

November 29, 1918

Mr. S. D. Warriner,
Philadelphia, Pa.

K+ 86-50 Patented
86-51 Unpatented
86-52 Placer

Dear Sir:-

I beg to submit my report upon the property of the Hubbard-Elliott Copper Company which consists of 35 patented and 84 unpatented lode claims located in the Chitina Mining District of Alaska. It is situated about 20 miles from the railroad station of Strelna and a 18-mile surveyed branch line indicates easy construction for a connection with the Copper River and North Western Railroad.

The property has been prospected by several 5' x 7' tunnels, having an aggregate length of over 2000 ft. In addition to the above, considerable surface work has been done at many points which show copper indications over a fairly large area.

There are three sets of fissure veins traversing the property, two of which are strongly mineralized and show upon the surface high grade bornite ores. There is a vein apparently continuous for a distance of 4800 ft. which has been developed by three tunnels situated at the two ends and approximately at the middle of its length.

The copper ores are found in a greenstone which has been greatly altered and slightly faulted. The ores occur in veins as chalcopyrite, bornite, cupriferous pyrite and chalcocite. The disseminated ores are of the same character. The gangue minerals are mostly calcite, quartz and epidote. The occurrence of the copper ore is confined to a series of amygdular lava flows, approximately 1000 ft. in thickness.

Altho copper indications are found on a large number of the claims, the main outcrops showing fairly well developed veins are confined to the Elizabeth, Curtis, Goodyear, Henry Prather and Swazey claims. The disseminated ore outcrops occur on the Copper King, Mineral King, Albert, Johnson and Guthrie claims.

The development of the property has been carried on mostly by means of tunnels and altho it cannot be stated that there has been developed any definite tonnage of positive ore, yet the development work has indicated the existence of a considerable amount of probable ore along a vein 4800 ft. in length, upon which a comparatively small amount of sinking ought to be able to develop a considerable tonnage of positive ore.

The following assays were obtained from representative samples taken from the following veins:-

Elizabeth	-	12 ft. across width of outcrop	-	13.85% Copper
Mineral King	-	20 ft. " " " "	-	3.08% "
Copper King	-	25 ft. " " " "	-	2.78% "
Goodyear	-	5 ft. " " " "	-	11.28% "
Albert Johnson		30 ft. across face - -	-	2.20% "

Albert Johnson Claim.

The disseminated ore occurs mostly in amygdular basalt which is sheared and fractured. The ore minerals are bornite, chalcopyrite and chalcocite. The containing rocks have apparently suffered from a leaching action which is accompanied by the development of chlorite, epidote and sericite. Calcite is fairly prominent as a gangue mineral altho quartz and epidote occur. The surface ore extends for 150 ft. and has a maximum thickness of 20 ft.

Copper King and Mineral King Claims.

The rock carrying the ore is a basic basalt. The ore is bornite altered largely to chalcocite and it occurs in a disseminated zone that reached 25 ft. in maximum width. The Mineral King outcrop can be traced on the surface for 150 ft. The Copper King outcrop is exposed on the surface for about 75 ft. The ore occurrence is peculiar on account of the bunched nature of the massive bornite. Minor faults intersect the ore body but the throw is slight in amount. In both these veins, the disseminated bornite has apparently been largely altered to chalcocite. Outside of some stripping, no systematic development work has been done upon these veins.

Curtis Claim.

The surface exposure is about 40 ft. in length and averages about 3 ft. thick and has a disseminated border around it for an additional two feet. No sinking has been done upon the vein altho a tunnel was driven to intersect the downward continuation of the vein.

Goodyear Claim.

The vein is exposed upon the surface for about 75 ft. and averages about 6 ft. in width. No sinking has been done upon the vein altho a tunnel driven below, intersected it at a point immediately beneath the most easterly surface exposure.

In considering together the following claims, Albert Johnson, Marie Antoinette, Elizabeth, Curtis, Goodyear and Henry Prather, it can be stated that the field relations are such, as to indicate a probability that the

separate ore occurrences on the above claims, were formerly all portions of the same ore zone but they have been subjected to faulting, with a slight amount of displacement. It would require a comparatively small amount of development work to prove this relation, which would establish a vein 4800 ft. long, upon which sinking would permit the development of a large body of ore.

The following is a list of tunnels over 300 ft. in length which have been driven to develop the above ore body:-

Albert Johnson	-	1077 ft. long
Elizabeth	-	321 " "
Curtis	-	396 " "

In addition to the above there are numerous smaller tunnels distributed over a large number of claims.

Properties situated as this, even at so comparatively a small distance as 20 miles from the railroad, have always been at the disadvantage of having to rely solely upon winter transportation for economical hauling of supplies. As the developments to date have not justified the construction of a railroad, I would recommend the construction of a road suitable for motor truck transportation.

When the development work justified the installation of a mill, it is very probable that the Ammonia leaching process, which has been so successfully developed at the Kennicott mill, would be found adapted to these ores. This process is now used successfully at the above mill, upon tailings containing less than 2% copper. The main advantage of this process consists in the fact that it produces a copper concentrate as high as 70%, which is about three

11/29/16

times the average copper content of any other direct milling process. Owing to the high metallic content of this concentrate, motor truck transportation could easily take care of the product of a small mill, which would serve the purpose of developing the property to such a stage, as would justify the installation of a larger mill necessitating railroad facilities.

