MR 112-5

Juneau, Alaska, April 27th, 1916.

KX 112-41

Eagle River Mining Company,

Macon, Georgia.

Gentlemen:

I am submitting herewith a general report on the properties owned by the Eagle River Mining Company, and the adjoining groups of claims known as the Yankee Basin Properties, which you have recently arranged to consolidate under a new organization known as the Eagle River Mines Company.

The following discussion of the merits of these properties, as well as the results of the past operations, is based upon my personal experience as superintendent of the Eagle River Mining Company from the year 1903 to 1910, and from 1910 to the present writing in an advisory capacity.

I am also attaching herewith a brief report on this combined group of claims made out by Mr. O. P. Rogers, superintendent of the Kensington Mining Company, who at one time was employed as an engineer by the Eagle River Mining Company and who is familiar with all the details of the past mining operations.

Mr. Rogers' report, with the attached maps and photographs will serve to illustrate the location of the combined groups, the status of the present development, the position and amount of underground development, the details of actual production, and the proposed new development and equipment program with detailed costs and time estimates.

As mentioned in Mr. Rogers' report, the original discovery on which the first claims of the Eagle River Group were located was made in the year 1902. Considerable attention was given to this discovery in the Juneau Mining District on account of the character and value of the ore, and shortly afterwards an option was obtained from the locators by one C. D. Mallary, acting as agent in the Juneau District for certain interest from Macon, Georgia.

At the request of Mr. C. D. Mallary, I made a preliminary examination of this outcrop, in behalf of William Ebner, of the Ebner Gold Mining Company, with whom I was employed as mine superintendent. My examination and report indicated an outcrop two hundred and fifty feet in length, varying from five to fifteen feet in width and having an average value of between $10.00 and $15.00 per ton.

The option held by C. D. Mallary was eventually exercised and a company, known as the Eagle River Mining Company, was organized, in Macon, Georgia, to purchase and operate the mine. In the year 1903 I was offered the management and in July of that year began active work in connection with the construction and development of the property.

Under the option it was necessary to immediately build a 10-stamp mill before any considerable development work could be accomplished, and within the period of nine months allotted in the option.

The necessary wharves, road from the beach to the mine, seven miles in length, 10-stamp mill with all accessory buildings, aerial tramway, flumes and waterpower plant, mine

buildings etc., were completed and operation began within the period, and such operation was conducted without interruption on through the year 1909. In 1908 an addition of ten stamps was added to the milling plant. From 1909 until 1915 underground development was carried on which will be discussed later in this report.

The results of the underground and surface development of this property as carried out during this period may be summarized as follows:

What may be considered as a "sub-belt" in the main Juneau Gold Belt, locally known as the Eagle River Belt, was determined and has been studied as such by the Geological Survey who have made a special report on this particular district. This sub-belt is made up of slate, graywacke and igneous contacts, the lode system determined following as a rule the graywacke and black slate adjacent thereto.

The ore occurs in chimneys of varying lengths and width, in lenses in the slate zone, and also in what may be described as stringer ore bodies. The mineral content is made up of galena, pyrrhotite, pyrite, a small amount of zinc and copper sulfides, arsenical pyrite with gold, both free and contained in the mineral. The percentage of mineral throughout the belt will average about two percent so that the ore may be classified as a free milling and concentrating proposition.

The outcrops of the chimneys, stringer zone and lenses occurring along the contact have been determined the full length of the Eagle River property and though the Yankee Basin properties, now united in this new organization, and through some succeeding claims owned by other interests. The properties which are now to be brought into this combination have a length on the ore zone of at least two and one-half miles. See attached maps.

On the Yankee Basin properties the only development work of any consequence has been conducted in connection with the continuation of the Yankee Boy vein consisting of a long crosscut tunnel with a small amount of drifting on the vein proper, and only open cuts and small tunnels have been made upon the continuation of the Yankee Chief lode system.

The study of the formation and of the ore as shown by this development work conclusively proves that the genesis of the ore as well as its characteristics is the same as those of the Silver Bow Basin lode system just back of Juneau. The only difference in the operation is that at Eagle River only the ore chimneys themselves have been developed and mined while in the Silver Bow Basin belt the operations have been carried out on a very large scale and the whole stringer zone worked en masse as a low grade ore body. No effort has yet been made in the Eagle River district to study the stringer zone areas with this large attack of operation in view.

