

007462  
Mayo Ore

105 M.

105 M.

Lot No. 1872

Test 1 to 28 inc.

# The General Engineering Co. ORE TESTING REPORT

to

~~MAYO ORE~~

~~YUKON TERRITORY~~

~~ALASKA~~

**RECEIVED**

JUL 2 1938

GENERAL ENGINEERING CO.  
(CANADA) LTD.

Date JUNE 28<sup>th</sup> 1938

June 28, 1938

THE GENERAL ENGINEERING COMPANY (CANADA) LTD.  
100 ADELAIDE STREET, WEST,  
TORONTO, ONTARIO, CANADA

Gentlemen:

MAYO ORE - OUR LOT 1872

The following report is based on a laboratory investigation of a cobbed lead-silver ore from the Mayo district in the Yukon Territory.

The ore as received at the laboratory assayed as follows:

Gold	- - - - -	0.02 oz.
Silver	- - - - -	245.1 oz.
Total lead	- - - - -	71.5 %
Lead sulphate	- - - - -	10.5 %
Oxide & carbonate lead	- - - - -	13.8 %
Copper	- - - - -	0.20%
Silica	- - - - -	1.6 %
Zinc	- - - - -	0.5 %
Alumina	- - - - -	0.8 %
Iron	- - - - -	3.75%
Lime	- - - - -	0.10%
Sulphur	- - - - -	2.5 %
Antimony	- - - - -	0.55%
Arsenic	- - - - -	0.21%

Approximately 40% of the total silver in the ore was associated with the galena as determined by assaying picked cubical galena and the balance probably largely present as the ruby silvers and freibergite; the latter mineral containing 50% silver (R. E. Head). A brief microscopic examination of the ore was made by R. E. Head, microscopist for the U. S. Bureau of Mines, and his report is attached to this letter.

The problem involved was to make a preliminary investigation of the possibility of developing a means of commercially extracting the silver from the ore hydro-metallurgically and recovering it as bullion or as a product sufficiently high-grade to offset excessive transportation costs due to location.

All the work was confined to combinations of flotation and/or cyanidation as the lead content of the ore precluded the use of hyposulphite treatment.

### FLOTATION

Flotation treatment of the ore was investigated to determine (1) the relative flotability of the silver and lead minerals and (2) the possibility of removing cyanicides and producing ~~of~~ a high-grade silver concentrate followed by cyanidation of the flotation tails.

Approximately 20% - 25% of the total silver is present in minerals that float in preference to the galena and a concentrate containing 650 - 700 oz. silver per ton and representing 5 - 7% of the total weight is easily obtained. This may be accomplished by using a limited amount of collector with or without lead depressants as the galena in the ore is oxidized to the extent that it floats with considerable difficulty. Attempts to increase the silver recovery beyond this point results in the galena floating in preference to the silver minerals with the net result that as the silver recovery increases the flotation tails also increase in silver content because of the low ratio of concentration obtained.

Cyanidation of the flotation tails results in a 4 lb. to 11 lb. reduction in cyanide consumption when using lime in the agitation step, depending on the dilution used, but does not increase the overall extraction over straight cyanidation when using greater than 1:1 densities in agitation. The effect of flotation on cyanide consumption was not checked when using lime-free cyanide pulps.

### CYANIDATION

The work on cyanidation was confined largely to the determination of the effect of various conditions in standard practice on this ore, the source of losses in the tailings, the reason for excessive cyanide and lime consumptions and to the extent possible, the correction of these conditions.

Dilution: The effect of pulp dilution in agitation on extraction and cyanide consumption is clearly shown in test No. 18. As would be expected the cyanide consumption increases with increased dilution, but the maximum economical extraction is obtained at 2:1 dilution. Any increase in dilution over this results in increased cyanide consumption with little or no increase in extraction.

Strength of Cyanide solutions: Comparing a 10 lb. with a 5 lb. solution, a 1% increase in extraction is noted or only 2.5 ounces additional silver are extracted at a cost of a 10 lb. additional cyanide consumption by using a 10 lb. cyanide solution. Lower strength solutions than 5 lbs. were not tried.

Agitation times: Practically all the silver minerals amenable to cyanidation are dissolved in a 24-hour period. An additional 5 to 6 ounces are extracted by increasing the period to 48 hours and no further benefit obtained by longer than 48 hour periods. The cost of the additional cyanide consumed by longer agitation periods would hardly be justified by the additional silver extracted.

Acid Leach: Pre-agitation of the pulp with sulphuric acid does not tend to lower the cyanide consumption and when used in sufficient concentration (Test No. 16) the cyanide consumption is increased, probably due to the sulphating of some of the lead minerals.

Grinding: As one of the main sources of tailings losses is due to the silver associated with the galena, grinding tests were made on picked galena. Approximately 30% of the silver in the galena is extracted at grinds finer than 200 mesh (50 microns). Grinding to the extent that the largest particle would only be 15 microns in diameter does not materially increase the extraction, thus indicating that about 65% - 70% of the silver in the galena is either in solid solution or sub-microscopic dissemination. This represents 22% of the total silver in the heads received here and it may be safely assumed that this silver is not recoverable by any commercial hydrometallurgical methods known.

Cyanicides & Protective alkalinity: It has been shown that the lead minerals in the ore are chiefly responsible for high cyanide consumptions, especially when lime is present in the pulp. The sulphate probably accounts for a portion of this as shown by the use of sulphuric acid, but most of it is due to the reaction product of the galena with lime, probably a hydrate. The lime is consumed very rapidly by the ore or by the pure galena and to maintain a protective alkalinity requires a prohibitive amount, however, it is unnecessary to have any protective alkalinity during agitation. The substitution of ammonium hydroxide for lime reduced the cyanide consumption 57% and although a large quantity of ammonium hydroxide was used it was probably unnecessary but time did not permit checking this point. The cyanide solutions were assayed for substances that might consume cyanide but only negligible amounts of copper, arsenic and antimony were present.

Calcium hypochlorite and desulphurizing treatments: The highest extraction obtained in the laboratory (67%) was obtained by pre-agitating with calcium hypochlorite before cyanidation and further work along this line may be justified with the view of lowering the amount of hypochlorite necessary and further increasing extraction. Desulphurizing with caustic and aluminum before cyanidation also resulted in an increase in extraction but not to the same extent as did the hypochlorite treatment. Because of the amount of caustic necessary it is improbable that commercial treatment by this method would be justified.

General Discussion: Because of the lack of assurance that the sample of cobbled ore worked on in the laboratory would be representative of a concentrate from the crude ore, it is impossible to predict from the work done here what the results would be in the crude ore. It is understood that the crude ore would contain approximately 7% lead and 80 oz. per ton silver, which, if the case, then the sample worked on in this laboratory would not be representative. It is also usually the case that in hand-picking an ore containing mixed lead minerals, the sulphide will predominate in the picked portion.

In comparing the work done in this laboratory with that done in 1957 by J. J. Denny, it is evident by the difference in extractions made using similar procedures that the two samples are not similar in their mineral distribution. It is felt that further work on this problem is justified on the crude ore, particularly in investigating further the possibility of extracting the silver from the crude ore without preliminary concentration and also to determine the recoveries possible and grade of concentrate that can be produced by concentration of the crude ore.

#4

Mayo ors.

This completes the preliminary work on this sample. Detailed reports of all tests accompany this letter.

Yours very truly,

THE GENERAL ENGINEERING COMPANY

BY

R. H. Lowe, Metallurgist

RHL:mo

NOTES ON MAYO ORE, ALASKA - BY MR. HEAD.

A microscopic examination was made of polished surfaces of, (A) high-grade, (b) Freibergite and Galena, (C) Ruby Silver Specimen, and (D) Minus 65 mesh Head sample.

