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FILE COPY

OTTAWA November 17th, 1941.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1119.

Mill Tailings from Trout Lake, British Columbia.

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DEPARTMENT OF MINES AND RESOURCES MINES AND GEOLOGY BRANCH

AWATTO

November 17th, 1941.

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ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1119.

Mill Tailings from Trout Lake, British Columbia.

taxes double close while globa show applies soon & may water many filter for a second

Shipment:

BUREAU OF MINES DIVISION OF METALLIC MINERALS

ORE DRESSING AND METAILURGICAL LABORATORIES

A shipment of two samples of material, designated Sample No. 1, Dump Tailing, weight 11 pounds, and Sample No. 2, Hillside Tailing, weight 10 pounds, was received on August 16th, 1941. These samples were submitted by J. M. Tillen, Trout Lake, British Columbia.

In his request letter, Mr. Tillen states:

(Shipment, cont'd) -

"These samples are from the old Silver Cup-Nettie P mill, situated at Five Mile on Lardeau Creek in the Lardeau mining division of British Columbia. The mill was designed to treat the ores from the Nettie P and Silver Cup mines. The plant was in operation about 1903-4, and about 10,000 tons of ore were milled. The recovery was very low. The mill was shut down and never operated sgain."

Characteristics of the Samples:

Both samples varied from coarse to fine material, including lumps of clay, Panning disclosed some sulphides which were badly oxidized.

Purpose of the Investigation:

The shipment was made to determine a method of recovering the silver in the form of a high-grade concentrate.

Investigative Procedure:

In order to determine the character of the material and the values in the various sized products, panning tests and screen analyses were made on each sample of the shipment.

Flotation tests were then made and included variations of grinding and the use of reagents.

Results of Test Work:

The results disclose that the original grind of this ore had slimed a great deal of the silver. 55 per cent of the silver was found in the material passing through a 525mesh screen. This slimed material is very difficult to recover by flotation.

The material is very badly oxidized, due to exposure on the dump since 1904.

- Pago 3 -

(Results of Test Work, cont'd) -

The tailings are very acid, requiring 22 pounds of soda ash per ton to get a pH of 8.3 to 8.5.

Concentration by flotation gave a recovery of 60.9 per cent of the silver, in a concentrate containing 47 ounces of silver per ton. Increasing the grade of concentrate to 94.9 ounces of silver per ton lowered the recovery to 30 per cent of the silver in the feed.

Water-washing the material prior to flotation, apart from decreasing the amount of soda ash consumed, was of no benefit to the recovery.

Sampling and Analysis:

The shipment was sampled by standard methods and was found to contain:

		Sample No. 1. Dump Tailing.	Sample No. 2. Hillside Tailing.
		aya yafatiki kuntuk katar utake tati tati tati kata kata tati tati kata kata	an a
Gold. oz./ton		0.025	0.105
Silver. "	65	9.62	13,24
Copper, per cent		6,08	0.04
Lead. "	8	1.58	1.68
Zîne, "	409	0.90	0.50
Mercury,	5	Trace	Trace

A screen sizing test was made on each sample as received:

		Sample No. 1.	Sample No. 2.
Mesh	0	Weight,	Weight,
No.	ŝ	per cent	per cent
	å		
+ 14	ŝ	1.23	3.20
- 14+ 20	8	4.33	0.97
- 20+ 28	0	7.39	2,63
- 28+ 35	0	9,26	7.90
- 35+ 48	8	13.10	13,12
∽ <u>4</u> 8+ 65	3	8.44	12.84
- 65+100	0	7.95	12,60
~1,00+1,50	8	7.61	12.96
-150+200	3 0	4.78	7.13
~20 0	2	35,91	26.65
	11 0	1.00,00	100.00
			an energy show a ferral and a state of the s

- Page 4 -

A screen analysis was made on each sample of tailing, with the following results:

Sample No. 1. - Dump Tailing.

