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February 19, 1945.

INTERIM REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

(Investigation No. 1788).

Summary of Experimental Test Work to Date on Gold Ore
from the Giant Yellowknife Gold Mines Property
at Yellowknife, Northwest Territories.

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Material Tested:

The two shipments of ore from the Giant Yellowknife Gold Mines Property on which most of the test work has been carried out were the Outcrop No. 1 ore, a shipment of 110 pounds, received in July of 1944, and the No. 3 Shipment, of 190 pounds of crushed drill cores, received on October 11, 1944.

Standard sampling and chemical analysis of these shipments gave the following results:

		<u>No. 1 Outcrop Ore</u>	<u>No. 3 Shipment Ore</u>
Gold, oz./ton	-	0.92	0.255
Silver, "	-	1.21	2.910
Copper, per cent	-	Trace.	0.04
Lead, "	-	0.05	Trace.
Zinc, "	-	Nil.	0.05
Iron, "	-	6.84	6.24
Arsenic, "	-	3.31	1.00
Antimony, "	-	Trace.	N.d.
Sulphur, "	-	3.07	2.73
SiO ₂ , "	-		41.30
CaO, "	-	0.72	11.86
MgO, "	-		1.50
Al ₂ O ₃ , "	-		15.34

N.d. - Not determined.

General Observations:

In the test work as carried out in the laboratories here, the No. 3 Shipment ore has been found to be, on the whole, the more amenable both to cyanidation of the various products and to flotation.

The two ore samples vary so widely with respect to the nature of the samples and to their gold and silver contents, that it is difficult to form a proper comparison of results of the test work. While the tailings loss is lower in the case of the No. 3 Shipment ore, from the test work the percentage of extraction naturally favours the higher-grade ore.

Also, in roasting our experience has been that the Outcrop No. 1 ore gives up its arsenic and sulphur more readily than the No. 3 Shipment ore, accounting for better results in cyaniding the calcine.

In roasting the concentrate, furnace draught and strict temperature control would appear to be important.

In the flotation of the No. 3 Shipment ore, considerable gangue slime appears to follow the concentrate which is readily eliminated in a cleaning operation. The amount of this material is 45 to 50 per cent of the rougher concentrate or 8 to 10 per cent of the ore, and the difference in gold value between the cleaner concentrate and the cleaner tailing (gangue slime) is so marked that from an economic and operating standpoint it would appear profitable to consider this feature.

Fine grinding appears necessary, especially in the case of the Outcrop No. 1 ore.

Infrasizer and screen analyses on some of the products show that the gold is very finely divided and is distributed to a large extent even to the very fine micron sizes.

Further treatment of flotation tailings without further grinding would seem to offer a small margin of profit,

(General Observations, cont'd) -

depending on tonnage. Cyanidation of the tailings offers greater possibilities than a tabling operation and would also serve as a safety operation in the case of high flotation tailings.

The treatment of the ore appears to involve considerable complications, with concentrate treatment offering the most difficulty. However, flotation, followed by a concentrate roasting treatment and with or without cyanidation of other products, appears to be the best plan of operation, as straight cyanidation of the ore, straight cyanidation of the concentrate, or cyaniding the roasted ore do not offer any possibilities.

On the Outcrop No. 1 ore, by ordinary methods of treatment, involving roasting and cyanidation of concentrate and cyaniding the flotation tailings, from the tests as carried out here an overall recovery of 87 to 88 per cent of the gold in the ore can be expected.

On the Shipment No. 3 ore, by the same methods of treatment as carried out here, and by varying the sequence of treatment operations, overall recoveries of 87.6 to 88.8 per cent of the gold in the ore can be expected.

However, certain preliminary treatment has been tried with considerable success, involving the treatment of the raw concentrate and also the cleaner tailings with sodium hydroxide and aluminium ingots. This treatment has shown increases in overall recovery of from 5 to 6 per cent of the gold in the ore when used on a lower grade rougher concentrate. We are of the opinion that further work along this line might be advisable.

Test details are summarized in the following pages.