The results of the examination are as follows:

(A) High-grade ore.

As would be expected in a specimen of ore containing 71% lead, the section was composed almost exclusively of galena; It also contained small amounts of freibergite and ruby silver but with but a trace of pyrite or arsenopyrite. (This latter occurrence is of no importance).

Etching tests made on the galena fail to show inclusions of other minerals in the galena cubes. The lack of iniformity in the etched surface of the galena is suggestive of variable composition but it is not possible to say conclusively that it represents the existance of silver in solid solution. A fire assay of picked cubes of 1/4 inch size might show the approximate silver content of the galena.

Freibergite was found along gashes between cubes of galena but appeared to occur more abundantly as small areas in the gangue. Ruby silver also appeared to be confined to gangue immediately surrounding the galena in a manner similar to the freibergite occurrence. Liberation of the freibergite and ruby silver would be an easy matter and can be accomplished by grinding to 65 mesh, assuming that the material examined is representative of the ore as a whole.

(B) Freibergite and Galena Specimen.

This specimen contained a predominating amount of freibergite and relatively little galena. The etching developed the same indications of variable composition in the galena as described above, but no other minerals were found included in it. The freibergite was free from inclusions and was not closely or immediately associated with the galena.

(C) Ruby silver specimen:

This was strictly a specimen sample and was barren of both freibergite and galena. Etching showed inclusions of another mineral which is presumed to be some form of silver combined with antimony or arsenic.

(D) Crushed Head Sample

A split portion of the head sample was sieved and a representative portion of the -65 + 100 mesh product was briquetted and polished. The surface examined was estimated to contain approximately 5000 particles. No inclusions of freibergite or ruby silver were found in any of the galena grains. Free grains of freibergite and ruby silver were observed and it was evident that greibergite predominated over the ruby silver, in quantity. These facts form the basis of believing that the liberation of the minerals can be accomplished by relatively coarse grinding. Obviously it has no relation to the liberation of any silver associated with the galena in chemical combination.

Suggestions:

1. The approximate silver content of the galena should be determined by fire assay of washed galena cubes not larger than 1/4 inch in diameter.
2. The silver content of the freibergite should likewise be determined on material isolated from the hand specimen.
3. It is doubtful whether the ruby silver should be assayed since it appears to occur in minor amounts in the head sample.

Submitted by  
R. E. Head,  
U. S. Bureau of Mines,  
Salt Lake City, Utah

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

J. M. CALLOW, PRESIDENT

SALT LAKE CITY UTAH      TORONTO CANADA      30 CHURCH STREET NEW YORK CITY

DATE JUNE 1938

ORE TESTING DEPARTMENT

### SUMMARY OF RESULTS OF ALL TESTS

LOT 1872 FROM MAYO MINE YUKON TERRITORY

FOR COMPLETE INFORMATION ON ALL INDIVIDUAL TESTS. SEE DETAIL SHEETS

REAGENTS IN POUNDS PER TON OF ORE

TEST NO.	GRINDING % .200 M.	PRODUCTS	CONCENTRATION RATIO	ASSAYS PER TON OF 2000 POUNDS			PERCENT OF TOTAL CONTENTS OF HEAD SAMPLES —PERCENT OF RECOVERY OR LOSS			CYANIDE	LIME	GAUSSIC SODA ASH	Pot. Bichromate SULPHATE SODIUM SULFITE	Alphamic acid SULPHURIC ACID	Cresylic acid SULPHURIC ACID	THIO CARBANILIDE	Pot. Bichromate XANTHATE	COPPER SULFATE	Cyanide solution	Miscellaneous
				Ag	Pb	Cu	Ag	Pb	Cu											
Prelim										.75	3									
95																				
Flot. Conct	2.8			264.1	78.8	0.25	41.24	41.33	48.93											
Flot. Tail				217.3	64.3	0.15	58.76	58.67	51.07											
Head				233.8	69.6	0.19	100.	100.	100.											
1	100									46.2	36									
Cyanide Ext				154.0			62.83													
" Tail				91.1			37.17													
Head (Assay)				245.1			100.00													
2	95											2	5	.1	.05					
Flot. Conc	21.4			596.0	75.0	0.6	11.61	4.93	14.00											
Flot. Tail				222.3	70.8	0.18	88.39	95.07	86.00											
Head				239.8	71.5	0.20	100.	100.	100.											
3	95									17.5	60	2	5	.15	.05					
Flot. Conct	17.0			720.9	73.3	0.65	17.86	Ag	60.83											
Cy. Extract				108.7			42.97													
Cy. Tails				99.1			39.17													
Heads				238.1			100.													
4	95									25	74.5	2	5	.15	.05					
Flot. Conct	17.			720.9			17.86	Ag	67.31											
Cy. Extract				125.1			49.45													
Cy. Tail				82.7			32.67													
Head				238.1			100.00													
5	95									27.3	55	2	5	.15	.05					
Flot Conct	17.			720.9			17.86	Ag	61.82											
Cyanide Ext				111.2			43.96													
" Tail				96.6			38.18													
Head				238.1			100.													
6	95									22.1	97	2	5							
Cyanide Ext				115.4			47.08													
" Tail				129.7			52.92													
Heads (Assay)				245.1			100.													

HEADS ASSAY : Ag 245.1 oz; Pb 71.5%

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

J. M. CALLOW, PRESIDENT

SALT LAKE CITY UTAH      TORONTO CANADA      30 CHURCH STREET NEW YORK CITY

DATE JUNE 1938

ORE TESTING DEPARTMENT

### SUMMARY OF RESULTS OF ALL TESTS

LOT 1872

FROM MAYO

MINE YUKON TERRITORY

FOR COMPLETE INFORMATION ON ALL INDIVIDUAL TESTS, SEE DETAIL SHEETS

REAGENTS IN POUNDS PER TON OF ORE

TEST NO.	GRINDING % - 200 M.	PRODUCTS	CONCENTRATION RATIO	ASSAYS PER TON OF 2000 POUNDS			PERCENT OF TOTAL CONTENTS OF HEAD SAMPLES —PERCENT OF RECOVERY OR LOSS			CYANIDE	LIME	CAUSTIC SODA ASH	Pot. Bicarbonate SODIUM SULPHATE	Sulphuric acid SULPHURIC	Creosote acid CREOSOTE	THIO CARBONILIDE	Pot. ethyl ANTHRATE	COPPER SULFATE	Manganese 'A'	Calcium Hypochlorite
				Ag	Pb	Cu	Ag	Pb	Cu											
7 95																				
	Flot. Conct	10.5	628.0	76.5	0.63	24.97	10.26	30.0												
	Flot. Tail		200.2	71.0	0.15	75.03	89.74	70.0												
	Head		241.2	71.5	0.20	100.	100.	100.												
8 95																				
	Flot. Conct	11.6	675.6	75.5	0.56	24.08	9.12	24.00												
	Flot. Tail		201.4	71.1	0.17	75.92	90.88	76.00												
	Head		242.4	71.5	0.20	100.00	100.	100.												
9 95																				
	Flot. Conct	12.2	629.4	75.3	0.56	20.65	8.60	23.00												
	Flot. Tail		215.2	71.2	0.16	79.35	91.40	77.00												
	Head		249.0	71.5	0.20	100.	100.	100.												
10 95																				
	Flot. Conct	13.2	677.6	75.0	0.56	21.05	7.92	21.0												
	Flot. Tail		207.6	71.2	0.17	78.95	92.08	79.0												
	Head		243.5	71.5	0.20	100.	100.	100.												
11 95																				
	Flot. Conct	14.2	651.1			19.28					50.7	174	2	1	.1					.05
	Cyanide Ext		106.8			41.57														
	" Tail		100.6			39.57														
	Head		238.8			100.00														
12 95																				
	Flot. Conct	14.2	651.1			19.28					54.3	142	2	1	.1					.05
	Cyanide Ext		60.8			23.66														
	" Tail		146.6			57.06														
	Head		238.8			100.														
13 95																				
	Flot. Conct	14.2	651.1			19.28					44.8	25	2	1	.1					.05
	Cyanide Ext		107.1			41.68														
	" Tail		100.3			39.04														
	Head		238.8			100.														
14 95																				
	Cyanide Ext		162.9			66.46					45.5	100								50
	" Tail		82.2			33.54														
	Head (Assay)		245.1			100.00														
HEADS ASSAY				Ag 245.1 oz; Pb 71.5%																