The history of the mining and milling operations at Eagle River is as follows:

Shortly after development work was started on the original outcrop a series of surface faults were encountered displacing the vein system horizontally as well as vertically from a few to several hundred feet. Constant effort was made through the years 1904 to 1912 to get through and underneath this faulted system in what may be termed the "Old Mine", but

as development work progressed and a better knowledge was obtained of this surface movement, and due to the position of the outcrop relative to the slope of the hill at this point, it finally became evident it would not alone be difficult but unprofitable to continue operations from this section.

During this period milling was continued from 1904 to 1910 in conjunction with this development mentioned above. Sixty-five thousand tons of ore was sent to the mill having an average value of $5.90 per ton. The broken condition of the ground on account of the faulting added a high percentage of waste to the ore so that it was reduced in value accordingly. As a matter of fact, the average value of the quartz mined during this period would approximate at least $10.00 per ton.

Eight distinct chimneys of ore were determined in this section of the ground throughout which the development was carried, the chutes varying in length from forty to one hundred feet or more, and having a width of from a few inches to thirty feet. Values ranged from $2.00 to $60.00 per ton and on account of the fractured nature of the ground leaching of the sulphides had occurred so that the ore mined in this section was highly free milling. Ninety-eight percent extraction was obtained, the greater part of which was free and easily amalgamated.

The stockholders of the Eagle River Mining Company were men of small means and had strained themselves to purchase and equip the mine. The purchase price of the original mine alone was $150,000.00 and the amount of development work required in order to try and get out of this faulted zone into solid formation entailed large expenditures principally from the revenue obtained from milling operations.

During the last three years, 1910 to 1912 inclusive, a final effort was made in the old workings to drive a long tunnel from the No. 5 Level in the mine in an endeavor to locate the vein in solid formation. A small amount of broken, fractured ore was encountered and milled, bringing up the total production to seventy thousand tons having an average value of $5.65 per ton from the old mine operations, and a total output of $372,612.35.

It was decided by agreement in 1912 to abandon the old workings and endeavor to locate the vein system by means of an adit tunnel, now called the Flume Tunnel, some five hundred feet lower in elevation than the lowest tunnel of the old mine operations, and driven from such a position as would assure the location of the formation underneath the surface slides and faults.

The real purpose of driving this tunnel was to endeavor to locate the vein system, and as it was impossible for the stockholders of the company to supply the necessary money two or three of the stockholders in conjunction with myself and assistant advanced the money for this tunnel.

The driving of the tunnel of course was a distinct gamble on our part as there was no absolute assurance that we would be able to find the vein, and further after finding it that the ore would continue to this depth and hold its value. However, I was certain that conditions existing in the belt as a whole were entirely favorable and from the experience obtained in the old mine operations felt sure that I could through this tunnel locate the ore system and that the values and ore would continue in depth.

This tunnel was driven during the years 1913, 1914

and 1915 a total length of approximately three thousand feet. The tunnel itself was in the nature of a prospect tunnel following the formation and only of sufficient size to permit of its continuance because the sum of money available for the purpose of driving this was limited.

In the year 1914 the first ore was encountered and during the two succeeding years through continuation of the drift and crosscuts in conjunction with diamond drilling additional ore was located and the Yankee Chief ore zone definitely determined beyond any movement or faulting action. The graywacke footwall, the characteristic narrow band of graphitic black slate with the lenses or chimneys of ore proved conclusively the location and discovery of the Yankee Chief vein system in depth.

During the years 1914 and 1915 there was milled two thousand three hundred fifty two tons from the first ore body having an average value of $15.34 per ton, and two thousand four hundred eleven tons milled from the second ore body having an average value of $5.07 per ton. The second ore body encountered as indicated on the map was in a permanent and solid formation. The first one still showed some indications of surface faults and displacement.