PLOTATION TESTS

Ore	No.	Grind, mesh	Calc. head, Au oz./ton	Concn- trate, per cent weight	Cleaner : tailing, per cent weight	Tail- ings, oz./ton Au	Concn- trate, oz./ton Au	Cleaner : tailing, oz./ton Au	Concentrate: As, per cent	Concentrate: S, per cent	Ratio: of concen- tration	Recovery, per cent	Cleaner : tailing	Remarks
Outcrop #1	1	:88.2 -200	0.924	13.4	3.95	0.06	6.30	0.90	24.4	22.46	7.46:1.	90.9	3.8	pH, 8.5
"	2	:88.0 -200	0.945	12.1	4.70	0.08	6.94	0.84	25.4	24.4	8.26:1.	88.9	4.2	" 8.6
"	3	:84.0 -200	0.962	16.3	2.80	0.06	5.68	0.28	19.49	18.70	6.13:1.	94.1	0.9	" 9.2
"	4	:96.6 -200	0.970	21.1	-	0.05	4.40	-	14.58	14.25	4.72:1.	96.0	-	" 8.4
"	5	:83.8 -200	0.938	18.6	-	0.065	4.76	-	15.8	15.88	5.4:1.	94.3	-	" 8.8
"	6	:96.2 -325	0.930	15.1	5.95	0.04	5.84	0.32	19.34	18.79	6.63:1.	94.6	2.04	" 9.1
"	7	:99.2 -325	0.870	14.1	5.50	0.035	5.80	0.40	22.02	20.43	7.06:1.	94.2	2.52	" 8.0
"	19	:98.8 -325	0.876	14.1	7.30	0.05	5.72	0.42	21.5	20.39	7.1:1.	92.1	3.42	" 8.4
"	26	:98.0 -325	0.898	14.0	6.31	0.09	5.68	0.46	20.61	19.44	7.1:1.	88.8	3.40	" 8.5
"	28	:98.2 -325	0.871	27.36	-	0.04	3.08	-	11.98	11.17	3.65:1.	96.7	-	" 7.7
"	31	:98.8 -325	0.906	24.9	-	0.04	3.56	-	13.17	12.19	4.01:1.	96.7	-	" 7.8
Shipment #3	1	:96.0 -325	0.238	19.86	-	0.02	1.12	-	4.85	13.78	5.04:1.	93.29	-	" 8.4
"	2	:97.8 -325	0.259	21.02	-	0.02	1.16	-	4.69	12.89	4.76:1.	93.95	-	" 8.3
"	3	:86.8 -325	0.238	20.21	-	0.02	1.10	-	4.69	13.36	4.95:1.	93.28	-	" 8.5
"	5	:97.0 -325	0.236	20.38	-	0.015	1.10	-	4.65	13.18	4.90:1.	94.95	-	" 8.4
"	6	:77.0 -325	0.251	21.42	-	0.02	1.10	-	4.27	12.56	4.67:1.	93.86	-	" 8.8
"	14	:80.6 -325	0.232	9.00	7.81	0.02	2.32	0.09	10.38	28.87	11.1:1.	90.0	3.0	" 8.8
"	16	:78.0 -325	0.253	17.8	-	0.0175	1.34	-	5.18	15.14	5.62:1.	94.3	-	" 8.7
"	17	:81.5 -325	0.254	9.4	7.7	0.02	2.46	0.085	9.52	27.52	10.64:1.	90.9	2.6	" 8.5
"	19	:82.5 -325	0.248	19.5	-	0.02	1.19	-	-	-	5.1:1.	93.6	-	" 8.5
"	20	:87.6 -325	0.2416	10.33	8.80	0.02	2.14	0.05	8.86	26.0	9.7:1.	91.5	1.82	" 8.8
"	23	:87.5 -325	0.234	10.3	8.8	0.02	2.08	0.04	8.74	24.84	9.7:1.	91.54	1.50	" 8.8
"	24	:86.0 -325	0.2568	8.0	10.8	0.02	2.88	0.095	10.48	32.51	12.5:1.	89.72	3.98	3,000 g. sample
"	25	:85.2 -325	0.236	23.7	-	0.02	0.93	-	3.87	11.48	4.22:1.	93.4	-	"

Flotation Tests.

(Flotation Tests, cont'd) -

A study of the results of the flotation tests reveals the following:

- (1) Finer grinding needed for Outcrop No. 1 ore than for Shipment No. 3 ore.
- (2) Higher tailings loss from Outcrop No. 1 ore than from Shipment No. 3 ore.
- (3) Less gangue slime following concentrate in case of Outcrop No. 1 ore.
- (4) Higher percentage of extraction from flotation in case of Outcrop No. 1 ore.

In practically all of the flotation tests the reagents and amounts of reagents used were:

Grinding -

	<u>Lb./ton</u>
Soda ash	- 2.0
Potassium amyl xanthate	- 0.2
Reagent No. 208	- 0.2

Flotation:

Potassium amyl xanthate	- 0.2
Copper sulphate	- 1.0
Pine oil	- 0.1

Two pounds of sodium silicate per ton of ore was used either in the rougher cell or in the cleaner cell, according to the flotation procedure.

CYANIDATION TESTS OF FLOTATION TAILINGS WITHOUT GRINDING.
(All 24-hour cyanidation periods).

Ore	Tailing: from Test No.	Flotation: Au oz./ton	Cyanide: residue, Au oz./ton	Extraction, per cent	Per ton value recovered at \$35.00 Au	Remarks
Outcrop #1	28	0.04	0.025	37.5	\$ 0.525	
"	28	0.04	0.025	37.5	0.525	PbO added.
"	28	0.04	0.020	50.0	0.70	No PbO added.
"	31	0.04	0.020	50.0	0.70	
Shipment #3	1	0.02	0.0075	62.5	0.44	
"	2	0.02	0.005	75.0	0.525	
"	3	0.02	0.0075	62.5	0.44	
"	10	0.02	0.0075	62.5	0.44	
"	14	0.02	0.0075	62.5	0.44	
"	16	0.0175	0.0075	57.2	0.35	
"	17	0.02	0.01	50.0	0.35	
"	19	0.02	0.005	75.0	0.525	
"	20	0.02	0.0075	62.5	0.44	
"	21	0.02	0.01	50.0	0.35	
"	23	0.02	0.01	50.0	0.35	
"	24	0.02	0.01	50.0	0.35	
"	25	0.02	0.01	50.0	0.35	

A study of these results reveals:

(1) A fair margin of profit may be realized from the Outcrop No. 1 flotation tailings on a moderately large tonnage.