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TEST NO.	GRINDING % .200 M.	PRODUCTS	CONCENTRATION RATIO	ASSAYS PER TON OF 2000 POUNDS				PERCENT OF TOTAL CONTENTS OF HEAD SAMPLES = PERCENT OF RECOVERY OR LOSS				CYANIDE	LIME	CAUSTIC SODA, ASH	SODIUM SULFIDE SULFITE	<i>Sulphuric acid</i> ZINC SULFATE	<i>Acetic acid</i> PINE OIL	THIO CARBANILIDE	<i>pot. Amyl</i> XANTHATE	COPPER SULFATE	<i>Acetylacet # 31</i>		
				Ag	Pb	Cu	Sb	Ag	Pb														
15	95	Cyanide Ext " Tail Head (Assay)		158.9 86.2 245.1				61.83 35.17 100.			53.0	50	90										
Desulphurized with caustic and aluminum before cyanidation. Cyanide agitation 5:1 density, 5 1/2 cy. sol. 48 hours.																							
16	95																						
Sample No.																							
Sample divided in equal parts and each leached 1 hour at 1:1 density with sulphuric acid before cyanidation. Cyanide agitation 3:1 density, 5 lbs. cyanide solution, 24 hours.																							
											50.4	5										0	
											51.3	5										5	
											51.0	5										10.	
											50.4	5										15.	
											52.8	5										25.	
											52.5	5										50.	
											59.1	5										100.	
											59.1	5										150	
											58.5	5										200	
17	95	Flot. Conct Cy. Ext. Cy. Tail Flot. Tail Cy. Ext. Cy. Tail Heads	1.5	248.1 96.8 151.3 219.0 163.8 55.2 238.0	83.55			67.94 26.51 41.43 32.06 23.98 8.08 100.	73.97														
Flot. Reagents																							
											1.						.05		.4		.1		
Flot. Conct 47.7 47 per ton flot. conct. Flot. Tail 48.3 122 per ton of flot. tails. Bulk separation made by flotation. Flotation tails and conct. cyanided separately. Cyanide agitation 3:1 density 48 hours. 5 lbs. cyanide solution																							
18	95	Sample #1 " #2 " #3 " #4 " #5		124.1 102.5 102.0 98.0 100.2				49.37 58.18 58.38 60.02 59.12			27.9	20											
Agitation Dilution																							
Ball mill product divided equally Agitation in all samples 48 hours in 5 lbs. cyanide solution.																							
19	*	Cyanide Ext " Tail Heads		90.3 142.5 232.8				38.79 61.21 100.00			62.0	60											
Test on hand picked granular galena. Cyanidation agitation 5:1 density, 44 hrs. 5 lbs. cyanide solution. * Grind - 100% minus 300 mesh.																							
20	*	Cyanide Ext. " Tail Head (Assay)		58.4 120.0 178.4				32.74 67.26 100.00			53.0	40											
Test on picked cubical galena. Ball mill product leached with ammonium acetate; acetic acid before cyanidation. Cy. Agit. 5:1 density, 5 1/2 solution, 44 hours * Grind 45% minus 10 microns Max. - 30 microns dia.																							
HEADS ASSAY				Ag 245.1 oz	Pb 71.5%																		

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DATE JUNE 1938

ORE TESTING DEPARTMENT

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LOT 1872 FROM MAYO MINE YUKON TERRITORY

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REAGENTS IN POUNDS PER TON OF ORE

TEST NO.	GRINDING % .200 M.	PRODUCTS	CONCENTRATION RATIO	ASSAYS PER TON OF 2000 POUNDS		PERCENT OF TOTAL CONTENTS OF HEAD SAMPLES —PERCENT OF RECOVERY OR LOSS		CYANIDE	LIME	CAUSTIC SODA ASH	SODIUM SULFIDE SULFITE	ZINC SULFATE	PINE OIL	THIO CARBANILIDE	XANTHATE	COPPER SULFATE	<i>Cyanuric Hydroxide</i>	<i>Alcohol 40%</i>
				Ag	Pb	Ag	Pb											
21 *		Cyanide Ext		59.8		33.52		23										100
		Cyanide Tails		118.6		66.48												
		Heads (Assay)		178.4		100.												
22 *		Cyanide Ext.		54.8		30.72		20.5										100.
		" Tail		123.6		69.28												
		Head (Assay)		178.4		100.												
23 *		Cyanide Ext.		58.4		32.74		24.5										100.
		" Tail		120.0		67.26												
		Head (Assay)		178.4		100.00												
24 *		Cyanide Ext.		58.8		32.96		25.5										100.
		" Tail		119.6		67.04												
		Head (Assay)		178.4		100.												
25 95		Cyanide Ext		145.2		59.24		33										100.
		" Tail		99.9		40.76												
		Heads (Assay)		245.1		100.												
26 95		Cyanide Ext.		143.9		58.71		28.5										80
		" Tail		101.2		41.29												
		Heads (Assay)		245.1		100.												
27 *		Cyanide Ext.		50.0		28.03		15										100.5
		" Tail		128.4		71.97												
		Heads (Assay)		178.4		100												
28 95		Cyanide Ext.		139.3		56.83		27.5										100.5
		" Tail		105.8		43.17												
		Head (Assay)		245.1		100.												

HEADS ASSAY : Ag 245.1 oz; Pb 71.5%  
Cubical galena - Ag 178.4 oz.

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE MAY 1938

TEST PRELIMINARY

ASSAY AND CALCULATIONS

OF PRELIMINARY, FLOT.