IN THE OWNER DESCRIPTION OF THE PROPERTY OF TH	:Weight,	: A 5 3	A J S. ?	Distri	bution,	1101000
Product	; per	; OZ.,	ton :	per	cent	
	: cent	: 423	Aŝ :	A12	: Ag	
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+ 65 mesh	: 43.75	0.025	4.34	37 .02	19,93	
- 65+100 "	; 7,95	0,03	3.01	8.07	2,51	
-100+200 "	: 12.39	0.015	5,43	6.29	7.06	
-200 "	: 35.91	0.04	18.70	48.62	70.50	
	¢					
A	Nonventer - Construction	and approximate of the second second second	(\$	n, "Vinenzamad kalar tanış iş il elari Artist taşfatadı olar. Baltada ge	uli tiningi tunya kataling persenya pengangan kataling kata	120200
Feed	;100.00	0,0295	9.53	100.00	100,00	
	0					
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	Sample	No. 2	Hillside	Talling.	
+ 65 mesh - 65+1.00 " -100+200 " -200 "	40.66 12.60 20.09 26.65	0.045 0.06 0.12 0.25	6.81 7.52 12.53 28,85	15.69 6.51 20.67 57,13	19.88 6.84 18.07 55.21
Feed	100,00	0,12].3,93	1.00.00	100,00
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Feed assays calculated values.

Details of Tests:

Test No. 1. - Flotation in Natural Pulp.

The feed for this test was made up of portions from each sample reground in a ball mill to 90 per cent minus 200 mesh with tap water. No alkaline reagents were added.

The reagents added to the grind were 0.2 pound of Aerofloat Reagent 208 and 0.15 pound of Aerofloat Reagent 25 per ton of feed.

The pulp was transferred to a flotation machine and after dilution was found to have pH, 6.1.

The pulp was conditioned 5 minutes with 0.1 pound

(Test No. 1, cont'd) +

Reagent 301 per ton and after adding 0.05 pound of pine oil per ton a black slimy froth was recovered. Reagent 301 was added in stages until no further froth was recovered, a total of 0.2 pound per ton. An addition of pine oil was required. A total of 0.10 pound per ton pine oil was used.

The flotation period was 12 minutes and the pH of the pulp at the end was 5.7, indicating increased acidity.

The flotation concentrate was recleaned without reagents.

Results:

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	3	Weight,	11	Ass	a y	° 8,9	;Distril	oution,	Ratic of
Product	9	per	ð	02./	ίon	Tel Ballander	: per	<u>cent</u>	: concen-
ente da sua tradição de la compansa da la compansa de la compansa de la compansa de la compansa de la compansa	÷	cont	2	Au	5 5	Ag	: Au	Ag	; tration
Food	9 9 9	100.00	4.7 ₄ (†16)	0.04	10,	94®	100,00	100.00	
Rough cone.	9 9 9 7 7 7 7	24.7	-Ch22	0.120	<u>89</u>	77 [®]	71.66	67,23	4.1:1,
Cleaner conc, Middling Flot, tailing	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	9.2 15.8 75.3		0.26 0.03 0.015	53 15 4,	03 97 76	60,00 11,66 28,34	44.60 22.63 32.77	10,9;1. 6,5;1,

Calculated values from the products of the test.

Lead in conc. - 4.30 per cent. Zinc " " - 6.22 "

Test No. 2. - Flotation.

ex-19

A flotation test was made on a feed composed of equal amounts of both samples reground to 56 per cent minus 200 mesh.

The reagents added to the grind were:

Lb./ton.

Soda ash - 4.0 Aerofloat No. 25 - 0.14

Reagents added to the pulp in the flotation

machine were:

- Page 6 -

(Test No. 2, cont'd) -

Lb./ton.

Sodium silicate	8	8.0
Copper sulphate	ep	1.0
Potassium amyl xanthate	8	0.2
Pine oil	e23	0.1

The rough concentrate was recleaned with 1,0 pound of sodium silicate per ton.

Constant of Water and Statistics and Statistics and the Statistics and Statistics	-		khole in viusasist A	n orbensester Ma	174		103220-4131 103	- 100	A contraction of the second	No. or	3. 4 A A A	CEACHICELOINE N	- 11 ⁻¹	and and a second	ALL
	ò	Margares	S B	8	ы <u>,</u>	a y	e 19	<i>د</i> د :	79.01.1	LN U	63.03	50	3 11	e ci o	07
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Calculated values.

A higher-grade concentrate was recovered than was obtained in the preceding test, with a sacrifice of recovery.

> <u>Pest No. 3. - Flotation and Superpanner Test of</u> <u>Flotation Tailing</u>.

The feed was composed of equal emounts of both samples and was reground to 81 per cent minus 200 mesh.

The reagents added to the grind were:

Lb./ton.