(2) On the Shipment No. 3 flotation tailings the margin of profit is almost eliminated unless the cyanide residue is 0.0075, or lower, ounce gold per ton. Cyanidation and filtering costs figured at 30 cents per ton more or less on 1,000 tons per day.

TABLING RESULTS ON FLOTATION TAILINGS,
OUTOROP NO. 1 ORE.

The flotation tailing in Tests Nos. 1, 2 and 5 were sampled and a portion run over the superpanner or over a Wilfley table. The results did not offer any possibilities for this operation.

	<u>Flotation</u> <u>tailings</u> <u>from Test No.</u>	<u>Flotation</u> <u>tailings,</u> <u>Au oz./ton</u>	<u>Concentration</u> <u>tailings,</u> <u>Au oz./ton</u>
1	-	0.06	0.05
2	-	0.08	0.07
5	-	0.065	0.055

CYANIDATION TESTS ON ORE.

<u>Ore</u>	<u>Test</u> <u>No.</u>	<u>Grind,</u> <u>per cent</u> <u>mesh</u>	<u>Head,</u> <u>Au</u> <u>oz./ton</u>	<u>Tailing,</u> <u>Au</u> <u>oz./ton</u>	<u>Extrac-</u> <u>tion,</u> <u>per cent</u>	<u>Remarks</u>
Outorop #1	8	98.0 -325	0.93	0.57	38.7	24 hours.
"	8	98.0 -325	0.93	0.575	38.2	48 hours.
"	30	97.2 -325	0.93	0.255	74.2	30 hours. Ore roasted by Beattie method.
Shipment #3	12A	81.2 -325	0.255	0.085	66.7	28 hours.
"	12B	94.4 -325	0.255	0.080	68.6	28 hours.
"	15	87.0 -325	0.255	0.065	66.7	24 hours.
"	18A	87.2 -325	0.255	0.060	76.5	29 hours. NaOH and Al used in preliminary agitation.
"	18B	87.2 -325	0.255	0.080	68.6	29 hours. No preliminary treatment.

On neither type of ore do these tests show any great possibilities.

FLOTATION CONCENTRATE TREATMENTS INVOLVING CYANIDATION AFTER ROASTING.

Ore	Conc. from Test No.	Assay, oz./ton	Assay, Preliminary treatment	Assay after treatment, oz./ton	Extraction, per cent	Method of Roasting	Assay, oz./ton	Assay of residue, per cent	Total extraction, per cent	Remarks
Oatcrop #1	1 to 7	5.40	Ground to 97.8% -325	5.40	-	Beattie	7.29:0.94	0.71:0.07	87.1	Cyanided at 4 to 1 dil'n for 28 hrs.
"	9 to 19	6.13	Ground to 99.6% -325	6.13	-	Beattie	8.56:0.70	1.21:0.21	92.2	Loss in wt. on roasting = 31.6%. Cyanided 4 to 1 dil'n for 48 hrs.
"	26	5.58	Ground to 99.8% -325	5.58	-	Forward	7.91:0.62	0.19:0.05	92.4	Loss in wt. on roasting = 29.4%. Cyanided at 4 to 1 dil'n for 44 hrs.
"	28	3.08	--	3.08	-	Beattie	3.72:0.41	1.27:0.11	88.8	Loss in wt. on roasting = 16%. Cyanided at 4 to 1 dil'n for 48 hrs.
"	28	3.08	--	3.08	-	Forward	3.73:1.03	0.50:0.06	71.1	Loss in wt. on roasting = 17.5%. Cyanided at 4 to 1 dil'n for 48 hrs.
"	31	3.56	Ground to 96% -325	3.56	-	Forward	4.51:0.84	0.41:0.02	80.95	Loss in wt. on roasting = 19.2%. Cyanided at 4 to 1 dil'n for 48 hrs.
Shipment #3	13	1.125	--	1.125	-	Beattie	1.40:0.47	1.55:3.35	63.2	Loss in wt. on roasting = 12%. Cyanided at 5 to 1 dil'n for 46 hrs.
"	13	1.125	Ground to 98.4% -325	1.125	-	Beattie	1.40:0.14	1.57:2.94	89.1	Loss in wt. on roasting = 12%. Cyanided at 5 to 1 dil'n for 46 hrs.
"	13	1.125	Ground to 98.4% -325	1.125	-	Forward	1.54:0.34	3.50:2.76	73.8	Loss in wt. on roasting = 15.3%. Cyanided at 5 to 1 dil'n for 46 hrs.
"	14	2.32	Ground to 95% - 325	2.32	-	Beattie	3.31:0.635	1.45:0.45	79.3	Loss in wt. on roasting = 24.1%. Cyanided at 5 to 1 dil'n for 48 hrs.
"	16	1.34	--	1.34	-	Beattie	1.56:0.59		75.1	Loss in wt. on roasting = 14.2%. Cyanided at 5 to 1 dil'n for 48 hrs.
"	16	1.34	Ground to 98.2% -325	1.34	-	Beattie	1.56:0.145		90.7	Loss in wt. on roasting = 14.2%. Cyanided at 5 to 1 dil'n for 48 hrs.