TEST ON ORE

FROM MAYO

MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS			CONTENTS = ASSAY X PER CENT OF WEIGHT			PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES = PER CENT OF RECOVERY OR LOSS																																																																																																	
			Ag	Pb	Cu	Ag	Pb	Cu	Ag	Pb	Cu																																																																																															
	<p>The ore as received was split and one representative portion was crushed in rolls close circuited with a 10 mesh screen and the other in rolls close circuited with a 20 mesh screen. An average portion of the minus 20 mesh product was cut out for assay and the balance of the ore retained for laboratory work.</p> <p>Heads assays were as follows:</p> <table style="margin-left: 40px;"> <tr><td>Au</td><td>- - - -</td><td>0.02 oz.</td></tr> <tr><td>Ag</td><td>- - - -</td><td>245.1 oz.</td></tr> <tr><td>Total Pb %</td><td>- - - -</td><td>71.5%</td></tr> <tr><td>Non-sulphide Pb</td><td></td><td>24.1%</td></tr> <tr><td>Cu</td><td>- - - -</td><td>0.2%</td></tr> <tr><td>SiO<sub>2</sub></td><td>- - - -</td><td>1.8%</td></tr> <tr><td>Zn</td><td>- - - -</td><td>0.3%</td></tr> <tr><td>Al<sub>2</sub>O<sub>3</sub></td><td>- - - -</td><td>0.80%</td></tr> <tr><td>Fe</td><td>- - - -</td><td>3.75%</td></tr> <tr><td>CaO</td><td>- - - -</td><td>0.10%</td></tr> <tr><td>S</td><td>- - - -</td><td>9.5%</td></tr> <tr><td>Sb</td><td>- - - -</td><td>0.55%</td></tr> <tr><td>As</td><td>- - - -</td><td>0.31%</td></tr> </table> <p>Samples of the ore, as received, and of the minus 10 mesh plus 20 mesh product were thoroughly washed and dried. Sufficient galena for assay was separated by hand picking with the following results:</p> <table style="margin-left: 40px;"> <tr> <td>Galena as received</td> <td>165.8</td> <td>84.3</td> <td>0.05</td> </tr> <tr> <td>( Minus 10 mesh</td> <td></td> <td></td> <td></td> </tr> <tr> <td>( Plus 20 mesh galena</td> <td>176.8</td> <td>84.3</td> <td>0.06</td> </tr> </table> <p style="text-align: center;"><u>PRELIMINARY FLOTATION TEST</u></p> <p>An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh with 2.0 lbs. soda ash, 0.75 sodium cyanide, 0.25 lbs. thio-carbamide. The ball mill product was floated in a Gecco machine with 0.20 lbs. Aerofloat #15.</p> <table style="margin-left: 40px;"> <tr> <td><u>Table No.1</u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2 Flot. Conct.</td> <td>36.5</td> <td>264.1</td> <td>78.8</td> <td>0.25</td> <td>9640</td> <td>2876</td> <td>9.13</td> <td>41.24</td> <td>41.33</td> <td>48.93</td> </tr> <tr> <td>3 Flot. Tail</td> <td>63.5</td> <td>217.3</td> <td>64.3</td> <td>0.15</td> <td>13735</td> <td>4083</td> <td>9.53</td> <td>58.76</td> <td>58.67</td> <td>51.07</td> </tr> <tr> <td>1 Heads</td> <td>100.</td> <td>233.8</td> <td>69.6</td> <td>0.19</td> <td>23375</td> <td>6959</td> <td>18.66</td> <td>100.</td> <td>100.</td> <td>100.</td> </tr> </table>											Au	- - - -	0.02 oz.	Ag	- - - -	245.1 oz.	Total Pb %	- - - -	71.5%	Non-sulphide Pb		24.1%	Cu	- - - -	0.2%	SiO <sub>2</sub>	- - - -	1.8%	Zn	- - - -	0.3%	Al <sub>2</sub> O <sub>3</sub>	- - - -	0.80%	Fe	- - - -	3.75%	CaO	- - - -	0.10%	S	- - - -	9.5%	Sb	- - - -	0.55%	As	- - - -	0.31%	Galena as received	165.8	84.3	0.05	( Minus 10 mesh				( Plus 20 mesh galena	176.8	84.3	0.06	<u>Table No.1</u>											2 Flot. Conct.	36.5	264.1	78.8	0.25	9640	2876	9.13	41.24	41.33	48.93	3 Flot. Tail	63.5	217.3	64.3	0.15	13735	4083	9.53	58.76	58.67	51.07	1 Heads	100.	233.8	69.6	0.19	23375	6959	18.66	100.	100.	100.
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HEAD ASSAY

Ag 245.1 oz.; Pb 71.5%

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

ORE TESTING DEPARTMENT

ASSAY AND CALCULATIONS

LOT 1872

DATE MAY 1938

TEST 1

OF CYANIDATION TEST ON ORE FROM MAYO MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS			CONTENTS — ASSAY X PER CENT OF WEIGHT			PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES — PER CENT OF RECOVERY OR LOSS		
			Ag			Ag			Ag		
<b>TEST #1</b>											
<p>An average portion of the ore was ground in a ball mill at 1:1 density in a 4 lb. cyanide solution with 6 lbs. lime per ton of ore to 100% minus 200 mesh.</p> <p>Ball mill cyanide consumption — 3.8 lbs. per ton of ore.</p> <p>Ball mill protective alkalinity — 0.10 lbs. lime per ton of solution.</p> <p>The ball mill product was diluted to 4:1 density with a 4 lb. cyanide solution, 10 lbs. lime per ton of ore added and agitated 63 hours. 39.2 lbs. cyanide and 30.0 lbs. lime per ton of ore were added during agitation.</p> <p>Agitation cyanide consumption — 42.4 lbs. per ton of ore</p> <p>Total cyanide consumption — 46.2 lbs. per ton of ore.</p> <p>Agitation protective alkalinity — 0.10 lbs. lime per ton of solution</p> <p>Lime used 36.0 lbs. per ton of ore.</p>											
<b>Table No. 1</b>											
2	Cyanide Extraction	100.	154.0			1540					62.83
3	Cyanide Tail	100.	91.1			911					37.17
1	Heads (Assay)	100.	245.1			2451					100.00

HEAD ASSAY

Ag 245.1 oz; Pb 71.5%

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

ORE TESTING DEPARTMENT

ASSAY AND CALCULATIONS

LOT 1872

DATE May 19 38

TEST 2 - 3

OF FLOTATION, CYANIDATION TEST ON ORE FROM MAYO MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS				CONTENTS = ASSAY X PER CENT OF WEIGHT				PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES = PER CENT OF RECOVERY OR LOSS			
			Au	Ag	Pb	Cu	Au	Ag	Pb	Cu	Au	Ag	Pb	Cu
<b>TEST #2</b>														
<p>An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was conditioned 5 minutes with 5 lbs. sulphuric acid per ton of ore and an additional 10 minutes with 2 lbs. Potassium bichromate. The pulp was then floated in a Geco cell with 0.10 lbs. cresylic acid and 0.05 lbs. potassium ethyl xanthate per ton of ore.</p>														
<u>Table No. 1</u>														
2	Flot. Conct.	4.67	0.06	596.0	75.0	0.60	0.28	2783	350	2.80	14.00	11.61	4.93	14.00
3	Flot. Tail	95.33	0.018	222.3	70.8	0.18	1.72	21192	6750	17.2	86.00	88.39	95.07	86.00
1	Heads*(assay)	100.00	0.02	239.8	71.5	0.20	2.00	23975	7100	20.0	100.	100.	100.	100.
* Silver head calculated.														
<b>TEST #3</b>														
<p>An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was conditioned 5 minutes with 5 lbs. sulphuric acid per ton of ore and 10 minutes with 2 lbs. pot. bichromate. The pulp was floated with 0.05 lbs. Minerec "A" and 0.15 lbs. cresylic acid per ton of ore.</p>														
<u>Table No. 1</u>														
2	Flot. Conct.	5.9	0.02	720.9	73.3	0.65	0.12	4253	432	3.8	6.00	17.86	6.08	19.00
3	Flot. Tail	94.1	0.02	207.8	70.9	0.17	1.88	19554	6668	16.2	94.00	82.14	93.92	81.00
1	Head *(Assay)	100.0	0.02	238.1	71.5	0.20	2.00	23807	7100	20.0	100.	100.	100.	100.
* Silver head calculated.														
<p>An average portion of the flotation tails was filtered, made up to approximately 1:1 density, 10 lbs. lime per ton of ore added and the solution made up to 5 lbs. cyanide strength. The cyanide strength and protective alkalinity were maintained during agitation by addition.</p> <p>Total cyanide consumption - - 17.5 lbs. per ton of ore.</p> <p>Agitation protective alkalinity - 0.03 lbs. lime per ton of solution.</p> <p>Lime used - 68 lbs. per ton of ore.</p>														
<u>Table No. 2</u>														
4	Cyanide Extraction	94.1		108.7				10229				42.97		
5	Cyanide tails	94.1		99.1				9325				39.17		
3	Flot. Tails	94.1		207.8				19554				82.14		
<u>Table No. 3</u>														
2	Flot. Conct.	5.9	0.02	720.9	73.3	0.65		4253			17.86	Ag		
4	Cyanide Extract.	94.1		108.7				10229			42.97	Ag	60.83	
5	Cyanide Tail	94.1		99.1				9325			39.17			
1	Heads	100.0		238.1				23807			100.00			

