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November 20th, 1940.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 905.

Cyanidation, Amalgamation and Concentration of a Gold Ore from the Bristol Mines Limited, Gold Bridge, British Columbia.

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Shipments:

Two samples of gold ore from the Bristol Mines Limited were received on June 7th, 1940. Sample No. 1, of 150 pounds, was representative of the ore body and Sample No. 2, of 50 pounds, was of a special nature. The

test work was performed mainly on Sample No. 1. The shipments were sent by Mr. A. E. Stromberg, Bristol Mines Limited, c/o Goldbridge Trading Company, Gold Bridge, British Columbia.

Location of the Property:

The property of the Bristol Mines Limited from which the present samples were received is situated on Tommy Creek, Bridge River area, Lillooet mining district, British Columbia.

Characteristics of the Ore:

Twelve polished sections, six for each sample, were prepared and examined microscopically for the purpose of determining the character of the ore. Since the microscopic characters of both samples are essentially the same this description covers them together.

Cangue -

The gangue consists of highly siliceous, dark grey rock with rather abundant, white, iron-free carbonate as disseminated grains and narrow discontinuous stringers.

Motallic Minerals -

Metallic mineralization consists almost entirely of an intimate admixture of pyrite and arsempyrite in which the former mineral predominates. Both minerals occur as coarse to very fine disseminated grains and small patches consisting of multiple individuals. Inclusions of gangue are numerous and in many places gangue impregnates the sulphides so extensively as to give the surface cut by

(Characteristics of the Ore, cont'd) -

the section a lace-like appearance. A negligible amount of chalcopyrite is present as very rare tiny particles in gangue.

Nothing was learned as to the mode of occurrence of gold, since neither native metal nor gold minerals are visible in the sections.

Sampling and Analysis:

After crushing, cutting, and sampling by standard methods, representative portions from each shipment assayed as follows:

	Shipment No.	Shipment No. 2.
Gold, oz./ton	0.24	2.00
Silver, "	0.09	0.79
Iron, per cent	8.29	10.67
Copper, per cent	Trace	0.08
Sulphur, "	4.10	6.14
Arsenic, "	1.86	4.04

Investigative Work:

The test work was conducted mainly on the representative Sample No. 1. This are proved to be extremely refractory, not amenable to either cyanidation, amalgamation or concentration. Some 9 per cent of the gold was extracted by cyanidation at a grind of 90 per cent minus 200 mesh. Amalgamation of jig and blanket concentrates gave no appreciable extraction of the gold, and the results of flotation and table concentration gave only some 55 per cent of the gold in the concentrates, assaying slightly

(Investigative Work, cont'd) -

over 1.0 ounce gold per ton.

Roasting of the raw ore followed by cyanidation of the calcine gave an extraction of 73 per cent of the gold. On Sample No. 2, straight cyanidation gave an extraction of only 9.5 per cent at a grind of 85 per cent minus 200 mesh in 48 hours, agitation.

Tests Nos. 1 to 13 were conducted on Sample No. 1 and Test No. 14 on Sample No. 2.

Details of the Test Work:

Test No. 1 (A - F). - Cyanidation.

Portions of the ore at minus 14 mesh were ground in cyanide solutions of 1 pound NaCN per ton strength to pass 82.9 per cent minus 200 mesh in Tests Nos. 1-A and 1-B 94.0 per cent minus 200 mesh in Tests Nos. 1-C and 1-D, and 90.2 per cent minus 200 mesh in Tests Nos. 1-E and 1-F. The pulps were then bottle-agitated for 24 or 48 hours. Sufficient line was added during the grinding and agitation periods to ensure an alkalinity of from 0.10 to 0.15 pound CaO per ton of solution. In Tests Nos. 1-E and 1-F, 0.25 and 0.75 pound of coal oil were added to the grind.