(Cont'd on next page)

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FLOTATION CONCENTRATE TREATMENTS INVOLVING CYANIDATION AFTER ROASTING (CONTINUED)

Ore	Conc. from Test No.	Assay ₂ Au oz./ton	Preliminary treatment	Assay after treatment, Au oz./ton	Extraction, per cent	Method or Roasting	Assay, Au oz./ton	Assay of residue, per cent	Total extraction on conc., per cent	Remarks
Shipment #3	17	2.46	Ground to 98.2% -325	2.46	-	Beattie	2.98:0.30		90.9	Loss in wt. on roasting = 25%. Cyanided at 5 to 1 dil'n for 48 hrs.
"	19	1.19	Agitated with: 200 g. Al + 2 g. CaO + 18 g. NaOH + 1190 cc. H ₂ O for 9 hrs; then cyanided for 30 hrs.	0.295	75.2	Beattie	0.40:0.075 cor- rec- ted to .069	3.40:3.53	94.2	Loss in wt. on roasting = 12.9%. Cyanided at 4 to 1 dil'n for 32 hrs. after grinding.
"	20	2.14	Same as #19	0.57	73.4	Beattie	0.70:0.27		89.8	Loss in wt. on roasting = 19.0%. Calcine ground and cyanided at 4 to 1 dil'n for 43 hrs.
"	20	2.14	Same as #19 without Al	0.52	75.7					
"	23	2.08	Ground and cyanided for 31 hrs.	0.625	70.0					
"	23	2.08	Ground and agitated with NaOH + CaO for 16 hrs. Cyanided for 31 hrs.	0.655	68.5	Beattie	0.920:0.27	1.41:1.61	90.1	Loss in wt. on roasting = 23.2%. Calcine ground and cyanided at 5 to 1 dil'n for 48 hrs.
"	24	2.88	--	2.88	-	Beattie	3.74:0.875	1.14:0.17	76.6	Loss in wt. on roasting = 29.1%. Calcine ground and agitated with NaOH + CaO. Filtered and cyanided at 5 to 1 dil'n for 48 hrs.

(Continued on next page)

FLOTATION CONCENTRATE TREATMENTS INVOLVING CYANIDATION AFTER ROASTING (CONTINUED)

Ore	Conc. from Test No.	Assay, Au oz./ton	Preliminary treatment	Assay after treatment, Au oz./ton	Extraction, per cent	Method of Roasting	Assay, Au oz./ton	Assay of residue, per cent	Total extraction, per cent	Remarks
							Cal. Res.	As S		
Shipment #3 (Flotation concentrate from cyanide residue of ore.)	15	0.40	--	0.40	-	Beattie	0.46; 0.115	1.30; 2.25	75.1	Loss in wt. on roasting = 13.4%. Calcine ground and agitated at 4 to 1 dil'n for 48 hrs.
Shipment #3	25	0.93		0.93	-	Beattie	1.15; 0.10	1.19; 0.51	91.4	Loss in wt. = 10.7%. Ground and cyanided for 48 hrs.
"	25	0.93	Cyanided for 30 hrs.	0.30	67.7	Beattie	0.36; 0.12	1.51; 0.41	88.5	Loss in wt. 10.5%. Ground and cyanided for 31 hrs.
"	25	0.93	Treated with NaOH + CaO for 9 hrs., then cyanided for 30 hrs.	0.28	69.9	Beattie	0.34; 0.13	1.79; 0.50	87.6	Loss in wt. 11.5%. Ground and cyanided for 31 hrs.
"	25	0.93	Treated with NaOH + Al + CaO for 9 hrs. then cyanided for 30 hrs.	0.16 weight correction: 0.261	72.0	Beattie	0.18; 0.04	1.25; 0.28	94.01	Loss in wt. 14.6% on roasting. Ground and cyanided for 31 hrs.
							0.0557			

(Continued on next page)

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(Flotation Concentrate Treatments Involving Cyanidation After Roasting, cont'd) -

A study of these concentrate treatment tests reveals:

1. Grinding of the concentrate after roasting is necessary, especially when the Forward method of roasting is used.
2. On Outcrop No. 1 ore, with a cleaner higher grade concentrate, there is little difference in results after the Beattie or Forward methods of roasting.
3. On a rougher concentrate of Outcrop No. 1 ore, the Beattie method of roasting appears to give better results. This also applies to the Shipment No. 3 ore.
4. Better percentages of extraction can be obtained on Outcrop No. 1 ore than on Shipment No. 3 ore.
5. It would appear that a preliminary treatment of concentrate before roasting and cyaniding will give better results.

CYANIDE TESTS ON CLEANER TAILINGS, SHIPMENT NO. 3 ORE.