HEAD ASSAY : Ag 245.1 oz. Pb 71.5%

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.  
 ORE TESTING DEPARTMENT  
 ASSAY AND CALCULATIONS

LOT 1872

DATE MAY 1938

TEST 4,5

OF FLOTATION, CYANIDATION TEST ON ORE FROM MAYO MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS				CONTENTS = ASSAY X PER CENT OF WEIGHT				PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES = PER CENT OF RECOVERY OR LOSS			
			Au	Ag	Pb	Cu	Au	Ag	Pb	Cu	Au	Ag	Pb	Cu
<u>TEST #4</u>														
Test No. 4 was a duplicate of test No. 3 except the agitation was at approximately 3:1 density in a 5 lb. cyanide solution for 24 hours. Total cyanide consumption - 25.0 lbs. per ton of ore. Agitation protective alkalinity - 0.05 lbs. lime per ton of solution. Lime used - 74.5 lbs. per ton of ore.														
<u>Table No. 1</u>														
4	Cyanide Extraction	94.1		125.1					11772					49.45
5	Cyanide Tails	94.1		82.7					7782					32.67
3	Flot. Tail (From Test 3)	94.1		207.8					19554					82.14
<u>Table No. 2</u>														
2	Flot. Conct (From test 3)	5.9	0.02	720.9	73.3	0.65			4253					17.86) <u>Ag</u>
4	Cyanide Extraction	94.1		125.1					11772					49.45) <u>67.31</u>
5	Cyanide Tails	94.1		82.7					7782					32.67
1	Heads	100.0		238.1					23807					100.
<u>TEST #5</u>														
Test No. 5 was a duplicate of test No. 3 except that agitation was at approximately 1:1 density in a 10 lb. cyanide solution for 24 hours. Total cyanide consumption - - - - 27.3 lbs. per ton of ore. Agitation protective alkalinity - - 0.05 lbs. lime per ton of solution. Lime used - - 55.0 lbs. per ton of ore.														
<u>Table No. 1</u>														
4	Cyanide Extraction	94.1		111.2					10464					43.96
5	Cyanide Tail	94.1		96.6					9090					38.18
3	Flot. Tail (From test 3)	94.1		207.8					19554					82.14
<u>Table No. 2</u>														
2	Flot. Conct (From test 3)	5.9	0.02	720.9	73.3	0.65			4253					17.86) <u>Ag</u>
4	Cyanide Extraction	94.1		111.2					10464					43.96) <u>61.82</u>
5	Cyanide Tail	94.1		96.6					9090					38.18
1	Heads	100.		238.1					23807					100.

HEAD ASSAY Ag 245.1 oz; Pb 71.5%

THE GENERAL ENGINEERING CO.

PER \_\_\_\_\_

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE MAY 1938

TEST 6 - 9

ASSAY AND CALCULATIONS

OF CYANIDATION, FLOTATION TEST ON ORE FROM MAYO MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS				CONTENTS = ASSAY X PER CENT OF WEIGHT				PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES = PER CENT OF RECOVERY OR LOSS			
			Au	Ag	Pb	Cu	Au	Ag	Pb	Cu	Au	Ag	Pb	Cu
<b>TEST No. 6</b>														
<p>An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was agitated 15 minutes with 5 lbs. Sulphuric acid and 2 lbs. potassium bichromate per ton of ore and then aerated 15 minutes following agitation. The pulp was filtered, repulped to 1:1 density, made up to 5 lbs. cyanide strength, 10 lbs. lime per ton of ore added and agitated 24 hours. Cyanide strength and protective alkalinity were maintained during agitation by new additions.</p> <p>Total cyanide consumption - - 22.1 lbs. per ton of ore.            Agitation protective alkalinity - 0.05 lbs. lime per ton of solution.            Lime used - 97 lbs. per ton of ore.</p>														
<b>Table No. 1</b>														
2	Cyanide Extraction	100.		115.4				11540					47.08	
3	Cyanide Tail	100.		129.7				12970					52.92	
1	Heads (Assay)	100.		245.1				24510					100.	
<b>TEST No. 7</b>														
<p>An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was conditioned 15 minutes, with 2 lbs. potassium bichromate and 0.10 lbs. Minerec "A" and floated in a Geco cell with 0.10 lbs. cresylic acid. The pH of the flotation tails was 7.0.</p>														
<b>Table No. 1</b>														
2	Flot. Conct.	9.59	628.0	76.5	0.63		6023	734	6.0			24.97	10.26	30.00
3	Flot. Tail	90.41	200.2	71.0	0.15		18100	6416	14.0			75.03	89.74	70.00
1	Heads (Assay)*	100.0	241.2	71.5	0.20		24123	7150	20.0			100.	100.	100.
* Ag on heads calculated.														
<b>TEST No. 8</b>														
<p>Test No. 8 was similar to test No. 7 except the pulp was conditioned with 2 lbs. potassium bichromate and 1 lb. sulphuric acid. The pH of the flot tails was 6.7.</p>														
<b>Table No. 1</b>														
2	Flot. Conct.	8.64	675.6	75.5	0.56		5837	652	4.8			24.09	9.12	24.00
3	Flot. Tail	91.36	201.4	71.1	0.17		18400	6498	15.2			75.92	90.88	76.00
1	Heads (Assay)*	100.00	242.4	71.5	0.20		24237	7150	20.0			100.	100.	100.
* Ag on heads calculated.														
<b>TEST No. 9</b>														
<p>Test No. 9 was similar to test No. 7 except the pulp was conditioned with 2 lbs. potassium bichromate and 3 lbs. sulphuric acid. The pH of the flot. tails was 6.5.</p>														
<b>Table No. 1</b>														
2	Flot. Conct.	8.17	629.4	75.3	0.56		5142	615	4.6			20.65	8.60	23.00
3	Flot. Tails	91.83	215.2	71.2	0.16		19762	6535	15.4			79.35	91.40	77.00
1	Heads (Assay)*	100.00	249.0	71.5	0.20		24904	7150	20.0			100.	100.	100.
* Ag on heads calculated.														

HEAD ASSAY

Ag 245.1 oz; Pb 71.5%

THE GENERAL ENGINEERING CO.