In this permanent formation an ore body on the level of the tunnel one hundred feet in length, having an average width of four and one-half feet, assayed $13.12 per ton. Diamond drill holes south of this indicated the continuation of this ore for another two hundred feet and the breast going northeast towards Yankee Basin, while in low grade quartz at the present time, is in the formation proper and should encounter the other chimneys of ore originally discovered and mined in the old workings. It was also shown by crosscuts that there was what may be considered a stringer zone thirty-six feet in width having an average value of $3.75 per ton.

There were no funds available to open up this tunnel and develop this new ore so that it could be mined profitably and in addition to that it was found at this level there was less free gold in the ore than in the old works, that is to say; less oxidization of the mineral, and while flotation tests proved conclusively that high extraction could be made at a low cost on this ore there was no money available to add the necessary equipment to the milling plant. Therefore the comparatively low extraction obtained on this ore and the high tails made it unprofitable to continue operations on the small scale permissible by the limited development and size of the tunnel.

It was my opinion and advice that mining operations should not be continued on this property without new and proper financing and proper development work, and that before this was undertaken an effort should be made to consolidate the adjoining groups so there would be a large enough area to make the whole proposition attractive to new money and, in addition, options should be obtained and arrangements made so that the new money could enter this proposition on the basis of a development program, namely; that the groups should be combined into a new company wherein fifty-one percent or controlling interest should be offered to the new money for a certain amount of described development work.

After considerable difficulty negotiations have been concluded to that end and the Eagle River Mining Company is now for the first time in a position to offer an attractive mining proposition to capital interested in this class of investment.

The fundamental elements of the proposition as it stands today are as follows:

First: A length of two and one-half miles on the ore zone has been brought together into one organization. Outcrops of ore are indicated throughout the total length of this zone.

Second: Mining operations conducted on the Eagle River side within a limited area have produced an output of over $450,000.00 on an average profitable grade of ore.

Third: The ore zone has been located on the Eagle River side beneath all surface faulting and the ore has been proven in depth, having a value shown to be equal if not better than that mined on the surface.

Fourth: A development program has been laid out compromising the driving of a working level which will at the sam time develop the ore zone. The meaning of this is, viz; whoever undertakes to drive this tunnel will be doing a piece of final development work necessary to future operations and, at the same time, developing ore. Any unusual risk is eliminated because if in driving this tunnel new ore is not encountered from time to time the proposition may be dropped without any material loss. On the other hand, if ore is encountered in this development work, as I believe it will throughout the whole length of the ore zone, the continuation of the tunnel will be warranted and on account of the great depth attained from this proposed adit tunnel a very large tonnage can soon be developed and made available.

The position of this tunnel is the only proper way to attack this whole lode system. The present equipment of the Eagle River Mining Company's property includes mill, boarding house, transportation system, wharf, etc., and is in excellent shape, properly located and sufficient to permit not alone the carrying out of the proposed development program but to permit of starting the actual work immediately without the usual loss of time in preliminary work existing on most properties.

The flotation tests carried on prove conclusively that the mill equipment up to five hundred tons daily capacity for this ore could be installed at a minimum expense with a resulting high extraction and low costs. Mining and milling operations conducted on the ore chutes alone should be carried out at a cost not to exceed $2.50 per ton, including tailing losses, and if the stringer zones are worked on a large scale the costs should run about $1.00 to $1.25 per ton.

Hydroelectric power for larger operations is available in the district and there is sufficient power for small operations by the addition of a small amount of winter power.

The proposition should be attractive to a group of men of reasonable means who are willing to drive an adit tunnel for development purposes with the possibility of developing a large mine with a minimum risk. In fact, all of the essential risks have already been eliminated. The only question now open is the quantity of the ore which will be developed along this ore zone. With this determined it will be possible for such group of men either to operate the mine themselves on a limited scale or sell it to one of the larger organizations, such as I am now working for, who would buy it and equip and operate the property on a large scale. It should be also noted that no payments on the property are required so that no forfeiture can occur as under the usual form of option.

Until this development is completed the property is not in shape to offer to one of the larger mining corporations

who as a rule do not conduct development work but there are numerous small organizations or groups of men who should be willing to undertake this development work with the possibilities in sight.

From my experience as superintendent of the old company and the results of operations conducted therein, I feel certain the driving of this adit tunnel would develop a large and profitable mine at an early date. Short lateral diamond drilling should be conducted in conjunction with the driving of the adit tunnel in order to locate and sample the ore bodies encountered.