(Test No. 1, cont'd) -

Ros	ults of C	yanidatio:	ns	(Feed,	0.24	Au oz	(ton)	
		-: Tailing	:Extrac-	Titr	ation,	: Rea	gents	Reducing
Test: %	: tion	,:assay,	tion of	: 1b.	/ton	s cons	sumed,	:power,
No.: -2	00 : hour							aml. N/10
; me	sh :	;oz./ton	per cent	::NaCN	: CaO	: Na.CN	: CaO	:KWn04/litre
0				•				
l-A : 82	。9 24	0.22	8.3	1.0	0.15	1.4	11.7	270
1-B : 82	.9 48	0.22	8.3	1.0	0.15	1.4	14.7	230
1-C : 94	.0 24	೦.೭೭	8.3	1.0	0.10	16	11.8	190
1-D: 94	.0 48	0.22	8.3	1.0	0.10	1.6	15.8	270
1-E: 90	。 2 24	0.22	8.3	l.O	0.10	8,0	11.8	150
l-F: 90	.2 48	SS.O	8.3	0.1	0.10	0.8	21.8	170

In Tests Wos. 1-E and 1-F coal oil was added to the grind in order to prevent any possible re-precipitation of the gold on account of some graphitic carbon being present in the ore sample.

Test No. 2. - Cyanidation.

As the previous test showed some fouling of the cyanide solutions, as evidenced by the reducing power, it was decided to supply fresh cyanide solutions after the grind and also after several hours of agitation.

The ore at minus 14 mesh was ground in cyanide solution of 1 pound NaCN per ton strength to pass 85 per cent minus 200 mesh. The pulp was then filtered, washed, sampled, and repulped with fresh cyanide solution and agitated for 7 hours. The pulp was then filtered, washed, sampled and repulped with fresh cyanide solution as before and agitated for 15 hours. Finally, a further 7-hour period of agitation was conducted on the repulped sample. During the different grinding and agitation periods enough lime was added to maintain alkalinity.

(Test No. 2, cont'd) -

Resu.				lation:			(Feed,				on)	
Rev. V refer to the Section of Tree and Committee or and and the section of the s							ition,	: R	eagen	ts	: Reducing	
Agita-	ខន	ssay,	i oi	eold,	0	lb./			onsum		: power,	
${ t tion}_{s}$		Au		er cont	8	rloa	ation_	: lb	./ton	ore	_aml. N/10	
hours	0 ;	z./tor	O CONTRACTOR	Diffe a professory of the state	8	NaCN	: CaO	:NaC	N 3 C	a0	:KinOa per li	bre
	8			The Book To E or S to S S S S S S S S S S S S S S S S S			AN HIALDRIGHT COLUMN	Namb latin order & family at the		***************************************	Action of the empty of article of the experience of the specific and the specific of the speci	Personal First
Grind 35	0											
minutes	8	0.22	;	8.3	,	1.00	0.10	0.8	0 6	0.0	30	
	8									_		
7	0	0.22	}	සා	1	0.96	0.70	0.1	Q = 4	2	70	
	9											
15	8	០.ខន	;	=	,	OO	0.10	0.1	5 1	8	150	
	0										_	
7	0	0.22	,	trae	•	0.96	0.10	0.1	0 1	. . O	50	
	0											

As shown by the above, the application of fresh cyanide solution was not successful in increasing extraction.

Test No. 3. - Infrasizing and Superpanning.

In order to ascertain the relationship between the gold and the sulphides and also to determine definitely whether the gold remained in the finer-sized particles after grinding and agitation in cyanide solution, a portion of the cyanide residue from Test No. 1-D, assaying 0.22 ounce gold per ton, was passed through the Haultain infrasizer as follows: The residue screened 94 per cent minus 200 mesh. The plus 200 mesh product assayed 0.24 ounce gold per ton and 4.46 per cent sulphur.

The minus 200 mesh product was passed through the Haultain infrasizer with the following results:

(Test No. 3, cont'd) -

Results of	Ti	ofrasiz	ing:			or a water a constant was printed a set of the	·
BANKS THE STATE STATE SOLVENS THE POST	3	Weight,	: As	saya	8	Di.sta	ribution,
Size in	o o	per	: Au,	8 S,	0	pe1	cent
microns	0	cent	soz./to	n:per cer	វប់ ៖	Λu	8 S
E152727 c1052 Check-Ph-1927 Driversons	0	Per Jacob Harriston Language	23123416244257457450	AN INTERNAL PROPERTY OF STREET, SALES		Cr tellion per ser a person	pri 12 a 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Above 56	0	8.8	0.42	8.62		5.4	6.7
56 to 40	0	11.1	0.26	4.49		l.5.O	13.8
40 to 28	0	11.6	0.25	4.58	•	L3.0	14.7
28 to 20	0	21.2	0.24	4.00		12.1	12.4
20 to 14	0	9.3	0.23	4.22		9.4	10.9
14 to 10	7	8.8	೦.೩೩	3.45		8.5	8.4
Below 10	0	45.2	0.19	2.64	ć	38.6	33.1
	2 .	The State of the Assessment Control Francisco	The second statement of the second and the second s	angeritesty Arenamentissa	************************	wastered to the Colombia was self-	CONTRACTOR OF THE PROPERTY OF
Totals	9	100.0	೦.22	3.61	3.0	0.00	300.0
	0	TYTYMINISMY INTO THE INTO	or time at the low caster of these days to		oranganiya (in. 7)		Production of the Production o

Another portion of cyanide residue, from Test No. 1.-A, assaying 0.22 cunce gold per ton, was concentrated on the Haultain superpanner.