Soda ash		17.5
Barrett's No. 4 oil	-	0.15
Sodium sulphide	-	2,0

Reagents added to the flotation machine were:

				Lb / ton
			6	
Potassium	amyl	xanthate	:9	0.25
Pine oil			-	0.05

- Page 7 -

(Test No. 3, cont'd) -

A second addition of reagents included:

	LD ./ ton
Soda ash -	5.0
Copper sulphate -	1.0
Potassium amyl xanthate -	0.25

pH of pulp 8.3.

The rough concentrate was recleaned without the use of reagents.

Results:

NUMBER OF THE OF A STREET STREET STREET STREET	2	Weight.	A.	A EI	3	0. V	S.	Distri	but	tion.	. a B	atio of	
Product	0	per	17 19 19 10 10	02	01	'ton		: per	° C 6	mt	, 0 	concen-	
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Feed	2	100,00		0.051		11.5	8	100.00)](00.00)		
	0	-				-		-					
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Rough conc.	0	31,45		0.14		27.4	3	86.62	3 7	4.49)	3.2:1.	
ALLENDERS CREATERS AND AND CONTRACTORS AND A CONTRACTORS	0	wynted i ryd wrtefnin arryffrian y m		and for the product of the set	*********	Station for Lines	121372.57	and which a stated for a state of the	20- 12-042-04	19 E 16 F. M. 19 F. 19 F. 19	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
Cleaner conc.	0 0	11.28		0,34		45.6	6	74.81	. 4	4.48	3	8,9:1,	
Middling	ъ 6	20,17		0.03		17.2	3	11.81	. 3	30.01		4.9:1.	
Flot, tailing	20	68,55		0.01		4.3]	13,38	3 2	25,51	•		
an a	0	2124, 142 - 544, 1224, 1144, 1427, 1227, 1237, 1437, 1437, 1437, 1437, 1437, 1437, 1437, 1437, 1437, 1437, 143 1447, 1447, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 1457, 145	178.6706 10624236	ር የሆኑም የሚያም የሚያም ነው። የሚያም የሚያም የሚያም የሚያም የሚያም የሚያም የሚያም የሚያም	**************************************	in Taylord Friday, 14	n an a star a	andari ta Sanangan (Branis persis) ing mala Sana menjari ta Sanangan menjari ta Sanangan sebaha	10-1718-1300 11-11-12-1-1-2	4187676223778720078 ALM (MARY) 42377278	ia ny fiantana	ቀነሳ ቀንም የህዝኛ እን በመሆም የመርከኛ የሌሎ የአማር ያንጃ ዘብሯት የታቀረ። የሆነ ላይ ቶ የሰረጃ ጊዜ ጊዜ ያምምሩ በሆኑ የሆነ ግር አማርትን የመንከምር	energy (1972) 1972 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 - 1973 -

© Calculated value.

A portion of the flotation tailing was screened on a 200-mesh screen. The plus 200 mesh product was assayed. The minus 200 mesh product was concentrated on the Haultain superpanner and the products were assayed. <u>Results</u>:

> Superpanner Concentration of minus 200 Mesh Flotation Tailing

		J." •	J. W OCA U.L. CA	de de verstande destader	0		
	;]	Neight,	: As	8 & Y S,	: Distr	ibution,	Ratio of
Product	0 0	per	<u> </u>	z./ton	; po:	r cont	concen-
272222272740	0	cont	; A11	: Ag	: Au	: AS	tration
a ng pangangang ng kang ng pangang	0 \$		17 THE FOR STATISTICS IN CONTRACTOR & SHOULD ST	1277 (Sam	ay for a low a start to a low strategy of the start of th	- Style- a care in Agentaly resident	arr net water after the Present of the statement of the
Feed	•	100,00	0.011	5,66	100.00	100,00	
Conc.	0 4	1.71	0.085	41,69	12.90	12,58	58,5;1,
Tailing	0	98,29	O ° OJ	5.04	87,10	87,42	
	0 0	a sanatashin kanayan kasiyan	WARSON CONTRACTOR				
Contraction of the second		A consistent and a second state of the second	a service and a construction of the local day of the service of th	and a state of the	the second s	the second	and a second

Plus 200 mesh tailing: Au, 0.01 oz./ton. Ag, 2.37

This test indicates that 87 per cent of the silver in the minus 200 mesh material is present as very fine slimes.

- Fage 8 -

Test No. 4. - Flotation.

The feed was composed of equal amounts of both samples and was reground to 65 per cent minus 200 mesh.