My duties as manager of the Alaska Gastineau Mining Company are such that I have no time to give this venture the consideration necessary to interest capital and it is not yet advanced to the point where the proposition as a whole would interest the people with whom I am associated.

I trust you will be able to bring this whole proposition to the attention of the right kind of capital and if you are successful in so doing I will at all times be willing to go into further details with them and give any advice or information which I have obtained through my experience in connection with your company.

I trust the data, maps and material attached hereto will be sufficient to give you clear and accurate idea of this whole proposition, not alone to yourselves but to the capital you expect to interest.

Yours very truly,

B. L. THANE.

BLT - H
ENCL.

Juneau, Alaska. March 30th, 1916.

Eagle River Mining Company,
Juneau,
A l a s k a.

Gentlemen:

(At the request of Mr. E. L. Thane,) I submit herewith a report on the proposed development of the Eagle River and Yankee Basin (Early-McWilliams) properties, (which recently have agreed to consolidate as the Eagle River Mines Company.)

The purpose of the following report is to render a description of the properties in regards to their geological features, history, and present state of development, etc, and illustrated with numerous photographs and maps, and to present a plan of development for opening the properties on a producing basis.

GENERAL DESCRIPTION.

The Eagle River Mining property is located at the head of Eagle River, 25 miles north-west of Juneau, Alaska, and 7 miles inland from Lynn Canal, and connected with tidewater by a horse tramway of easy grade. The wharf is situated in Eagle Cove where wharfage can be secured by any of the vessels plying the trade in Southeastern Alaska.

This property consists of 23 lode claims which are located along the strike of the lode system and join on their north boundary the Early-McWilliams group of 24 claims, which are located on a continuation of the same lode system.

The geological formation on the two properties is essentially the same as that of the Alaska-Juneau and Alaska-Gastineau Mines, and consists of quartz stringers, veins in an interstratified series of clay slates and graywacke slates. The marked similarity of the ore throughout the two groups, is rather conclusive that the ore zone is continuous throughout their length or for about 12,000 feet, and the rich ore encountered in the flume tunnel (see Map 4) is further proof of its extension downward.

On the Early-McWilliams group, four main veins varying in width from 2 to 12 feet, and carrying high values, are exposed (see Map 3) besides a number of wide stringer zones carrying low values. The strike of the veins here is about N 50° W, but as they approach the Eagle River side of the mountain they turn more to the north and are broken and displaced by slide action and faulting.

Most of the Early-McWilliams claims lie on the divide at an elevation of 2500 to 3,000 feet, and are easily traced owing to lack of vegetation. The Eagle River side is covered with dense forest and tundra, making it difficult to prospect on the surface, although the old mine workings and the new flume tunnel proved the extension of the ore zone on the Eagle River side, and at a depth much below the ore encountered on the Early-McWilliams Group.

PRESENT DEVELOPMENT OF THE PROPERTIES.

The Early-McWilliams property comprises 21 claims, joining on their south end the Eagle River group, and all situated at an elevation of over 1500 feet. Extensive prospecting has proved the extent of the ore zone over 6,000 feet, and tunnels driven on claims joining the north end lines show a continuation of the zone further still. In one of these tunnels, namely the E Pluribus Unum, a 20 inch stringer on the foot wall assays over $200.00 to the ton.

The 23 claims comprising the Eagle River group join on their north end the Early-McWilliams group, and are located on the southern slope of the mountain which is covered with dense vegetation and tundra.

The original or Eagle lode was discovered in 1902, and consisted of a chain of three ore chutes, whose total length was 250 feet and varied in width from five to fifteen feet.

This chute was undercut by the main tunnel driven at an elevation of 1,000 feet. The ore encountered by the different tunnels driven proved to be chutes and lenses, disconnected and faulted, and the whole area mined was broken and displaced, requiring extensive timbering.

In order to get out of this broken ground, the Flume Tunnel was started at an elevation of 555 feet and north of the general fault line which roughly follows Ward Creek. (see Map A) This tunnel encountered ore 1700 feet from the Portal, in a solid formation and proved the downward extension of the ore zone to this level.