Results of	Superpanning:			CERTAIN SEED OF STATE SEEDS SEEDS TO AN ALLEGATION OF SEEDS SEEDS
CAR LAND WELL THE MAN OF THE MAN AND LAND AND A PART PARTY NAMED IN THE	:Weight,: Ass	заув :	Distribu	tion,
Product	per : Au,	; S, ;	per ce	nt
the special of the subsection	: cent :oz./tor	n:per cent:	Au s	S
	0			
Feed	*100.00 0.22	4.10	JOO.O	100.0
Conc. tip	; 1.39 1.14	57.20 [©]	7.1	15.9
Conc. bulk	: 2.71 1.00	28.80	1.8.1	79.0
Sands	: 56.96 0.195	2.92	49.6	40.6
Slimes	: 38.94 0.18	2.58	31.2	24.5
the statistic stars somewhilm out will one and or a successful	D D C	, 1905年1月1日 - 中国大学社会、中国社会、中国社会、中国社会、中国社会、中国社会、中国社会、中国社会、中国	ood al-grammagadastandisegraps on a 3 th Little Long gate	\$1247\$EESCOPEN FARRAN, combiney (sporter) and USAch Sevano

[©] Calculated.

The sands screened 75.4 per cent minus 200 mesh and the slimes screened 99.0 per cent minus 325 mesh.

The tip of the panner concentrate was examined under the binocular microscope and was seen to consist of pyrite and arsenopyrite with no gold visible.

Both the infrasizer and superpanning tests on these cyanide residues demonstrate that extremely fine grinding of the ore does little to improve the extraction of the gold

(Test No. 3, contid) -

in cyanide solution, the minus 10 micron sized particles assaying 0.19 cunce gold per ton in the infrasizer test and the slime particles, which screened 99 per cent minus 325 mesh, assaying 0.18 cunce gold per ton in the superpanning test.

Test No. 4. - Flotation and Cyanidation.

In this test the graphitic carbon in the ore was removed by flotation concentration prior to cyanidation.

The ore at minus 14 mesh was ground with 6 pounds of lime per ton to pass 85 per cent minus 200 mesh. The pulp was then transferred to a flotation machine and the graphitic carbon floated off by the addition of 0.03 pound potassium amyl xanthate and 0.03 pound pine oil per ton. The flotation tailings were then agitated in cyanide solution of 1 pound NaCN per ton strength for 24 hours.

Results of Flo	otation:			
	:Weight,:	Assay,	:Distribution	Ratio of
Product	ber :	Au	: of gold,	: concon-
	cent:	oz./ton	: per cent	: tration
	0	110100000000000000000000000000000000000		
Feed.	:100.00	0.24	00°00T	
Flot. conc.	; 3.33	1.04	14.60	30:1.
Flot. tailing	: 96.67	0.21	85.40	
\$\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	C C	HIII-COUNTY AND THE SEASON OF SEASON SEASON AND SEASON SEASON AND SEASON	eriin de verde de en de verde de verde de verde de verde de la	on the second street street second second second second second second second

The flotation concentrate assayed 1.04 ounces gold per ton and 1.61 per cent carbon.

The flotation tailing was agitated in cyanide solution with the following results:

(Test No. 4, cont'd) -

Results of Cyanidation: (Feed, Au, 0.21 oz./ton)

Agita-:Grind,:Tailing:Extrac-:Titration,:Reagents :Reducing power,

tion,: % : assay,:tion of : lb./ton : consumed, :ml. N/10 KM:04

hours: -200 : Au : gold, : solution :lb./ton ore: per litre

: mesh :oz./ton:per cent:MaGN: CaO : NaGN : CaO :

24 85.0 0.21 Nil 0.96 0.15 0.3 5.7 130

It is evident from this test that the removal of the graphitic carbon prior to cyanidation has no beneficial effect on the extraction.