PER \_\_\_\_\_

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE JUNE 1928

TEST 10, 11

ASSAY AND CALCULATIONS

OF FLOT. CYANIDATION

TEST ON ORE

FROM MAYO

MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS				CONTENTS — ASSAY X PER CENT OF WEIGHT				PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES — PER CENT OF RECOVERY OR LOSS			
			Au	Ag	Pb	Cu	Au	Ag	Pb	Cu	Au	Ag	Pb	Cu
<u>TEST #10</u>														
<p>Test No. 10 was similar to test No. 7 except the pulp was conditioned with 2 lbs. potassium bichromate and 7 lbs. H<sub>2</sub>SO<sub>4</sub> per ton of ore. The pH of the flot. tails was 6.4.</p>														
<u>Table No. 1</u>														
2	Flot. Conct.	7.55	677.6	75.0	0.56	5116	566	4.2		21.05	7.92	21.0		
3	Flot. Tails	92.45	207.6	71.2	0.17	19192	6584	15.8		78.95	92.08	79.0		
1	Heads (Assay)*	100.	234.5	71.5	0.20	24308	7150	20.0		100.	100.	100.		
*Ag on heads calculated.														
<u>TEST #11</u>														
<p>An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was conditioned with 1 lbs. sulphuric acid and 2 lbs. potassium bichromate per ton of ore and floated in a Gecco cell with 0.05 lbs. Minerec "A" and 0.15 lbs. cresylic acid per ton of ore.</p>														
<u>Table No. 1</u>														
2	Flot. Conct.	7.07	651.1			4603				19.28				
3	Flot. Tail	92.93	207.4			19274				80.72				
1	Heads	100.00	238.8			23877				100.00				
<p>The flotation tails were filtered and a portion diluted to 5:1 density made up to 5 lbs. cyanide strength, 100 lbs. lime per ton of ore added and agitated 48 hours. The cyanide strength and protective alkalinity were maintained during the agitation period. At periodic intervals the silver was precipitated with sodium sulphide and removed from the solution and the solution returned to the pulp.</p> <p>Cyanide consumption — 50.7 lbs. per ton of ore                      Agitation protective alkalinity — 3.2 lbs. lime per ton of solution.                      Lime used — 174 lbs. per ton of ore.</p>														
<u>Table No. 2</u>														
4	Cyanide Extraction	92.93	106.8			9925				41.57				
5	Cyanide Tails	92.93	100.6			9349				39.15				
3	Flot. Tails	92.93	207.4			19274				80.72				
<u>Table No. 3</u>														
2	Flot. Conct.	7.07	651.1			4603				19.28)				
4	Cyanide Extract.	92.93	106.8			9925				41.57)		60.85		
5	Cyanide Tails	92.93	100.6			9349				39.15				
1	Heads	100.	238.8			23877				100.00				

HEAD ASSAY  
 Ag 245.1 oz.  
 Pb 71.5%

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE JUNE 1933

TEST 12 & 13

ASSAY AND CALCULATIONS

OF FLOTATION, CYANIDATION TEST ON ORE FROM NAYO MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS				CONTENTS = ASSAY X PER CENT OF WEIGHT				PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES = PER CENT OF RECOVERY OR LOSS			
			Au	Ag	Pb	Cu	Au	Ag	Pb	Cu	Au	Ag	Pb	Cu
<b>TEST #12</b>														
<p>A portion of the flotation tails from test #11 were filtered and repulped to 5:1 density. The solution was made up to 5 lbs. cyanide strength, 100 lbs. lime per ton of ore added and agitated 48 hours. Cyanide strength and protective alkalinity were maintained during agitation.</p> <p>Cyanide consumption - - - 54.3 lbs. per ton of ore.</p> <p>Agitation protective alkalinity - 1.1 lbs. lime per ton of solution.</p> <p>Lime used - - - 142 lbs. per ton of ore.</p>														
<u>Table No. 1</u>														
4	Cyanide Extraction	92.93	60.8			5650						23.66		
5	Cyanide Tails	92.93	146.6			13624						57.06		
3	Flot. Tails (From Test 11)	92.93	207.4			19274						80.72		
<u>Table No. 2</u>														
2	Flot. Conct. (From test 11)	7.07	651.1			4603						19.28	) 42.94	
4	Cyanide Extraction	92.93	60.8			5650						23.66		
5	Cyanide Tail	92.93	146.6			13624						57.06		
1	Heads	100.	238.8			23877						100.00		
<b>TEST #13</b>														
<p>A portion of the flotation tails from test No. 11 was filtered and repulped to 5:1 density. The solution was made up to 5 lbs. cyanide strength, 25 lbs. lime per ton of ore added and agitated 48 hours. Cyanide strength was maintained at approximately 5 lbs. during agitation but no lime was added for protective alkalinity.</p> <p>Cyanide consumption - - - 44.8 lbs. per ton of ore.</p> <p>Agit. protective alkalinity - None</p> <p>Lime used - - 25 lbs. per ton of ore.</p>														
<u>Table No. 1</u>														
4	Cyanide Extraction	92.93	107.1			9953						41.68		
5	Cyanide tails	92.93	100.3			9321						39.04		
3	Flot. Tails (From test 11)	92.93	207.4			19274						80.72		
<u>Table No. 2</u>														
2	Flot. Conct. (From test 11)	7.07	651.1			4603						19.28	) 60.95	
4	Cyanide Extract.	92.93	107.1			9953						41.68		
5	Cyanide Tail	92.93	100.3			9321						39.04		
1	Heads	100.00	238.8			23877						100.		

HEAD ASSAY : Ag 245.1 oz; Pb 71.5%

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE JUNE 19 38TEST 14 - 15

ASSAY AND CALCULATIONS

OF CYANIDATIONTEST ON OREFROM MAYOMINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS				CONTENTS — ASSAY X PER CENT OF WEIGHT				PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES — PER CENT OF RECOVERY OR LOSS			
			Au	Ag	Pb	Cu	Au	Ag	Pb	Cu	Au	Ag	Pb	Cu
			<u>TEST #14</u>											
			An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was filtered, made up to 1:1 density, 60 lbs. calcium hypochlorite (bleaching powder) added and agitated 18 hours. The pulp was filtered and washed thoroughly, diluted to 5:1 density, made up to 5 lbs. cyanide solution, 100 lbs. lime per ton of ore added and agitated 48 hours. Cyanide strength was maintained at approximately 5 lbs. during agitation.											
			Cyanide consumption - - - 45.5 lbs. per ton of ore											
			Agitation protective alkalinity - 0.5 lbs. lime per ton of solution.											
			Lime used - - 100 lbs. per ton of ore.											
	<u>Table No. 1</u>													
2	Cyanide Extract.	100.		162.9				16290					66.46	
3	Cyanide Tails	100.		82.2				8220					33.54	
1	Heads (Assay)	100.		245.1				24510					100.	
			<u>TEST # 15</u>											
			An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was filtered, made up to 3:1 density with a 3 lb. caustic solution (90 lbs. caustic per ton of ore) and agitated 20 hours in the presence of aluminum strips. The pulp was then filtered, diluted to 5:1 density, made up to 5 lbs. cyanide strength, 50 lbs. lime per ton of ore added and agitated 48 hours. The cyanide solution was maintained at approximately 5 lbs. cyanide strength during agitation.											
			Cyanide consumption - - 53.0 lbs. per ton of ore.											
			Agitation protective alkalinity - 1.2 lbs. lime per ton of solution.											
			Lime used - - 50 lbs. per ton of ore.											
	<u>Table No. 1</u>													
2	Cyanide Extraction	100.		158.9				15890					64.83	
3	Cyanide Tail	100.		86.2				8620					35.17	
1	Heads (Assay)	100.		245.1				24510					100.00	

HEAD ASSAY: Ag 245.1 oz; Pb 81.5%

 THE GENERAL ENGINEERING CO.

PER \_\_\_\_\_

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

ORE TESTING DEPARTMENT

ASSAY AND CALCULATIONS

LOT 1872

DATE JUNE 19 38

TEST 16

OF CYANIDE TEST ON ORE FROM MAYO MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS				CONTENTS = ASSAY X PER CENT OF WEIGHT				PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES = PER CENT OF RECOVERY OR LOSS			
			Ag		Pb		Ag		Pb		Ag		Pb	
			Ag	Pb	Ag	Pb	Ag	Pb	Ag	Pb	Ag	Pb		
	<b>TEST #16</b>													
	<p>An average portion of the ore was ground wet in a ball mill to 95<math>\frac{1}{2}</math> minus 200 mesh. The ball mill product was divided into equal parts. Each part was agitated 1 hour at 1:1 density with diluted sulphuric acid then filtered and washed thoroughly. Each portion was then diluted to 3:1 density, the solution made up to 5 lbs. cyanide strength, 5 lbs. lime per ton of ore added and agitated 24 hours. The solution was maintained at approximately 5 lbs. cyanide strength during the agitation. No assays were run on the cyanide tails.</p>													
	<u>Sample No.</u>	<u>Sulphuric acid per ton of ore</u>				<u>Cyanide cons. per ton of ore</u>								
	1	0.0				50.4								
	2	5.0				51.3								
	3	10.0				51.0								
	4	15.0				50.4								
	5	25.0				52.8								
	6	50.0				53.5								
	7	100.0				59.1								
	8	150.0				59.1								
	9	200.0				58.5								

HEAD ASSAY Au 245.1 oz; Pb 71.5%



THE GENERAL ENGINEERING CO.

