Ottawa, February 15, 1928

REPORT # 276
of the
ORE DRESSING AND METALLURGICAL LABORATORIES

Concentration of the lead-zinc ore of the Stirling Mine, Cape Breton, N.S.

C. S. Parsons

Shipment: Two small shipments of about 50 pounds were received October 14th. 1927 from the British Metal Corporation (Canada) Ltd. from the Stirling Mine, in Cape Breton, N.S.

Characteristics and Analysis: The samples consisted of a complex mixture of chalcopyrite, galena, sphalerite and pyrite, with small values in gold and silver finely disseminated and associated with an altered gangue containing magnesium and lime silicate minerals of a taley nature, and some quartz. Lot No. 1 represented the high grade ore and Lot No. 2 the low grade ore. Analysis:

	Lot No. 1 (high grade)	Lot No. 2 (Low grade)
Copper	0.49 %	0.50 %
Lead	4.02	1.16
Zinc	16.11	7.99
Gold	0.06 oz/ton	0.08 oz/ton
Silver	2.67 "	2.14 "
Iron	6.54 %	5.43 %

Purpose of Tests: It is necessary with such an ore to separate the lead and zinc, which are the principle values, and concentrate them into two products of marketable value, a lead concentrate for the lead smelter and a zinc concentrate for the zinc smelter. As much of the copper, gold, and silver values as possible should be recovered in the lead concentrate as the zinc smelter would not pay for those metals in the zinc concentrate. The samples were submitted for the purpose of having a series of preliminary tests made on the ore with the view of following with further tests on a

276

larger and more representative sample if the development at present being carried out on the ore deposit indicated ore bodies of commercial extent.

Experimental Tests: Most of the work was carried out on the low grade Lot No. 2. One test however was made on the high grade ore.

Lot No. 1 - High grade ore

Test No. 1

Product	Weight %	Assay Cu %	Pb %	Zn %	Au oz.	Ag oz	% of values Pb	Zn	Au	Ag
Lead conc.	11.1	0.71	27.61	11.81	0.28	9.56	64.9	8.05	54.0	38.59
Table conc	0.7	0.43	11.97	15.12			18.6	0.69		
Table tail	5.7	0.69	4.83	19.32	0.06	4.12	5.9	7.36	7.75	10.74
Zinc conc.	27.1	0.17	1.39	46.52	0.02	4.52	8.2	77.15	12.45	44.49
Tailing	55.4		0.25	1.98	0.02	0.31	2.4	6.75	25.8	6.2

1000 grams ore -14 mesh ground 45 mins in ball mill, the discharge approximately 80% -200 mesh.

Reagents - To ball mill: Soda ash 5 lb/ton; Cyanide 0.4 "
To lead cells: Aerofloat 0.2 lb/ton; C.T.C. 0.2 lb/ton
To zinc cells: Copper sulph 2 lb/t; Aerofloat 0.15 "
Cleaned lead concentrate with Aerofloat 0.1 lb/ton