Test No. 5. - Gyanidation and Charcoal Flotation.

In this test an endeavour was made, by adding activated charcoal to the cyanide grind with subsequent agitation and final flotation of the gold-bearing charcoal from the remainder of the pulp, to obtain an improved extraction of the gold.

The ore at minus 14 mesh was ground in cyanide solution of 0.4 pound per ton strength to pass 94 per cent minus 200 mesh. Four pounds of activated pine charcoal and 6 pounds of lime per ton were added to the grind.

The pulp was then agitated for 6 hours and transferred to a flotation machine. The charcoal was then floated by the addition of 0.05 pound potassium amyl xanthate and 0.04 pound pine oil per ton. The resulting flotation concentrate was cleaned in a smaller machine. Prior to flotation the titration of the pregnant solution was 0.4 pound NaCN and 0.15 pound CaO per ton of solution.

(Test No. 5, cont'd) =

Results of Fl	otation:			
	:Weight,	: Аявау,	: Distribution	Ratio of
Product	; per	: Au	: of gold,	: concen-
	; cent	:oz./ton	: per cent	: tration
	8			A STATE OF THE PARTY OF THE PAR
Feed	:100.00	0.24	100.0	
Flot. conc.	: 0.96	0.68	2.8	104:1.
Flot. middlin	g: 4.57	IS.O	4.1	21:1.
Flot. tailing	84.47	0.23	93.1	
	п С			

The barren solution did not contain any appreciable amount of gold.

The above results indicate that the charcoal process of cyanidation and flotation is not applicable to this type of ore.

Test No. 6. - Table Concentration and Cyanidation.

The ore at minus 14 mesh was ground in cyanide solution of 1 pound NaCM per ton strength to pass 75.0 per cent minus 200 mesh. The pulp was then passed over a Wilfley table and the resulting table concentrate reground in cyanide solution of 2 pounds NaCM per ton strength to pass 99 per cent minus 325 mesh. The reground concentrate was then added to the table tailings and this product was agitated in cyanide solution of 1 pound per ton strength for 24 and 48 hours.

The weight of the table concentrate was 6.4 per cent of the weight of the feed. The table tailing assayed 0.21 ounce gold per ton.

(Test No. 6, cont'd) -

Results of Agitation of Reground Table Conc. and Table Tailing:

and the same to be an artist	New years (Consumer and Antibus Section and An	(1	Feed, Au, (0.24 oz	./ton)				
Grind,	:Agita-	·: Tailing	g:Extrac~	: Titre	tion.	0	Reagent	8	esteronis, a
%	: thon,	: assay,	stion of	: 1b./	ton	8	consum	od,	
~S00	: hours		gold,		rtion	6	lb./ton	OTO	
mosh	o O Transference and annual	coz./to	n:per cent	: NaCN	: CaO	,	NaCN :	CaO	ADDUCTS ADDUCTS
80.1	24	0.225	6.3	1.0	0.15		0.8	7.6	
80.1	48	0.21	12.5	1.0	0.10		0.9	8.7	

The total reagent consumption, including cyanide grind, regrinding of table concentrates and agitation of combined products, was:

For 24 hours | agitation =

For 48 hours' agitation =

Test No. 7. - Concentration and Amalgamation.

In this test the ore at minus 14 mesh was ground in a ball mill with 2 pounds of soda ash, 0.05 pound of potassium amyl xanthate and 0.05 pound of pine oil per ton to pass 72.8 per cent minus 200 mesh. The pulp was then transferred to a flotation machine and a flotation concentrate obtained by the further additions of 0.1 pound potassium amyl xanthate, 1.2 pounds copper sulphate and 0.08 pound pine oil per ton. The resulting flotation concentrate was cleaned on a smaller machine. The flotation

(Test No. 7, contid) =

tailing was passed over a corduroy blanket. The flotation and blanket concentrates were combined and amal_amated with mercury in a mortar.

