sulphuric Acid	--	274	274
Repairs,	140	193	333
Fuel	--	76	76
Steam, Power, Light, Misc.	--	11	11
Totals,	$742	$1330	$2072

Basis of Cost 14,084 pounds of 100% Hydrofluosilicic Acid = 14.7¢ per pound.

Charged to Tank House.

TAXES EXCLUSIVE OF LAND.

Actual Value	$1,000,000
Assumed Assessed Value,	600,000
Assumed Rate $4.20 per $100	
Taxes per Year	25,500
Taxes per month	2,125

FIRE INSURANCE.

Plant Cost		$1,000,000
Exclusions,		100,000
Insurable Value		$ 900,000
At 90% Co-insurance,		$ 810,000
Estimated Rate Unsprinkled	$0.50 per	$100
Estimated Rate Sprinkled	$0.17 per	$100
Premium Yearly Unsprinkled		$4050
Premium Yearly Sprinkled		1377
Yearly Saving on Sprinkled Risk		$2673
Cost Sprinkler System		$12140

Period to Amortize Sprinkler System disregarding interest about 4-1/2 years.

Fire Insurance per month, $115

WORKMENS' COMPENSATION INSURANCE.

Pay-Roll per month	$16,889
at estimated rate $2.10 per $100	355

METAL LOSS.

Lead Contents 1500 tons Bullion	1452.8 tons.
Lead Loss at 0.75 per cent	10.9 tons.
Lead Loss Value at 6¢ foreign lead price	$1308

United States Treasury Department would establish wastage figures for the plant.

METAL INVENTORY.

Yearly Cost,	$6000
Monthly Cost	$ 500

DEPRECIATION.

Cost $1,000,000 at 5% yearly,	$50,000
per Month,	$ 4,167