Lot No. 2 - Low grade ore

Test No	Product	Weight %	Assay Cu %	Pb %	Zn %	Au oz.	Ag oz.	% of values Pb	Zn	Au	Ag
1	Lead conc.	10.02	0.5	8.75	3.79			75.7	5.1		
	Zinc "	17.50		1.36	35.43			20.5	81.8		
	Tailing	72.48		0.06	1.37			3.8	13.1		
	(Ore 1000 grams -14 mesh ground 45 mins. Discharge from mill approximately 80% -200 mesh)										
2	Lead conc.	13.7	2.45	7.09	7.46			80.0	12.9		
	Zinc "	17.0		1.06	38.23			14.9	82.7		
	Tailing	69.3		0.09	0.50			5.1	4.4		
	(Ore 1000 grams -14 mesh ground 60 mins. Discharge from mill approximately 90% -200 mesh)										
3	Lead conc.	16.2	0.98	3.72	5.43			52.7	11.3		
	Zinc "	22.7		2.16	28.18			43.0	82.7		
	Tailing	61.1		0.08	0.76			4.3	6.0		
	(Ore 1000 grams -14 mesh ground 60 mins. in ball mill)										
4	Lead conc.	13.9	0.30	6.89	4.49			82.7	7.9		
	Zinc conc.	21.0		0.80	31.91			14.5	84.9		
	Tailing	65.1		0.05	0.86			2.8	7.1		
	(Ore 1000 grams -14 mesh ground 45 mins. in ball mill)										
6	Talc conc.	4.7	0.24	1.56	1.56	0.10	1.82	6.2	0.9	5.9	4.5
	Lead conc.	8.3		10.66	6.06	0.16	7.54	74.9	6.6	16.4	32.7
	Zinc conc.	15.4		1.03	39.26	0.27	6.56	13.4	80.9	57.3	52.7
	Tailing	71.6		0.09	1.21	0.03	0.27	5.5	11.6	20.4	10.1
	(Ore 2000 grams -14 mesh ground 45 mins. in ball mill										
8	Talc conc.	6.8		0.61	2.31	0.07	2.67	3.8	2.0	7.5	8.4
	Lead conc.	3.6		23.74	6.73	1.04	32.88	75.7	2.9	57.3	54.2
	Zinc conc.	7.8		1.03	58.42	0.02	4.34	7.3	55.4	2.4	15.6
	Zinc midd.	7.6		1.32	32.27	0.08	3.18	9.2	30.1	9.6	11.2
	Tailing	74.2		0.06	1.07	0.02	0.31	4.0	9.6	23.2	10.6
	(Ore 1800 grams -14 mesh ground 45 mins in ball mill)										

Reagents used:

Test No. 1 -	To ball mill:	Soda ash	5 lb/ton
		Cyanide	0.25 "
	To Lead cell:	Aerofloat	0.2 "
	To Zinc cell:	Aerofloat	0.2 "
		Copper sulph	2 "
Test No. 2 -	To ball mill:	Soda ash	5 lb/ton
		Aerofloat	0.5 "
	To Lead cell:	Aerofloat	0.2 "
	To Zinc cell:	Copper sulph	2 "
		Aerofloat	0.2 "
Test No. 3 -	To ball mill:	Soda ash	5 lb/ton
		Cyanide	0.2 "
	To Lead cell:	TT	0.6 "
	To Zinc cell:	Copper sulph	2 "
		Aerofloat	0.2 "
Test No. 4 -	To ball mill:	Soda ash	2 lb/ton
		Cyanide	0.4 "
	To Lead cell:	Aerofloat	0.2 "
	To Zinc cell:	Copper sulph	2 "
		Xanthate	0.4 "
Test No. 6 -	To Ball mill:	Soda ash	5 lb/ton
		Cyanide	0.5 "
	To Lead cell	Aerofloat	0.2 "
	To Zinc cell:	Copper sulph	2 "
		Aerofloat	0.2 "

Refloated talc from lead concentrate - Agitated 15 minutes with

Lime	10 lb/ton
Cyanide	1 "
Pine oil	

Test No. 8 -	To Ball mill:	Soda ash	5 lb/ton
		Cyanide	0.4 "
	Talc float:	Pine oil	0.1 "
	To Lead cell:	Aerofloat	0.1 "
	To Zinc cell:	Copper sulpha	2 "
		Xanthate	0.1 "
		Pine oil	0.1 "

Summary of Results on Low Grade Ore: It was found on attempting to float the ore that a large amount of gangue of a talcy nature was present and that this talcy gangue floated with the lead leaving the grade of the lead concentrate below that of a marketable product. Tests 1 - 4 were run varying the alkalinity of the pulp and trying different collecting reagents all without success. In test no. 6 the talc and lead were floated togather then the concentrate was treated by the addition of chemicals to deaden the lead and an attempt made to float the talc away from the lead. The results show

that this was not successful. The method, however, has promise. In test no. 8, it was decided to attempt to float the talc before concentrating the lead. The reagents used are given. In floating the talc by itself great care had to be taken not to add an excess of frothing reagent which would cause an increase in losses of lead, zinc, gold, and silver in that product. The results of this test are very encouraging and it is noteworthy that by eliminating the talc in such a manner the recovery of the gold and silver in the lead concentrate is increased to a rather remarkable extent.

In mill operation it would no doubt be profitable to table this talc product to recover part of the lead and precious metal values removed with it during flotation.