Results:

		Flotation			e Substitute of 20 ma and 20 MeV and above the property of the substitute of the
\$14 Gry # arc0 (13 deby & \$150, ett prop) \$ \$5. Gry maps at \$10 deby section to many sections \$100 \$ depy	:Weight,	: Авзау,	:Distribution	0	Ratio of
Product	s ber,	: Au	: of gold,	\$	concen-
	: cent	:oz./ton	: per cent	0	tration
A CAMPAGNA MANAGAMA A CAMPAGNA A CAMPAGNA A CAMPAGNA A	0	_	THE THE PERSON OF THE PERSON OF PERSON OF THE PERSON OF T	il reprise and in	ent ak benefingen en gestillen fra alle for en er en er en er en er en er en er er en er er en er er en er er
Feed	00,00£;	0.240	200.0		
Flot. conc.	: 6.03	0.81	20.5		16.6:1.
Flot. middling	: 7.32	0.24	7.3		
Flot. tailing	: 86.65	0.20	72 . ຂ		
Converted by Cold and antiques of the specific and an antique of the specific and the speci	3	litin a britanne skaderkerikskaperim att	idropi klupama projekovano kanto		C. Amerika K. Galas Lamanta I. Tana I. Makamban dan dan dan dan dan dan dan dan dan d

The pH of the pulp was 8.6.

Blanket Co	oncentrati	on of Flo	tation Tailir	
Feed	1,00.00	0.20	100.0	
Blanket conc.	1.39	0.20 1.27 [©]	8.8	72:1.
Blanket tailing	: 98.61	0.185	S. 10	
	O ANTI TRANSPORTANTA DE LA PROPERTA DE	en e		Windston Commission Co

[©] Calculated.

Ama	lgamation of Co	mbined	Concentrates.
Assays,	Au oz./ton	0	Extraction
Feed	? Tailing	0	of g ol d,
1,000	7.02-1-1-116	8	per cent
MONTH OF A STREET STANDINGS IN THE COLUMN	No. William Section and Section and Control of Control Control of Control Control of Con	ů ů	
0.85	0.85	0	Nil
#>@###################################	ትነ «ተመራል » ችነን የተታመረዋቸውን የሳስኒስያቸው እነፋቸው ለሚያቸውን በመረናቸውን	o g nt the province of the all	Copyrighted in the control of the co

Summary:

		Per cent
Gold recovered in flotation concentrate and middling	æ	27.8
Gold recovered in blanket concen- trate	æ	6 . 3
Overall recovery	¢:3	34.1 per cent.

Gold extracted by amalgamation from combined concentrates -

N11.

Test No. 8. - Concentration and Amalgamation.

The ore at minus 14 mesh was ground to pass 62 per cent minus 200 mesh and the pulp passed through a Denver jig with the jig overflow passing over a corduroy blanket. The combined jig and blanket concentrates were then amalgamated and the amalgam residue added to the blanket tailing. This product was then reground with 2 pounds of soda ash, 0.05 pound of potassium amyl xanthate and 0.05 pound of pine oil per ton to pass 79.8 per cent minus 200 mesh and transferred to a flotation machine. A concentrate was then obtained by the additions of 1.2 pounds copper sulphate, 0.08 pound pine oil and 0.10 pound potassium amyl xanthate per ton. This concentrate was cleaned in a smaller machine.

Results:

Ji	lg and B	lanket Cor	ce	ntrati.on.		
	:Weight	,: Assay,	9	Distribution	ф 0	Ratio of
Product	; per	a Au	9	of gold,	8	concon∞
AND THE RESERVE OF THE PROPERTY OF THE PROPERT	; cent	:oz./ton	8	per cent	0	tration
	ò			And the state of t		A STATE OF THE PROPERTY OF THE
Feed	:100.00	0.24		100°0		
Jig and blanket						
concentrates	: 7.20	0.56		16.9		14:1.
Blanket tailing	: 92.80	0.215		85.1		
THE WATER AND THE PARTY OF THE	o o	Marco effett There are not to the Library for Share				The state of the s

After amalgamation of the combined jig and blanket concentrates the amalgam residue was added to the blanket tailing. This product assayed 0.24 ounce gold per ton, showing no extraction of gold by amalgamation.

(Results continued on next page)

(Test No. 8, contid) -

(Results, continued) -

Flotation	of Blank				uo .
THE REAL PROPERTY AND THE PROPERTY OF THE PROP	:Weight	,: Assay, :	Distribution	8	Ratio of
Product	; per	a Au a	of gold,	g	concen-
	: cent	:oz./ton:	per cent	ĝ	tration
	0	The state of the s			
Feed	:100.00	0.24	200.0		
Flot. conc.	: 5.88	0.86	21.0		17:1.
Flot. middling	: 6.26	0.24	6.2		
Flot. tailing	: 87.86	0.20	72.8		
	9	Control of the second of the s	o on the layers and the company of t		The Court was a second print the second party of the second party

The pII of the pulp was 8.4.