PER \_\_\_\_\_

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE JUNE 1938

TEST 17

ASSAY AND CALCULATIONS

OF CYANIDE TEST ON ORE FROM MAYO MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS					CONTENTS = ASSAY X PER CENT OF WEIGHT				PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES = PER CENT OF RECOVERY OR LOSS																							
			Ag	Pb				Ag	Pb			Ag	Pb																						
<b>TEST #17</b>																																			
<p>An average portion of the ore was ground wet in a ball mill with 1.0 lbs. soda ash and 0.10 lbs. Aerofloat #31 per ton of ore to 95% minus 200 mesh. The ball mill product was floated in a Geco cell with 0.05 lbs. cresylic acid and 0.40 lbs. Potassium Amyl Xanthate per ton of ore.</p>																																			
<table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2"></th> <th colspan="3">Total Sulphide Non-S</th> <th colspan="3">Total Sulphide Non-Sul</th> <th colspan="3">Total Sulphide Non-S</th> </tr> <tr> <th colspan="2"></th> <th>Pb</th> <th>Pb</th> <th>Pb</th> <th>Pb</th> <th>Pb</th> <th>Pb</th> <th>Pb</th> <th>Pb</th> <th>Pb</th> </tr> </table>																Total Sulphide Non-S			Total Sulphide Non-Sul			Total Sulphide Non-S					Pb	Pb	Pb	Pb	Pb	Pb	Pb	Pb	Pb
		Total Sulphide Non-S			Total Sulphide Non-Sul			Total Sulphide Non-S																											
		Pb	Pb	Pb	Pb	Pb	Pb	Pb	Pb	Pb																									
2	Flot. Conct.	65.16	248.1	83.55	74.75	8.8	16166	5444	4871	573	67.94	73.97	96.95	24.53																					
3	Flot. Tail	34.84	219.0	55.0	4.4	50.6	7630	1916	153	1763	32.06	26.03	3.05	75.47																					
1	Heads	100.	238.0	73.6	50.2	23.4	23796	7360	5024	2336	100.	100.	100	100.																					
<p>A portion of the filtered concentrate was diluted to approximately 3:1 density, made up to 5 lbs. cyanide strength, 20 lbs. lime per ton of ore added and agitated 48 hours. Cyanide strength and protective alkalinity, were maintained during agitation.</p> <p>Agitation cyanide consumption - 47.7 lbs. per ton of concentrate.                      Agitation protective alkalinity - 0.3 lbs. lime per ton of solution.                      Lime used - 47 lbs. per ton of concentrates.</p>																																			
<b>Table No. 2</b>																																			
4	Cyanide Ext. (From Flot. / cons)	65.16	96.8				6307			26.51																									
5	Cy. Tail (From Flot. Conct)	65.16	151.3				9859			41.43																									
2	Flot. Conct.	65.16	248.1				16166			67.94																									
<p>A portion of the filtered flotation tails was diluted to approximately 3:1 density, made up to 5 lbs. cyanide strength, 20 lbs. lime per ton of ore added and agitated 48 hours. Cyanide strength and protective alkalinity were maintained during agitation.</p> <p>Agitation cyanide consumption - 46.3 lbs. per ton of tails                      Agitation protective alkalinity - 0.05 lbs. lime per ton of solution.                      Lime used 122 lbs. per ton of tails</p>																																			
<b>Table No. 3</b>																																			
6	Cy. Ext. (From Flot. Tail)	34.84	163.8				5707			23.98																									
7	Cy. Tail (From Flot. Tail)	34.84	55.2				1923			8.08																									
3	Flot. Tail	34.84	219.0				7630			32.06																									
<b>Table No. 4</b>																																			
4	Cy. Ext. (From Flot. Conct)	65.16	96.8				6307			26.51																									
6	Cy. Ext. (From Flot. Tail)	34.84	163.8				5707			23.98																									
5	Cy. Tail (From Flot. Conct)	65.16	151.3	83.55			9859	5444			41.43	73.97																							
7	Cy. Tail (From Flot. Tail)	34.84	55.2	55.0			1923	1916			8.08	26.03																							
1	Heads	100.00	237.96	73.6			23796	7360			100.	100.																							
<b>Table No. 5</b>																																			
4,6	Cyanide Extraction	100.	120.1				12014			50.49																									
5,7	Cyanide Tail	100.	117.82				11782			49.51																									
1	Heads	100.	237.96				23796			100.																									

HEAD ASSAY Ag 245.1 oz; Pb 71.5%

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE JUNE 19 38

TEST 18, 19

ASSAY AND CALCULATIONS

OF CYANIDE

TEST ON ORE

FROM MAYO

MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS				CONTENTS = ASSAY X PER CENT OF WEIGHT				PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES = PER CENT OF RECOVERY OR LOSS	
			Ag	Pb	Ag	Pb	Ag	Pb	Ag	Pb		
	<b>TEST #18</b>											
	<p>An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was filtered and divided into 5 equal parts. Each portion was diluted to different densities with 5 lbs. cyanide solution, 20 lbs. lime per ton of ore added and agitated 48 hours. The cyanide strength was maintained in all tests during agitation, but no additional lime for protective alkalinity was used in any.</p>											
	Sample No.	Dilution	Cyanide consp. per ton of ore	Cyanide tails <u>Oz. Ag</u>				Silver <u>Extraction</u>				
	1	1:1	27.9	124.1				49.37				
	2	2:1	42.4	102.5				58.18				
	3	3:1	48.3	102.0				58.38				
	4	4:1	60.8	98.0				60.02				
	5	5:1	66.0	100.2				59.12				
	<b>TEST #19</b>											
	<p>A sample of the heads as received was screened on a 10 mesh screen and the oversize washed. Sufficient fine granular galena for assay and testing was hand-picked from the washed oversize and crushed to minus 48 mesh and sampled for assay. The reject was ground wet in a porcelain pebble mill to all pass 300 mesh. The ball mill product was filtered, made up to 5:1 density with a 5 lbs. cyanide solution, 30 lbs. lime per ton of ore added and agitated 44 hours. Cyanide strength and protective alkalinity were maintained during agitation.</p>											
	<p>Agitation cyanide consumption - 62.0 lbs. per ton of ore                      Agitation protective alkalinity - 0.2 lbs. lime per ton of solution.                      Lime used - 60 lbs. per ton of ore.</p>											
	<b>Table No. 1</b>											
			<u>Cu</u>	<u>Sb</u>								
2	Cyanide Extraction	100.	90.3			9030					38.79	
3	Cyanide Tail	100.	142.5			14250					61.21	
1	Heads	100.	232.8	81.0	0.25	0.56	23280			100.		