Reagents added to the ball mill:

Lb./ton.

Soda ash				C 2	14.0
Barrett's	NO.	4	011	دي ة	0.13

Reagents added to the other flotation machine:

- 8 pounds of soda ash per ton was added to give an alkalinity of pH 8.5.
- Reagents Nos. 208 and 301 were added in stages as a 1 per cent solution, at the rate of 0.4 pound of reagent per ton.
- O.125 pound of pine oil per ton was used in several additions.

The rough concentrate was recleaned without reagents.

Results:

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Producit producit	0 9 9	Weight, per	0 0 0 0 0 0 0 0	A S S OZ	9	ays, ton	1000,7990 0 0 0 0 0 0 0	Distri	bution, cont	Ratio of concen-
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Feed	69 96 00	100,00	0	.065		11,45		100.00	100.00	
Rough conc.	0	35,61	0	.1.46	•14 7 7-14	26.47	F3-L577	80.20	82.34	S 8 s 1
Cleaner conc. Middling Flot, tailing	00 90 01 00	14.79 20.82 64.39	0 0 0	,08 .08 .84		47.14 11.78 3.14		54.58 25.62 19.80	60.91 21.43 17.66	6.8;1. 4.8;1.
	Reason	nan karatan karatan karata			খনগ্ৰ	MARRINE	an a	<u> arrest arrest arrest a</u> rrest arrest	and the second	TERMINE SATISFIELD

Calculated value.

A total of 22 pounds of soda ash per ton of feed was required to give alkalinity to the pulp, of pH 8.5. An increase in recovery is obtained by flotation in an alkaline circuit. There is still a fair quantity of silver in the tailing. - Page 9 -

Test No. 5. - Flotation with Varied Reagents.

The feed was composed of equal amounts of both samples and was ground to 65 per cent minus 200 mesh.

Reagents added to the ball mill:

Ib./ton

a 1 b				00.0
Soda asn			410	22.0
Aeroflost	No.	25	53	0.1
fç	No.	208	473 473	0.4

Reagents added to the pulp in the flotation

machine were:

0.4 pound No. 301 Aerofloat and 0.15 pound of pine oil per ton, added in stages.

The pulp in the flotation machine had pH, 8.7. Recleaned concentrate with 0.1 pound No. 301 Aerofloat per ton.

Results:

	Weight,: per : cent :	Assay oz./ton Au : Ag	; Distri ; per ; Au	bution,: cent : : Ag :	Ratio of concen- tration
Feed [®]),00,00	0.08 11.8	55 100,00	100,00	217, 6 2021 Theorem 21 (1) 1 (
Rough conc.	; ; 25,98	0,1875 31.8	59 76.70	71.09	3,85;1,
Cleaner conc. Middling Flot, tailing	7.04 18,94 74.02	0.45 61.0 0.09 20.4 0.02 4.8	51 49.87 13 26,83 51 23,30	37,57 33,52 28,91	14,2:1. 5,3:1.

· Calculated value.

Test No. 6. - Flotation of a Washed Pulp.

The feed for this test was composed of equal amounts of both samples and was ground in water without reagents to 65 per cent minus 200 mesh. The pulp was filtered and washed three times.

- Page 10 -

(Test No. 6, cont'd) -

The filter cake was repulped in a flotation machine and conditioned with 16 pounds of soda ash per ton, pH 8.3. 0.2 pound of Reagents Nos. 208 and 301 and 0.10 pound of pine oil per ton were added to the pulp in stages as required. The concentrate was recleaned without reagents.

Results:

Charlesting bearing for the second state of the second state and the second state	******	21274-0100 22 +X 26 VACTOR-000		NET BERT TELEVISION OF BUILDING THE TALE OF STATE	ale a sur l'en l'en l'en l'en le ser l'en le ser le se	Cardenary and the second and the second s
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Product	s por :	02.	/ton	: per	cont	: concen-
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	O	ango antia (1999) ango nao mata wila	an a	a de la capacita de la compania de l La compania de la com		
Feed	: 100.00	0,061	11,53	100.00	100.00	
a a submit magneti i constructione-submitter a construction and formation of the submitter of	0	Now have a finance of the state	1919 PRIME AND A SAME OF 1994 A TWO DOWN	1447 F & 44 2010 C. B. L. B. L. B. L. B. S.	MANY AND A MARKED AND ADDRESS OF THE PARTY OF	
	¢ 0					
Rough conc.	; 34.41	0,14	26,58	78,57	79.25	2,9,1.
	9					
Cleaner conc.	: 12,72	0,31	48,91	64.40	53.92	7.9:1.
Middling	: 21.69	0.04	13,48	14.17	25,33	4.6:1.
Flot, tailing	: 65.59	0.05	3.65	21.43	20,75	
$f(x_1,y_2) = f(x_1,y_2) = f(x$	C Q Is a pression with the track of the state of the stat	in shing to very set in the set	***************************************	an a		ari Elemato dell'Indere de Destrute net d'Arti