Summary of Test No. 8:

		Per cent
Gold recovered in jig and blanket concentrates	æ	16.9
Gold extracted by amalgamation	eza	Wil.
Gold recovered in flotation concen- trate and middling		27.2 per cent.

Test No. 9. - Table and Flotation Concentration.

A portion of the ore at minus 14 mesh was ground in a ball mill to pass 41 per cent minus 200 mesh. The pulp was then passed over a Wilfley table and a concentrate and middling product obtained. The table tailing was then reground in a ball mill with 4 pounds of soda ash, 0.05 pound potassium amyl xanthate and 0.05 pound of pine oil per ton to pass 86.6 per cent minus 200 mesh. The pulp was then transferred to a flotation machine and a flotation concentrate obtained by the further additions of

(Test No. 9, contid) -

0.10 pound of potassium amyl xanthate, 0.08 pound pine oil and 1.2 pounds of copper sulphate per ton. This concentrate was cleaned in a smaller machine.

Results:

Table Concentration.							
Product	:Weight,		: Distribution of gold,	n: Ratio of concen-			
I I OCHO V	: cent	:oz./ton	: per cent	: tration			
Feed Table conc. Table middling Table tailing	:100.00 : 8.60 : 11.40 : 80.00	0.25 [©] 0.56 0.30 0.21	100.0 19.3 13.6 67.1	11.6:1. 8.8:1.			
F.	lotation	Concentra	tion of Table	Tailing.			
Feed Flot. conc. Flot. middling Flot. tailing	:100.00 : 5.58 : 6.37 : 88.05	0.205 ⁰ 1.14 0.42 0.13	100.0 31.1 13.0 55.9	17.9:1. 15.7:1.			

[©] Calculated.

The pH of the pulp was 8.7.

Summary:

	Per cont
Gold recovered in table concentrate and middling	32.9
Gold recovered in flotation concentrate and middling	29.6
Overall recovery	62.5 per cent.

Test No. 10. - Table and Flotation Concentration.

The flow-sheet of this test was similar to that of Test No. 9. The initial grind, prior to table concentration, was 72.8 per cent minus 200 mesh and the regrinding of the

(Test No. 10, cont'd) =

table tailing, prior to flotation, was 94.6 per cent minus 200 mesh. Conditions otherwise followed the procedure of Test No. 9.

Results:

Table Concentration.						
€ mile ±1 g ±1 pr physic , processed 4 moneys says a person at part along newson to deposit you and a	:Weight	: Assay,	: Distribution :	Ratio of		
Product	; per	: Au	: of gold, :	concen-		
	; cent	:oz./ton	: per cent :	tration		
Feed Table conc. Table middling Table tailing	;100.00 ; 5.15 ; 7.02 ; 87.83	0.24 ⁰ 0.62 0.39 0.21	100.0 13.1 11.2 75.7	19,4;1, 14,2;1,		
Flotati	on Conce	entrati.on	of Table Tailing)		
Feed Flot. conc. Flot. middling Flot. tailing	:100.00 : 6.36 : 7.94 : 85.70	0.21 ⁰ 1.06 0.38 0.135	100.0 31.6 14.1 54.3	15.7:1. 12.6:1.		

[©] Calculated.

The pH of the pulp was 8.4.

Summary:

		Per cent
Gold recovered in table concentrate and middling) ==	24.3
Gold recovered in flotation concentrate and middling	ಷ್	34,6
Overall recovery	3	58.9 per cent.

Test No. 11. - Flotation Concentration.

The ore at minus 14 mesh was ground in a ball mill with 6.5 pounds of soda ash, 0.07 pound Aerofloat No. 31 and 0.05 pound of potassium amyl xanthate per ton to pass 86.6 per cent minus 200 mesh. The pulp was then transferred to a flotation machine and a flotation concentrate obtained by the addition of 0.10 pound pine oil, 0.05 pound potassium amyl xanthate, 0.04 pound Reagent No. 301 and 1.4 pounds copper sulphate per ton. This concentrate was cleaned in a smaller machine.