From 1904 to 1912 the old workings produced 70,112 tons of ore, averaging $5.65 per ton and having a gross value of $396,820.00. Being mined near the surface the ore was considerably oxidized and free milling, giving a net recovery of 90%, by amalgamation in the mill. Owing to the broken character of the ground, upheave, was mixed with 25 to 30% of ground up slate, so that the true value of the quartz ore was nearer $10. than $5.65.

The ore encountered in the flume tunnel was not oxidized and gave a recovery of only 56% by both amalgamation and concentration. However flotation tests have proved that a recovery of over 90% can be made by this method. A copy of these tests is appended in this report. The condensed results are as follows:

I Amalgamation of crude ore crushed through 65-mesh, followed by flotation of tailings.

	Gold	Silver
Heads- Crude ore	41.20	0.75
Tails- Final	7.08	0.18
Extraction,	34.12	0.57
% Apparent Ext.	82.82	75.47

II Crude ore crushed through 150-mesh, straight flotation.

	Gold	Silver
Heads -	41.20	0.75
Tails -	2.74	0.095
Extraction	$38.46	0.655
% Apparent Extraction	94.91	90.06

During the years 1914 and 1915, 4764 tons of ore, having a gross value of $48,319.00 and averaging $10.14 were mined from the Flume Tunnel. A chart of the production and value of the ore mined from the old workings and flume tunnel is appended to this report.

The present improvements and equipment on the Eagle River Group consists of the following:-

Milling Plant:

This mill is equipped with 20 stamps, amalgamating plates and concentrating tables, and operated by water power.

Boarding Plant:

Accommodations for 30 men.

Store and Warehouse:

Engineering and Assay Office:

Superintendent's Cottage:

Asst. Superintendent's Cottage:

Company House:

Blacksmith Shop:

Flume and Pipe Line for mill power:

Tramway to beach:

Wharf:

This equipment is in good repair and considered as an asset in the estimates for development.

PROPOSED DEVELOPMENT PROGRAM.

The initial development under this program provides for the following items:-

1. New Adit Tunnel.
   This tunnel to be driven in the ore zone and started about 300 feet north of the present mill, at an elevation of 350 feet.

2. Raise for ventilation.

3. Diamond drilling to determine the extent and value of the zone as the tunnel progresses.

4. Mine tools and equipment to carry on the work.

This is an ideal development, as the tunnel will be driven in a proved ore zone, and no expenditures are needed outside of the initial development, except as fully warranted by the development. The terms of the option on the Early-McWilliams

property require no purchase price, and any payments made thereon will be from the proceeds of the mining operations, providing the development proves satisfactory.

The supplementary development is to be started at such a time as ore proven up by the development warrants it. The character of the supplementary development depends upon the nature of the ore encountered, it may be either:

1. Narrow veins or lenses carrying high values, or
2. Wide stringer zones, carrying low values.

The expenditure on the initial development will be the same in either case.

The estimate on mining 100 to 150 tons daily from narrow high grade veins (Plan A) provides for an all year round power plant, the present water power development being inadequate for this tonnage; re-arranging the present stamp mill as a flotation plant, and providing sufficient air compressor capacity for the work, besides necessary changes and addition to the present equipment. The estimate however provides for no development in ore, it being considered that the adit is driven in the ore zone and the cost of development be borne by the ore extracted.

Under this plan it is entirely feasible that the tunnel and diamond-drill prospecting will indicate ore of sufficient grade and tonnage to warrant the purchase and installation of equipment necessary for mining this amount before the initial development work is finished.

The character of equipment necessary for mining 500 tons per day from the second type of deposit (Plan B) differs radically from the first. It requires very extensive equipment and high initial expenditure. The time necessary to develop the mine to produce this tonnage is necessarily much longer than in the first type.

This type of deposit is essentially the same as is mined by the Alaska-Juneau and Alaska-Gastineau Mining Companies near Juneau. The chief value in this plan lies in the low operating cost. The expenditures for a 1000 H.P. water power plant, and the erection of a 500 ton flotation Mill are the largest items. This power site is available, and can be developed.

Of the two plans considered, Plan A. offers the least expenditure and quickest returns on the money invested. The advisability of operating on Plan B. can only be determined by the development in the new tunnel.