HEAD ASSAY : Ag 245.1 oz; Pb 71.5%

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE JUNE 1938

TEST 20 - 21

ASSAY AND CALCULATIONS

OF CYANIDE

TEST ON ORE

FROM MAYO

MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS				CONTENTS — ASSAY X PER CENT OF WEIGHT		PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES — PER CENT OF RECOVERY OR LOSS	
			Ag	Pb	Ag	Pb	Ag	Pb	Ag	Pb
<u>TEST #20</u>										
<p>A sample of the heads as received was screened on a 10 mesh screen, the oversize washed thoroughly, and the cubical galena isolated from this sample by hand-picking. A portion of the galena was crushed to minus 48 mesh and leached one hour at 1:1 density in a solution containing 1/3 water, 1/3 acetic acid and 1/3 ammonium acetate by weight. The leached product was filtered and washed, sampled for assay and the reject ground wet in a pebble mill to 45% minus 10 microns in diameter.</p> <p>The ball mill product was filtered, made up to 5:1 density with a 5 lb. cyanide solution, 20 lbs. lime per ton of ore added and agitated 44 hours. Cyanide strength and protective alkalinity were maintained during agitation.</p> <p>Agitation cyanide consumption — 53.0 lbs. per ton of ore.                      Agitation protective alkalinity — 0.5 lbs. lime per ton of solution                      Lime used — 40 lbs. per ton of ore.</p>										
<u>Table No. 1</u>										
2	Cyanide Extraction	100.	58.4			5840			32.74	
3	Cyanide Tail	100.	120.0			12000			67.26	
1	Heads	100.	178.4	84.3		17840			100.	
<u>TEST #21</u>										
<p>A sample of galena was obtained as in test No. 20, crushed to minus 48 mesh and ground wet in a porcelain mill until the largest average particle was approximately 30 microns in diameter and 45% minus 10 microns in diameter. The ball mill product was filtered, made up to 5:1 density with 5 lbs. cyanide solution containing 1% ammonium hydroxide (100 lbs. per ton of ore) and agitated 42 hours.</p> <p>Agitation cyanide consumption — 23.0 lbs. per ton of ore.                      Agitation protective alkalinity — 1.7 lbs. lime per ton of solution.</p>										
<u>Table No. 1</u>										
2	Cyanide Extraction	100.	59.8			5980			33.52	
3	Cyanide Tail	100.	118.6			11860			66.48	
1	Heads	100.	178.4			17840			100.	

HEAD ASSAY A Ag 245.1 oz; Pb 71.5%

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE JUNE 1933TEST 22 - 24

ASSAY AND CALCULATIONS

OF CYANIDE TEST ON FROM MAYO MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS		CONTENTS — ASSAY X PER CENT OF WEIGHT		PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES — PER CENT OF RECOVERY OR LOSS	
			Ag	Pb	Ag	Pb	Ag	Pb
<u>TEST #22</u>								
Test No. 22 was similar to test No. 21 except the sample was ground until the largest average particle was approximately 50 microns in diameter and 13% was minus 10 microns.								
Agitation cyanide consumption - - 20.5 lbs. per ton of ore.								
Agitation protective alkalinity - 0.8 lbs. lime per ton of solution.								
<u>Table No. 1</u>								
2	Cyanide Extraction	100.	54.8		5480		30.72	
3	Cyanide Tail	100.	123.6		12360		69.28	
1	Heads (Assay)	100.	178.4		17840		100.	
<u>TEST #23</u>								
Test No. 23 was similar to test No. 21 except the sample was ground until the largest average particle was approximately 20 microns in diameter and 49% was minus 10 microns.								
Agitation cyanide consumption - - 24.5 lbs. per ton								
Agitation protective alkalinity - 1.0 lbs. lime per ton of solution.								
<u>Table No. 1</u>								
2	Cyanide Extraction	100.	58.4		5840		32.74	
3	Cyanide Tail	100.	129.0		12900		67.26	
1	Heads (Assay)	100.	178.4		17840		100.00	
<u>TEST #24</u>								
Test No. 24 was similar to test No. 21 except the sample was ground until the largest average particle was approximately 15 microns in diameter and 51% minus 10 microns.								
Agitation cyanide consumption - - 25.5 lbs. per ton of ore.								
Agitation protective alkalinity - 0.9 lbs. lime per ton of solution.								
<u>Table No. 1</u>								
2	Cyanide Extraction	100.	58.8		5880		32.96	
3	Cyanide Tail	100.	119.6		11960		67.04	
1	Heads (Assay)	100.	178.4		17840		100.00	

HEAD ASSAY Ag 245.1 oz; Pb 71.5%

 THE GENERAL ENGINEERING CO.

PER \_\_\_\_\_

# THE GENERAL ENGINEERING COMPANY

## CONSULTING ENGINEERS

SALT LAKE CITY, UTAH, U. S. A.

LOT 1872

ORE TESTING DEPARTMENT

DATE JUNE 19 38

TEST 25 - 28 inc.

ASSAY AND CALCULATIONS

OF CYANIDATION

TEST ON ORE

FROM MAYO

MINE YUKON TERRITORY

SAMPLE NO.	SAMPLES	PER CENT WEIGHT	ASSAYS PER TON OF 2000 POUNDS		CONTENTS = ASSAY X PER CENT OF WEIGHT		PER CENT OF TOTAL CONTENTS OF HEAD SAMPLES = PER CENT OF RECOVERY OR LOSS	
			Ag		Ag		Ag	
<b>TEST #25</b>								
An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was filtered, made up to 5:1 density with a 5 lb. cyanide solution containing 1% ammonium hydroxide (100# per ton of ore) and agitated 60 hours.								
Agitation cyanide consumption - - 35 lbs. per ton of ore.								
Agitation protective alkalinity - 0.4 lbs. lime per ton of solution								
<u>Table No. 1</u>								
2	Cyanide Extraction	100	145.2		14520		59.24	
3	Cyanide tails	100	99.9		9990		40.76	
1	Heads (Assay)	100	245.1		24510		100.	
<b>TEST #26</b>								
An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was filtered, made up to 5:1 density with a 5 lb. cyanide solution containing 1-1/5% ammonium hydroxide (80# per ton of ore) and agitated 60 hours.								
Agitation cyanide consumption - - 28.5 lbs. per ton of ore								
Agitation protective alkalinity - 0.4 lbs. lime per ton of solution.								
<u>Table No. 1</u>								
2	Cyanide Extraction	100.	145.9		14590		58.71	
3	Cyanide Tail	100.	101.2		10120		41.29	
1	Heads (Assay)	100	245.1		24510		100.00	
<b>TEST #27</b>								
A sample of the picked cubical galena was ground wet in a ball mill to 45% minus 10 microns. The ball mill product was filtered, made up to 5:1 density with a 5 lb. cyanide solution containing 1% ammonium hydroxide (100# per ton of ore), 5 lbs. per ton Aerosol "OS" added and agitated 24 hours.								
Agitation cyanide consumption - - 15 lbs. per ton of ore.								
Agitation protective alkalinity - 3.0 lbs. lime per ton of solution								
<u>Table No. 1</u>								
2	Cyanide Extract.	100.	50.0		5000		28.05	
3	Cyanide Tails	100.	128.4		12840		71.97	
1	Heads (Assay)	100.	178.4		17840		100.00	
<b>TEST #28</b>								
An average portion of the ore was ground wet in a ball mill to 95% minus 200 mesh. The ball mill product was filtered, made up to 5:1 density with a 5 lb. cyanide solution containing 1% ammonium hydroxide (100# per ton of ore), 5 lbs. Aerosol "OS" per ton of ore added and agitated 24 hours.								
Agitation cyanide consumption - - 27.5 lbs. per ton of ore								
Agitation protective alkalinity - 0.5 lbs. lime per ton of solution.								
<u>Table No. 1</u>								
2	Cyanide Extraction	100.	139.3		13930		56.85	
3	Cyanide Tail	100.	105.8		10580		43.17	
1	Heads (Assay)	100.	245.1		24510		100.	

HEAD ASSAY Ag 245.1 oz; Pb 71.5%