Results	OŢ,	Flot	atic	113 3	
THE TOTAL CONTRACT OF STREET AND STREET AND STREET	AMERICAN PROPERTY.	CT DA ARCTICHA P TARAN	HIRATE CONTRACTOR	THE PARTY OF THE	MULICIAL
			3 WG	10	հե

· · · · · · · · · · · · · · · · · · ·	:Wolght,: As		: Ratio of
Product	: per : A		: concen-
	: cont :oz.	/ton: per cent	: tration
	a 6	8	
Feed	:100.00 0.	235 ^w 100.0	
Flot. conc.	: 12.58 1.	08 57.4	8:1.
Flot. middling	: 8.40 0.	26 9.2	12:1.
Flot. tailing	: 79.02 O.	10 33.4	
WARRING COURTED OF THE WARRING TO BE THE WARRING	O O	erricolus alta cor primeritar estru es eller es el este es en escripe par el regional mendels constituir este	and the content of th

Calculated. The pH of the pulp was 9.6.

Raising the pH of the pulp to 9.6 by adding 6.5 pounds of soda ash reduces the amount of the gold in the flotation tailing. The results are still not satisfactory, however.

Test No. 12. - Flotation Concentration.

The ore at minus 14 mesh was ground in a ball mill with 1.5 pounds of soda ash, 0.05 pound potassium amyl menthate and 0.05 pound pine oil per ton to pass 84 per cent minus 200 mesh. The pulp was then transferred to

(Test No. 12, cont'd) -

a flotation machine and a pyrite concentrate removed by the addition of 0.03 pound pine oil and 0.03 pound potassium amyl xanthate per ton. Five pounds of soda ash per ton was then added to the pulp which was conditioned for 15 minutes. An arsenopyrite concentrate was then obtained by the additions of 1.5 pounds copper sulphate, 0.05 pound potassium amyl xanthate, 0.05 pound Reagent No. 301 and 0.08 pound pine oil per ton. The pyrite and arsenopyrite concentrates were cleaned on a smaller machine. The different products were assayed for gold and arsenic.

Result	a of	Flot	cation:
7 f /2 f /2 (V*** A	~ ~	7. 46.77	J CL O .1. O 44 0

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	:Weight,	asaa:	ys	_:Distri	.butior	g:Ratio
Product	; per	: Au,	a As,	; por	cent	of concar
	: cent	:oz./ton	per cent	;; Au	, As	tration:
	9	0				
Feed	:100.00	0.24	1.72	100.0	100.0	
Pyrite conc.	: 1.58	0.46	2.93	3.O	2.7	63;1.
Pyrite middling	: 3.30	0.34	2.44	4.7	4.7	30:1.
Arsenopyrite conc.	: 11.21	1.14	9,25	52,5	60.2	8.9:1.
Arsenopyrite middling	8.33	೦.32	2.26	ll.2	10.9	12:1.
Tailing	: 75.58	0.09	0.49	28.6	21.5	
	ç					ser mali (Engert du rent mas a summ

[©] Calculated.

The pH of the pyrite flotation was 8.1. That of the arsenopyrite flotation was 9.6.

It is apparent from the results of this test that the gold is largely contemporaneous with the arsenopyrite.

Test No. 13. - Roasting and Cyanidation.

Portions of the ore at minus 14 mesh were roasted in an oxidizing atmosphere for six-hour periods. The temperature was gradually raised to 325° C. where it was held until the fumes of arsenic and sulphur were no longer visible; the ore being constantly rabbled. The temperature was then gradually raised to 650° C. and continued at that temperature for 1 hour. At the conclusion of the roast, the calcine was cooled, weighed and assayed. Portions of the calcine were then cyanided as described below. An analysis of the calcine resulted as follows:

Gold - 0.26 oz./ton
Sulphide sulphur - 0.10 per cent
Sulphate sulphur - 1.05
Arsenic - 0.95

The loss in weight was 5.2 per cent.

The cyanidation of the calcine resulted as follows:

4				(Feed		0.26 02					
	8	ô	Grind,	:Tailing:	Extrac-	: Titi	eation,	3	Reage	nts	CHARLES THE PARTY OF
Tes	t:	Agita-:		: assay,		: lb.	./ton	9	cons	umed,	
No	0 0	tions	-200	: Au	gold,	േടഠി	lution	3	lb./t	on ore	
	ő	hours:	mesh	:oz./ton:	per cen	t: NaCN	ca0	Q Q	NaCN	; Cao	LIFE CONTRACTOR
-	2				COURT STATE STATE	and Carlotte and Carlotte		JI,CRIVATI	Pr. And Deleganist Strategy and		THE PARTY OF THE P
A.	8	24	84.2	0.095	63.5	2.1	0.10		1.8	12.5	
$_{\mathrm{B}}$	9	48	84.2	0.09	64.4	೭.೦	0.05		2.2	14.7	
C	. 9	24	84.2	0.08	69.2	1.9	0.15		3.8	16.0	
D	Q U	48	84.2	0.075	71.2	1.9	0.10		4.1	18.5	
	0										
E	8	24	84.2	0.07	73.1	2.0	0.10		5.1	26.2	-
\mathbf{F}^{i}	9	48	84.2	0.07	73.1	2.1	0.05		5.3	19.0	
G	2	24	84.2	0.10	61.5	1.0	0.10		1.3	15.0	
\mathbf{H}	0	48	84.2	0.095	63.5	1.1	0.10		1.5	17.5	
	8										

(Test No. 13, cont'd) =

In Tests A, B, G and H the calcine was ground in water, filtered and washed, prior to cyanidation. In Tests C and D the calcine was ground in cyanide and agitated in the grinding solution. In Tests E and F the calcine was ground in cyanide, filtered and washed, and fresh cyanide used for the agitation.

Test No. 14, straight cyanidation on Sample
No. 2, shows that the same deposition of the gold prevailed
as in Sample No. 1.

Test No. 14. - Straight Cyanidation.

Portions of the ore of Sample No. 2, at minus 14 mesh, were ground in cyanide solutions of 1 pound NaCN per ton strength to pass 85.8 per cent minus 200 mesh. The pulps were then agitated for 24- and 48-hour periods.

Results	8		(Feed =	Au, 2.0	00 oz./t	on).		
Agita-:	Grind,	:Tailing	:Extrac-	: Titi	atilon,	0	Reagen	
tions	%	: assay,	tion of			8	consume	эd,
					lution	0	lb./ton	ore
000000000000000000000000000000000000000	mesh	:oz./ton	sper cen	t: NaCN	; CaO	0	NaCN :	CaO
fact and and and a source and	THE PERSON NAMED OF THE PARTY OF THE	Berging better to history a factor group of						D. 61
24	85.8	1.96	2.0	0.90	0.05		2.1	13.0
4.0	05 0	3 ()2	O 15	0.00	0.50		2.7	מ מנ
48	85.8	1.81	9.5	0.92	0.10		601	17.8

Summary and Conclusions:

Sample No. 1 -

Straight cyanidation of the ore at a grind of 94 per cent minus 200 mesh gave an extraction of 8.3 per cent of the gold and a cyanide residue of 0.22 ounce gold per ton in 48 hours' agitation. The pulp settled very slowly and filtered with difficulty. Flotation of the graphitic carbon in the ore followed by regrinding and agitation in cyanide solution of the flotation tailing did not improve this extraction to any great extent.

Grinding in cyanide with the addition of charcoal, followed by agitation and flotation of the gold-bearing charcoal, gave a cyanide residue of 0.23 ounce gold per ton.

Jig and blanket concentration of the ore, followed by amalgamation of the combined concentrates, resulted in no appreciable recovery of the gold by amalgamation.

The best results obtained by flotation concentration were 57.4 per cent of the gold recovered in a concentrate which assayed 1.08 ounces gold per ton and was 12.5 per cent of the weight of the feed.

In the infrasizing test on the cyanide residue it was clearly shown that fine grinding of the ore would not benefit the extraction of the gold to any great extent as the minus 10 micron product assayed 0.19 ounce gold per ton and carried 38.6 per cent of the gold remaining after 48 hours, agitation.

The microscopic examination showed why it was

(Summary and Conclusions, cont'd) -

not possible to produce an economic concentration of the gold-bearing sulphides; the gangue material so impregnates the sulphides as to render them not susceptible to concentration.

Sample No. 2 -

On the high-grade shipment, Sample No. 2, both the microscope and the cyanidation tests showed that the ore is similar to that of Sample No. 1 as regards metallurgical behaviour.

Roasting Treatment -

On Sample No. 1, roasting of the raw ore followed by cyanidation of the calcine gave an extraction of some 70 per cent of the gold.

as practised by the Getchell Mine, Inc., Red House,
Nevada, where the reasting of the raw ore is conducted in
rotary kilns, would apparently apply to this ore. As
shown in the test work the ore is of an extremely refractory
nature and the gold was not amenable to any other method
of ore dressing applied in this investigation.

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