Appended to this Report are the following:-

1. Cost estimate - Plan A. Mining 100-150 tons per day, from narrow high grade veins.
2. " " - Plan B. Mining 500 tons per day, from wide low grade stringer zone.
3. Detailed items of expenditure on Plan A.
4. Production Chart - Eagle River Mining Co.
5. Record of Flotation Tests on Eagle River, Ore.
6. Map 1. - Geological Map of Juneau District.
7. " 2. - " " " Eagle River District.
8. " 3. - " " " Cross section of Eagle River and Early-McWilliams Groups.
9. " 4. - Eagle River Mine and Assay Map.
10. Numerous Photographs of the property.

Yours truly,

O. P. ROGERS
Engineer.

EAGLE RIVER MINING COMPANY

ORE PRODUCTION & MILLING DATA.

EAGLE RIVER MINE

YEARS	GROSS TONNAGE	GROSS VALUE	HEADS	TAILS	RETS. FROM BULL & CONCTS.	REMARKS.
		Old Workings.				
1904	8,640	53,136.00	6.15	0.35	50,100.00	
1905	8,128	49,987.20	6.15	0.35	47,200.00	
1906	12,395	76,229.25	6.15	0.35	71,600.00	
1907	8,426	49,460.62	5.87	0.35	46,592.26	
1908	16,368	103,104.38	6.30	0.35	97,375.75	
1909	11,620	54, 988.49	4.73	0.35	50,921.49	
1910	3,815	8,364.48	2.19	0.25	7,410.73	Represents isolated ore bodies mined during explor. work. Note an av. of typical ore.
1911	545	1199.00	2.20	0.20	1,089.49	
1912	175	350.00	2.00	0.15	322.83	
Total,	70,112	396,819.42	5.65	0.33 av.	372,612.35	
Total Up to 1910	65,557	386,905.94	5.90	0.35	363,789.50	Extraction
		New Workings - Flume Tunnel.				
1913	Mill not running this year.					
1914	2,353	36,095.02	15.34	6.75	20,225.36	
1915	2,411	12,223.77	5.07	2.10	7,153.97	
			10.14	4.39 av.		
Total	4,764	48,318.79			27,379.33	Extract.56.5%
Grand Total.	74,876	445,138.21			399,991.68	
Total excluding 1910,11,12.	70,341	435,224.73	6.18	0.62	391,168.83	

April 26, 1915.

UTAH COPPER COMPANY - ARTHUR PLANT.

FLOTATION DEPARTMENT

TEST MADE ON THE EAGLE RIVER MINING COMPANY GOLD ORE

	Oz.Au.	Oz.Ag.	% Fe.	%Insol.	%Zn.	%Cu.	% Pb.
ANALYSIS CRUDE ORE.	2.06	1.50	5.90	80.10	0.40	0.08	Trace.

AMALGAMATION TEST

	Oz.Au.	Oz.Ag.	App.Ext'n Au.	App. Extn.Ag.
Heading,	2.06	1.50		
Plate Tailing,	.91	1.33		
Extraction,	1.15	0.17	55.83%	11.33%

FLOTATION TEST CRUDE ORE, CRUSHED THROUGH 65-MESH.

Test No.	Heading Oz. au.	Heading Oz. ag.	Tailing Oz. au.	Tailing Oz. ag.	Concentrate Oz. au.	Concentrate Oz. ag.	% Ind. Ext'n au.	% Ind. Ext'n ag.	Lbs. Oil Used	Gals. Calura Used	
1448	2.06	1.50	.49	.48	8.50	6.26	80.88	73.65	1.90	--	
1449	2.06	1.50	1.30	1.07	7.50	5.40	44.83	35.75	1.90	--	
1450	2.06	1.50	.36	.36	12.12	8.60	85.05	79.32	1.90	4.90	
1451	2.06	1150	.23	.25	7.86	5.70	91.51	87.16	2.55	4.90	R.
Avg.	2.06	1,50	.595	.540	8.995	6.490	78.15	68.81	2.06	4.90	

FLOTATION TESTS-PLATE TAILING-CRUSHED THROUGH 65-MESH.
(Same Headings as Above)