Cleaner tailings from Test No.:	Assay, Au : oz./ton	Assay residue, Au : oz./ton	Extraction, per cent	Per cent:		Remarks
				As	S	
14	:0.09	: 0.035	: 61.0	:0.46	:0.66	Cyanided at 2 to 1 dil'n for 24 hrs.
17	:0.085	: 0.045	: 47.0	:0.42	:0.78	Cyanided at 2 to 1 dil'n for 24 hrs.
20	:0.05	: 0.015	: 70.0	:0.26	:0.38	Agitated with Al + NaOH + CaO for 10 hrs., then cyanided at 2 to 1 dil'n for 24 hrs.
23	:0.04	: 0.015	: 62.5	:0.24	:0.38	Agitated with NaOH + CaO for 10 hrs., then cyanided at 2 to 1 dil'n for 24 hrs.
24	:0.095	: 0.057	: 39.5	:0.65	:0.83	Cyanided at 2 to 1 dil'n for 24 hrs.
24	:0.095	:	:	:	:	Agitation with Al + NaOH + CaO. Bottle broken.
24	:0.095	: 0.030	: 68.4	:0.65	:0.83	Agitated with CaO + NaOH for 9 hrs., then cyanided at 2 to 1 dil'n for 24 hrs.

From these results it would appear that the preliminary treatment of the cleaner tailings, either with sodium hydroxide alone or with sodium hydroxide and aluminium might offer some possibilities. It is not known whether the hydrogen gas in the

(Cyanide Tests on Cleaner Tailings, Shipment No. 3 Ore, cont'd) -

NaOH + Al treatment is necessary for better results over the action of the NaOH on the arsenic in the concentrate.

INFRA SIZER TESTS.

Flotation Tailings, Test No. 7 (Outcrop No. 1)

A s s a y s		
Au, oz./ton	As, per cent	S, per cent
0.35	0.11	0.11

Size	:Weight, : per : cent	A S S A Y S			DISTRIBUTION,		
		: Au, : oz./ton	: As, : per cent	: S, : per cent	: Au	: As	: S
-56+40 microns	: 2.67	: 0.20	: 0.20	: 0.15	: 15.6	: 4.5	: 3.0
-40+28 "	: 8.88	: 0.04	: 0.11	: 0.05	: 10.3	: 8.2	: 5.4
-28+20 "	: 15.21	: 0.025	: 0.07	: 0.05	: 11.2	: 9.0	: 5.8
-20+14 "	: 16.52	: 0.015	: 0.02	: 0.06	: 7.3	: 2.8	: 7.5
-14+10 "	: 14.96	: 0.015	: 0.035	: 0.05	: 6.5	: 4.3	: 5.5
-10 "	: 41.76	: 0.04	: 0.02	: 0.23	: 49.1	: 71.2	: 72.8
Total	:100.00	: 0.034	: 0.117	: 0.132	:100.0	:100.0	:100.0

Cyanide Residue Roasted Concentrate, Test No. 31 (Outcrop No. 1)

A s s a y s		
Au, Oz./ton	As, per cent	S, per cent
0.84	0.41	0.02

Size	:Weight, : per : cent	A S S A Y S			DISTRIBUTION,		
		: Au, : oz./ton	: As, : per cent	: S, : per cent	: Au	: As	: S
+56 microns	:	:	:	:	:	:	:
+40 "	: 6.845	: 1.53	: 0.23	: 0.11	: 12.3	: 4.7	: 14.0
+28 "	:	:	:	:	:	:	:
+20 "	:	:	:	:	:	:	:
+14 "	: 11.48	: 1.28	: 0.28	: 0.05	: 17.2	: 9.3	: 10.5
+10 "	: 18.61	: 0.98	: 0.34	: 0.05	: 21.5	: 18.3	: 17.2
-10 "	: 63.065	: 0.66	: 0.37	: 0.05	: 49.0	: 67.7	: 58.3
Total	:100.00	: 0.85	: 0.34	: 0.054	:100.0	:100.0	:100.0

These infrasizer tests indicate the finely divided nature of the gold and also that the gold is proportionately associated with the arsenopyrite and sulphur.

SPECIAL AND MISCELLANEOUS TESTS.

Type of product	From Test No.	ASSAYS		Extraction, per cent	Remarks
		Head, Au oz./ton	Residue, Au oz./ton		
Concentrate from Outcrop #1 Ore	Compo-site 4 to 7	5.40	3.15	41.7	Ground to 98% -325 mesh and agitated with lime for 6 hrs., filtered, washed, and cyanided at 3 to 1 dil'n for 24 hrs.
Outcrop #1 Ore	30	0.93	0.255	74.2	Ore roasted by Beattie method and ground to 97.2% -325. Cyanided at 2½ to 1 dil'n for 30 hrs.
Shipment #3 Ore	12	0.255	0.085	66.7	Ground to 81.2% -325 and cyanided at 2 to 1 dil'n for 28 hrs.
"	12	0.255	0.080	68.5	Ground to 94.4% -325 and cyanided at 2 to 1 dil'n for 28 hrs.
Shipment #3 Ore	18	0.255	0.06	76.5	Ground to 93.5% -325 and one-half of filtered product treated with NaOH + Al + CaO and cyanided.
"	18	0.255	0.08	68.6	Other one-half of product cyanided with no preliminary treatment.