Washing the pulp indicates that part of acidity was water-soluble. The consumption of soda ash was reduced by approximately 6 pounds per ton of feed by washing the pulp. No particular increase in recovery or grade of concentrate was obtained.

Yest No. 7. - Desliming followed by Flotation.

The feed was composed of equal amounts of both samples.

The feed was deslimed and the resulting sands were reground to 65 per cent minus 200 mesh.

Reagents added to the ball mill:

Lb./ton.

Soda ash			6 2	5.0
Aerofloat	No.	25	÷	0,20
50	No.	208		0,5

Pulp in flotation machine, alkalinity - pH 7.7. Addition of 2.0 pounds soda ash per ton, pH 9.0. " 0.40 pound of Aerofloat No. 301. Flotation period, - 7 minutes. Recleaned concentrate with 0.1 pound of No. 301. Aerofloat per ton.

- Page 1.1 -

(Test No. 5, cont'd) -

Results:

excision weblettert ar according to the former and a set of the set	; Weight,	: Assays	3	Distrit	meion,	Ratio of	
Product	: per	\$ 02.	ton	; per	cent	": concen-	
	: cont	: All ;	Ag	; Au	: AE	; tration	
entering in the second s	A CONTRACT OF A CONTRACT OF	X + 4 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999	an a	and a construction of boots (Lower, 19, 201			22234
Feed	100,00	0.06	11.55	100.00	100.00		
Slimes	; 26,18	0_055	24.35	ສ ຊໍສ]	55.17	3,8;1,	
	0	٦	-	-			
a din la manana sejanggan ya kanà kapatén nangra dan kanana kanénana panénana dan kanana dan kanang kanang kan I	0 0	uran nagatara kanadaratan galari	* Parings Strandsstrate	alam merengan yang dari kerangkan di kerang di	CHOCHTARIS PATER IN 18.24 A	an a	
Rough conc.	: 16:45	0.82	18,58	58,29	26,46	6,1;1,	
eleganda den nasilari karing dan angan angan karing dan sa ke	0 0	(1)				•	
Cleaner conc.	: 2.77	0,96	51,04	42,86	12.24	36:1.	
Middling	: 13,68	0.07	12.01	15.43	14,22	7.3:1.	
Flot, tailing	: 57.37	0_02	3.70	18.50	18,37		
	0					יון היה לין "די ^ה רביר אל אוראיר ירים העירא אל המרכב לא איר האוריבה או אור האור אור אור אור אור אור אור אור אור א	
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A screen test made on the slime portion of the feed shows 99,3 per cent minus 325 mesh.

55.17 per cent of the silver in the feed reports in the slime overflow. This result indicates that much of the silver occurring in the deposit of mill tailing is extremely fine.

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Summary:

The results of the investigation indicate that the feed contains silver in the very fine sizes. The surfaces of the metallic minerals have been badly oxidized.

A concentrate containing 94.9 ounces of silver per ton was made at the expense of a recovery of only 30 per cent of the silver in the feed.

Approximately 55 per cent of the silver in the feed was found in the minus 325 mesh portion.

Using a natural pulp, a recovery of 44.6 per cent of the silver was obtained in a concentrate containing 53 ounces of silver per ton.

Fine grinding did not lower the valuesin the tailings,

Conclusions:

The investigation indicated that the material will be difficult to treat economically, due in part to the oxidized condition of the material and, also, to the degree of sliming to which the minerals have been subjected in the original grind.

Flotation in a natural pulp would save the expense of using up to 22 pounds of soda ash per ton of feed, required to produce an alkalinity (pH 8.5) normal to flotation practice.

No evidence of the presence of metallic mercury could be discovered in any of the material.

The results of this investigation apply only to the samples submitted.

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WSJ: OHB.