1454	.91	1.33	.42	.42	4,16	6.40	59.89	73.23	1.90	4.90	G-6
1455	.91	1.33	.30	.32	4.68	6.62	71.65	79.80	1.70	4.90	R#9
1480	.91	1.33	.38	.34	2.52	3.78	74.27	81.79	3.74	7.30	RS
1481	.91	1.33	.40	.40	3.40	5.74	63.52	75.16	3.84	7.30	G-6
1482	.91	1.33	.33	.36	3.88	4.48	72.04	79.31	3.84	7.30	G-6
Avg.	.91	1.33	.354	.368	3.520	5.404	67.93	77.58	3.00	6.34	

FLOTATION TEST - CRUDE ORE - CRUSHED THROUGH 150 MESH

Test No.	Heading Oz. Au.	Heading Oz. Ag.	Heading % Fe.	Tailing Oz. Au.	Tailing Oz. Ag.	Tailing % Fe.	Concentrate Oz. Au.	Concentrate Oz. Ag.	Concentrate % Fe.	% IND. EXT'N Au.	% IND. EXT'N Ag.	LBS. OIL Used
1539	2.06	1.50	6.90	.147	.193	3.10	8.20	5.86	16.40	94.58	90.10	4.95
1537	2.06	1.50	6.90	.127	.193	3.30	8.50	6.00	18.20	95.28	90.03	4.23
Avg.	2.06	1.50	6.90	.137	.193	3.15	8.35	5.93	17.30	94.91	90.06	4.59

NOTE: Solution for Test No. 1482 was heated to 120° F.

UTAH COPPER COMPANY - ARTHUR PLANT

EXPERIMENTAL & RESEARCH DEPARTMENT

FLOTATION TESTS JUNE 19th, 1915.

MATERIAL:

Crude ore from the Eagle River Mining Co., Alaska.

NATURE OF TEST:

A series of eleven flotation tests was run on this ore, four of which were on crude ore crushed to pas 65 mesh screen; two on crude ore crushed to pass 150 mesh screen, and five tests on the tailing from a plate amalgamation test in which an apparent extraction of 55.83% of the gold, and 11.33% of the silver was effected, making a tailing which assayed 0.91 oz. gold and 1.33 ozs. silver per ton. All flotation tests were made with the Janney flotation testing machine, using standard flotation iols and reagents. 500 grams of pulverized ore used in each flotation test.

METHODS AND DISCUSSION:

The ore was received, was crushed to pass 65 mesh screen and a sample taken for heading assay and analysis, which was used as a basis for all calculations. Another portion was taken for a plate amalgamation test. The remainder being left for flotation tests on the crude ore. A portion of this was subsequently crushed to pass 150 mesh screen.

All tests were of five minutes duration, two products only being produced, viz, concentrate and tailings, all tests were conducted at atmospheric temperature, except No. 1482, in which the solution was heated to 120° F.

The amount of both oils and calura, indicated in the tests is the quantity used per ton of ore.

NAME OF OILS EMPLOYED IN TESTS:

Name	Laboratory Number	Sp. Gr.
Light oil coal tar	188-Q-8	0.9524
Light oil coal tar	788-G-60	0.9694
Reconstructed Stove Oil,	631-J-25-1-24	0.8789
Recopinol	813-D-58-1-23	0.8590
Chesapeake Pine	642-D-59	0.8710
Reco No. 9,	813-J-45-1-57	0.8420

Coal tar is produced by the destructive distillation of coal, as by-product in the manufacture of gas.

Reco stove oil is a refined mineral oil reconstructed at this plant.

Chesapeake pine oil is produced in the destructive distillation of pinewoods and recopinol is produced by reconstructing pine oil at this plant.

Reco No. 9 oil is produced by reconstructing flotation oil No. 9 which is produced in the refining of petroleum oil.

TEST NO. 1448:
Crude ore thru 65-mesh; 1.9 lbs. of light oil coal tar added at start of test. Produced a good froth carrying mostly iron sulphides.

TEST NO. 1449:
Crude ore, thru 65-mesh; used 1.9 lbs. light oil coal tar added at beginning of test. (see test No. 1448.)