TEST NO. 19.

4,000 grams of ore ground to 87.5 per cent minus 325 mesh.

Reagents Added (lb./ton):

To Grinding -

Soda ash - 2.0
 Reagent No. 208 - 0.2
 Potassium amyl xanthate - 0.2

To Flotation -

Potassium amyl xanthate - 0.2
 Copper sulphate - 1.0
 Pine oil - 0.1
 Flotation time, - 20 minutes.

pH, 8.5.

(Continued on next page)

(Test No. 19, cont'd) -

Product	Weight, : per : cent	Assay, : Au : oz./ton	Distribution of gold, per cent
Flotation concentrate:	19.5	1.19	93.6
Flotation tailings :	80.5	0.02	6.4
Total	100.0	0.248	100.0

19-A.

595 grams of concentrate agitated with 200 grams aluminium ingots, 2 grams CaO, 18 grams NaOH and 1190 cc. H₂O for 9 hours. Filtered, washed, and cyanided at 4.2 to 1 dilution for 30 hours. Residue filtered, washed, weighed and sampled. An increase in weight was noted to 627 grams.

Results:

Assay of raw concentrate, Au oz./ton	= 1.19
Assay residue, "	= 0.295 (.311)
Extraction of gold, per cent	= 75.2
Per cent extraction on basis of original weight	= 73.9 per cent.

19-B.

1000 grams of flotation tailings was cyanided at 2 to 1 dilution for 24 hours.

Results:

Assay of flotation tailing, Au oz./ton	= 0.02
Assay residue, "	= 0.005
Extraction of gold, per cent	= 75.0
Increase in extraction on ore by cyaniding flotation tailing	= 4.8 per cent.

19-C.

465 grams of cyanide residue (19-A) was roasted by the Beattie method (loss in weight = 12.9 per cent). 250 grams of the roasted concentrate was ground and cyanided at 4 to 1

(Test No. 19, cont'd) -

dilution for 32 hours, then filtered, washed and sampled.

Results:

Assay residue from 19A, Au oz./ton	=	0.295
Assay roasted concentrate, "	=	0.40
Assay cyanide residue, "	=	0.075 (.069)
Extraction of gold, per cent	=	81.2
Per cent extraction on basis of original weight	=	94.2

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Summary of Test No. 19 Series:

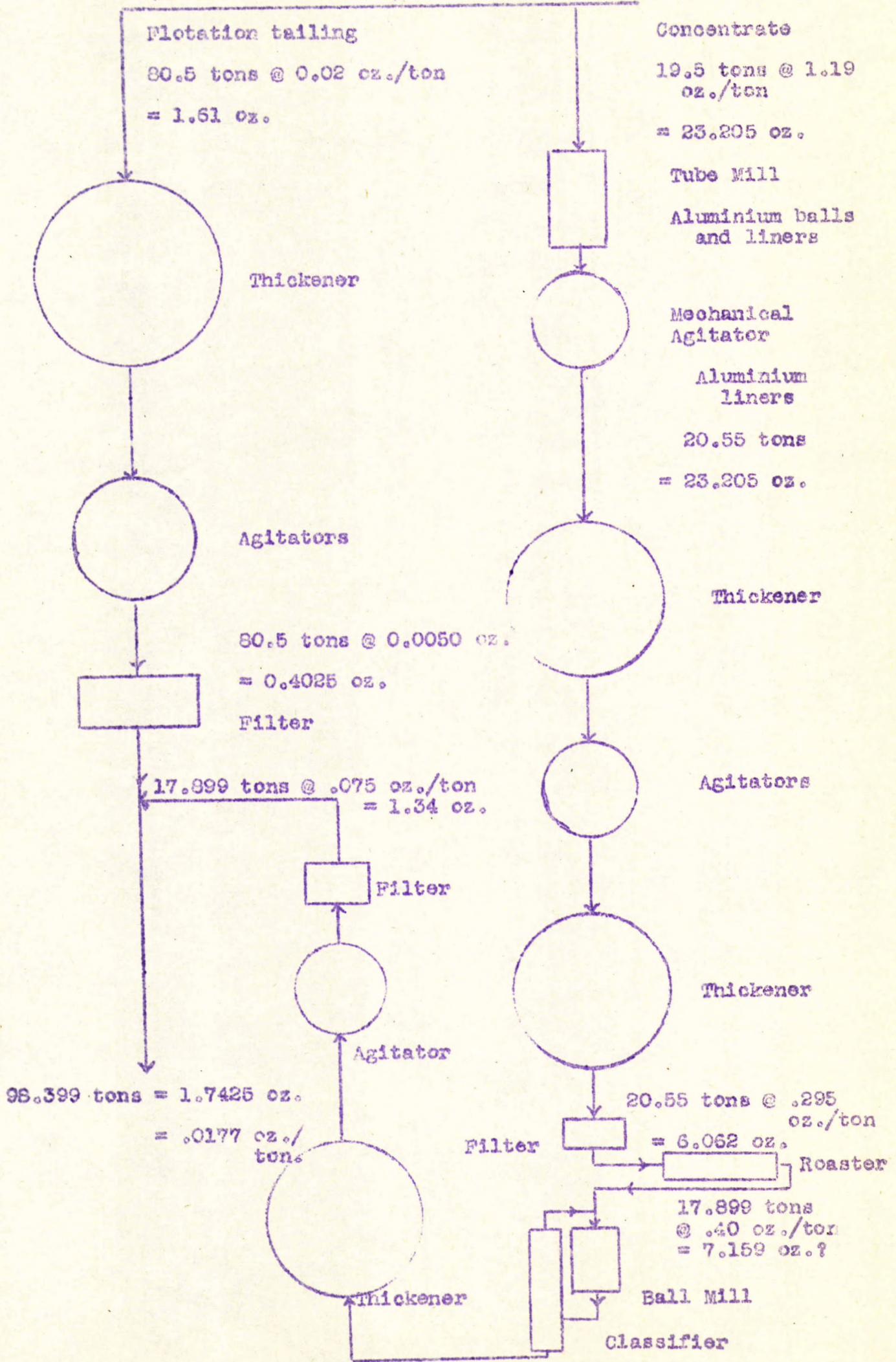
<u>Test No.</u>		<u>Per Cent</u>
19	Extraction on ore by flotation	= 93.6
19-B	Increase in extraction on ore by cyaniding flotation tailing	= 4.8
19-A + 19-C	Extraction on concentrate	= 94.2
19 + 19-A + 19-C	Recovery on ore by flotation + concentrate treatment	= 88.1
19 + 19-B + 19-A + 19-C	Overall recovery by flotation and cyaniding tailings + concentrate treatment	= 92.9