TEST NO. 1450:
Crude ore, thru 65-mesh. Used 1.9 lbs. light oil coal tar and 4.9 gallons of calura, which made a tailing almost entirely free from sulphides. In this case especially, the tailing looked very clean.

TEST NO. 1451:
Crude ore, thru 65-mesh. Used 2.55 lbs. of compounded 80% Reco-stove, and 20% recopinol oil. Also 4.9 gals. of calura. The tailing appeared to be very free from sulphides.

TEST NO. 1454:
Plate tailing thru 65-mesh; 1.9 lbs. of light oil coal tar and 4.9 gals. of calura were used. This produced a good froth the tailing did not appear to be as clean as with reconstructed oils.

TEST NO. 1455:
Plate tailing, thru 65-mesh. 1.7 lbs. of compounded 80% reco-stove and 20% recopinol with addition of 4.9 gals. of calura used. Tailing apparently cleaned up well.

TEST NO. 1480:
P late tailing thru 65-mesh. Used 3.74 lbs. of compounded 80% reco-stove oil and 30% recopinol, with 7.3 gals. of calura. The tailing was apparently entirely free from sulphides.

TEST NO. 1481:
Plate tailing thru 65-mesh. Used compounded oil of 90% light oil coal tar and 10% chesapeake pine, with addition of 7.3 gals. of calura; this gave a good active froth and apparently floated all of the mineral.

TEST NO. 1482:
Plate tailing thru 65-mesh. Used 3.84 lbs. of compounded 90% listh coal tar dl and 10% chesapeake pine. Also added 7.3 gals. of calura. The solution was heated to 120° F. It has been found advantageous in some cases with gold ores to heat the solution, however, it is apparently of no benefit in this case.

TEST NO. 1539:
Crude ore thru 150-mesh. Used 4.25 lbs. of light oil coal tar (No. 788-G-80) and 0.7 lbs. of chesapeake pine with 19.2 gals. of calura. A good froth was produced and apparently made clean tailings.

TEST NO. 1537:
Crude ore thru 150 mesh. Used 3.98 lbs. of reco No. 9 flotation oil, 0.25 lbs. of recopinol, and 14.4 gals. of calura. Obtained a good rich, black froth with tailing apparently free from sulphides.

It should be noted that the percentage indicated extraction shown in the tabulated statement for tests, Nos. 1454, 1455, 1480, 1481 and 1482 show the indicated extraction in the flotation test only, but as these tests were on the tailing from plate amalgamation test, the total percentage apparent extraction, calculated from the original crude ore assay and the ultimate flotation tailings, showing the combined result of amalgamation and subsequent flotation treatment is herewith given.

Test No.	Percent	Apparent Extraction
1454	Au. 79.81	Ag. 72.00
1455	85.44	78.67
1480	84.47	77.33
1481	80.58	77.33
1482	83.98	76.00
Average calculated from Average Tailing,	82.82	75.47

The tests show that over one-half of the gold can be saved by plate amalgamation, and by subsequent treatment of the plate tailing by flotation a much better extraction is obtained than by flotation alone, on pulps crushed to the same degree of fineness.

The recovery of approximately one-half of the gold content by amalgamation is a decided advantage, as the smelters would not pay full value for the gold content in the concentrate.

The best average results were obtained on pulp crushed to pass 150-mesh, and the economic value of this increased extraction by finer crushing will be best ascertained by local and plant conditions, and the degree of fineness to which it will be advantageous, or economic to reduce the ore would be arrived at by a calculation of the increased cost (with possible reduction of capacity of plant or additional equipment necessary) and the increased extraction made possible by the fine crushing.

The results of these tests would tend to show that a part of the gold is either in some other form than free or associated with sulphides, or is so finely divided and disseminated thru the gangue that it is not freed with crushing thru 65-mesh, as the flotation tailings, in every case appeared to be entirely free from sulphides and the plate tailing should contain very little free gold. It is most reasonable to suppose that it is the extremely fine division of the gold which would only be freed by finer crushing than 65-mesh.

These results could doubtless be bettered in the large machines, so it is obvious that this ore has good possibilities in treatment by flotation.

TESTS MADE BY E. SHORES.

(Signed) E. SHORES