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{ Possible Flow-Sheet comprises Page 16.
Tests continue on Page 17. }

Possible Flow-Sheet for Pulp Treatment of Flotation Products per 100 tons, Shipment No. 3 Ore, Conforming to Test No. 19 Series.

(100 tons x .248 oz./ton = 24.8 oz. Au.)



TEST NO. 20.

4,000 grams of ore ground to 87.6 per cent minus 325 mesh. Usual flotation reagents used and a cleaner concentrate made by the addition of 1 lb./ton sodium silicate in the cleaner cell.

Product	A S S A Y S				DISTRIBUTION,		
	Weight, : : per : : cent	Au : : oz./ton	Per cent : : As : : S :	Per cent : : Au : : As : : S :	per cent	per cent	per cent
	Cleaner concentrate	10.33	2.14	8.86 : 26.00	91.50	94.30	97.10
Cleaner tailing	8.80	0.05	0.26 : 0.36	1.82	2.36	1.14	
Flotation tailing	80.87	0.02	0.04 : 0.06	6.68	3.34	1.76	
Total	100.00	0.2416	0.97 : 2.77	100.00	100.00	100.00	

20-A.

500 grams of cleaner tailings was treated with aluminium ingots, NaOH, CaO, and H₂O for 10 hours. Filtered and washed, cyanided at 2 to 1 dilution for 24 hours. Filtered and washed.

Results:

Assay cleaner tailing, Au oz./ton = 0.05
 Assay residue, " = 0.015
 Extraction, per cent = 70.0
 Increase in extraction on ore by cyaniding cleaner tailings = 1.28 per cent.

20-B.

1,000 grams of flotation tailings cyanided at 2 to 1 dilution for 24 hours. Filtered and washed.

Results:

Assay of flotation tailing, Au oz./ton = 0.00
 Assay residue, " = 0.0075
 Extraction of gold, per cent = 62.5
 Increase in extraction on ore by cyaniding of flotation tailing = 4.18 per cent.

(Continued on next page)

(Test No. 20, cont'd) -

20-C.

620 grams of cleaner concentrate was agitated with aluminium ingots, NaOH, CaO and H₂O for 10 hours, and filtered and washed, then cyanided at 4 to 1 dilution for 30 hours. Residue filtered, washed, dried, weighed, and sampled. An increase in weight was noted to 650 grams.

Results:

Assay cleaner concentrate, Au oz./ton	=	2.14
Assay residue, "	=	0.57 (0.59)
Per cent extraction on basis of original weight, per cent	=	72.4

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20-C-1.

100 grams of cleaner concentrate agitated with NaOH, CaO and H₂O (no aluminium) for 10 hours and filtered and washed. Cyanided at 4 to 1 dilution for 30 hours. Filtered and washed.

Results:

Assay cleaner concentrate, Au oz./ton	=	2.14
Assay residue, "	=	0.52
Extraction of gold, per cent	=	75.7

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20-D.

531 grams of cyanide residue of concentrate (20C) roasted by Beattie method (loss in weight = 23.0 per cent), sampled.

250 grams of the roasted concentrate was ground, filtered, washed, and cyanided at 4 to 1 dilution for 43 hours. Filtered and washed.

Results:

Assay of cyanided concentrate, Au oz./ton	=	0.57
Assay roasted concentrate, "	=	0.70
Assay residue, "	=	0.27 (.218)
Extraction of gold, per cent	=	63.6
Per cent overall extraction by (20-C + 20-D)	=	89.8

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(Continued on next page)

(Test No. 20, cont'd) -

Summary of Test No. 20:

<u>Test No.</u>		<u>Per Cent</u>
20	Extraction on ore by flotation	= 91.5
20-A	Increase in extraction on ore by cyaniding cleaner tailings	= 1.28
20-B	Increase in extraction on ore by cyaniding flotation tailings	= 4.18
20-C + 20-D	Extraction on cleaner concentrate	= 89.8
20 + 20-C + 20-D	Recovery on ore by flotation + concentrate treatment	= 82.16
20 + 20-A + 20-B + 20-C + 20-D	Cyaniding cleaner tailings + cyaniding flotation tailings + concentrate treatment	= 87.62

TEST NO. 25.

3,000 grams of ore ground to 86.8 per cent minus 325 mesh. Usual flotation reagents. No cleaning.

Product	:Weight, : : per : : cent :	A S S A Y S				DISTRIBUTION,		
		: Au, : : oz./ton :	: Per cent : : As : : S :	: Au : : As : : S :	: per cent	: Au : : As : : S :		
Flotation concentrate:	23.7	0.93	3.87:11.48	93.4	96.0	98.1		
Flotation tailing :	76.3	0.02	0.05: 0.07	6.6	4.0	1.9		
Total	100.0	0.236	0.95: 2.77	100.0	100.0	100.0		

25-A.

Results:

Assay flotation tailing, Au oz./ton	=	0.02
Assay residue, "	=	0.01
Extraction of gold, per cent	=	50.0
Increase in extraction on ore by cyaniding flotation tailing	=	3.3 per cent.

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(Test No. 25, cont'd) -

25-B-1.

150 grams flotation concentrate roasted by Beattie method (loss in weight = 10.7 per cent).

75 grams of roasted concentrate cyanided at 5 to 1 dilution for 48 hours.

Results:

Assay flotation concentrate, Au oz./ton	=	0.93
Assay roasted concentrate, "	=	1.15
Assay residue, "	=	0.10
Extraction of gold, per cent	=	91.4

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Summary:

<u>Test No.</u>		<u>Per cent</u>
25	Extraction on ore by flotation	= 93.4
25-A	Increase in extraction on ore by cyaniding flotation tailings	= 3.3
25 + 25-B-1	Recovery on ore by flotation + concentrate treatment	= 85.3
25 + 25-A + 25-B-1	Overall recovery	= 88.6

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25-B-2.

150 grams flotation concentrate cyanided at 5 to 1 dilution for 30 hours. Filtered and washed. Residue roasted by Beattie method (loss in weight = 10.5 per cent) and cyanided at 5 to 1 dilution for 31 hours.

Results:

Assay flotation concentrate, Au oz./ton	=	0.93
Assay residue, "	=	0.30
Extraction of gold, per cent	=	66.7
Assay roasted concentrate, Au oz./ton	=	0.36
Assay residue, "	=	0.12
Extraction of gold, per cent	=	66.7
Total extraction, per cent	=	88.5

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(Test No. 25, cont'd) -

25-B-3.

150 grams flotation concentrate treated with NaOH, CaO (no aluminium) and H₂O for 9 hours. Filtered, washed, and cyanided at 5 to 1 dilution for 30 hours. Filtered, dried, and roasted by Beattie method (loss in weight = 11.5 per cent). Cyanided at 5 to 1 dilution for 31 hours.

Results:

Assay flotation concentrate, Au oz./ton	=	0.93
Assay residue, "	=	0.28
Extraction, per cent	=	69.9
Assay roasted concentrate, Au oz./ton	=	0.34
Assay residue, "	=	0.13
Extraction, per cent	=	61.7
Total extraction of gold, per cent	=	87.6

25-B-4.

150 grams of flotation concentrate treated with aluminium ingots, CaO, NaOH, and H₂O for 9 hours. Filtered, washed, and cyanided at 5 to 1 dilution for 30 hours. Filtered, dried, and roasted by Beattie method (loss in weight = 14.6 per cent). Cyanided at 5 to 1 dilution for 31 hours.

Results:

Assay flotation concentrate, Au oz./ton	=	0.93
Assay residue, "	=	0.16 (.261)
Extraction, per cent on original weight	=	72.0
Assay roasted concentrate, Au oz./ton	=	0.18
Assay residue, "	=	0.04 (0.0557)
Extraction of gold, per cent	=	77.8
Total extraction of gold, per cent	=	94.01

Note: There was an increase in weight in the concentrate in 25-B-4, from 150 grams to 245 grams, after the preliminary treatment.

(Continued on next page)

(Test No. 25, cont'd) -

Summary of 25-B-4:

<u>Test No.</u>		<u>Per Cent</u>
25	Extraction on ore by flotation =	93.4
25 + 25-A	Increase in extraction on ore by cyaniding flotation tailings =	3.3
25 + 25-B-4	Total extraction on ore by flotation + concentrate treatment =	87.8
25 + 25-A + 25-B-4	Total recovery on ore by flotation + cyaniding flotation tailing + concentrate treatment =	91.1

Note: If the increase in extraction on the ore from cyaniding the flotation tailings in Test 25 (3.3 per cent) had equalled the increase in Test 19 (4.8 per cent) the overall results in these two tests would have been practically the same.

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WH:GMB.