As this property has hitherto been developed mainly by means of tunnels and with a very small amount of sinking, I would recommend sinking upon the ore body rather than attempting to develop the same at depth by lower and longer tunnels. The property is now equipped with a 25 H.P. gasoline air compressor, which would furnish ample air for sinking for two jackhammer drills and permit hoisting with a small tuggger hoist. With this equipment, the cost of development of the ore body at depth would not be excessive.

In view of the chances being so good for developing an ore body of such a size and average value, that will in the future justify its equipment for large scale mining and milling operations, I have no hesitation in recommending the consideration of this property from the standpoint of being an unusually attractive development proposition.

Respectfully submitted,

/s/ Howard W. DuBois

To
Messrs
Frederic B. Bard
Albert J. Elliott
Walter Smedley

Syndicate Managers.

Gentlemen:

I submit herewith my report covering the period from October 25th, 1920 to November 15th, 1921. With this report, I also submit my accounts and vouchers and deliver samples of ore taken from the workings for assay.

Following the completion of our conferences in New York in 1920, I left the latter city in October arriving that month at Cordova, Alaska, proceeded to Strelna and then to Elliott Creek.

Expecting the prompt delivery of the machinery and equipment at Strelna, I had planned to commence its transportation to Elliott Creek in early December, the most favorable season for it, and immediately set about creating my organization of men and horses, also sledging equipment and the purchase and transportation of supplies. Also at Elliott Creek the hauling of wood for building and fuel purposes and in December was ready to start moving the machinery.

As a matter of fact, the delivery of the machinery was unavoidably delayed, and I did not obtain actual possession of it for transportation until the middle of January; this delay had lost us some of the most favorable weather of the season, and from that time on we experienced the most severe winter weather conditions that have been seen in Alaska for years, which compelled us to change our route of transportation, adding greatly to our expense and length of time required. We finally delivered most of our machinery and equipment at the Lower Camp at Elliott Creek in March, concluding all delivery the first week in April.

From that time on until the middle of August our organization was variously engaged in distributing to the different points selected for operations the heavy machinery, tunnel rails, air pipes, oil tanks, logs, lumber, supplies and the building of cement bases for the heavy machinery; and construction of the following permanent log buildings, viz; engine house, blacksmith shop, commissary camp, bunk houses, office buildings, meat house and the general repair of the middle camp, the base of the season's operations for our working force.

During almost this entire period our progress was slow because of the scarcity of labor and bad weather also made it impossible to comply

with my program wired to you June 9th. But labor became more plentiful in August.

The program for the season's mining work agreed upon before I left New York for Alaska was followed in most respects and varied from only as conditions presented which, in my judgment, necessitated a change. In particular, I abandoned all idea of work at the "Albert Johnston" tunnel, because owing to the long accumulation of ice in the tunnel and the fact that the compressor base had been partly destroyed in its exposed position, and that a great deal of time would be required to clear the tunnel and replace the base, I considered it wiser to concentrate the force at the two other and far more advantageous points for the obtaining of immediate results.

We commenced actual operations with our rock drills on the 18th day of August, 1921, a complete compressor equipment being installed at "Rainbow Creek" for work on the "Henry Prather" and "Goodyear" group of claims, and from this time operated with practically no cessation for 73 days, at the end of which we closed down for the season.

However, during October I materially increased our working force from time to time so I could get the men, and in consequence our tunnel driving in the ore advanced very rapidly and the difference by way of increase in our ore development above the amounts reported was accomplished through this increase of force and my report of this increase was held to be incorporated in this formal report to you, and I may add with the intention of thereby giving you an agreeable surprise.

Taking a survey of the entire season's operations at "Rainbow Creek", our work consists of the following: We prepared to drive a main tunnel under the massive outcrop of the "Henry Prather" group and while constructing our base for the installation of the heavy machinery at the point thus selected, we installed and drove a preliminary exploration tunnel at a point 40 feet below the outcrop. 20 feet in we encountered the ore body and tunnelled in it a distance of 57 feet without getting out of ore and from about the center of this tunnel we sank a 15 foot shaft all in ore - being high grade throughout both tunnel and shaft.

So soon as our lower depth tunnel was fairly under way, we shifted our force concentrating our work below.

This depth tunnel is located at a point about 100 feet above "Rainbow Creek" and enters the mountain 174 feet below the "Henry Prather" outcrop and 134 feet below and somewhat to the left of the upper tunnel. It is 7 by 5 feet and was driven a total distance of 214 feet of which 81 feet is entirely continuously in ore on all sides. Two up-raises were made from this tunnel, one of 10 feet all in ore and the other 30 feet, 20 of which are all in ore.

At a point about 140 feet in from the mouth of the tunnel an off-set tunnel was run almost at right angles into the ore body at the left of the tunnel and extended also to the right of the latter, the total length of this offset tunnel is 120 feet and it is all in ore which is very rich. Both these tunnels in their directions and objects are in the nature of cross-cutting and drifting in the vein.

To summarize: Our total work in tunnel-driving, up-raising and sinking aggregates as shown in the drawings submitted herewith, 477 feet of which 314 feet is in ore on all sides of the tunnel, shafts and upraises, the ore improving always as we proceed in until the highest grade found was in the last of our work in the lower and off-set tunnels. The assays of the samples I have delivered/^{to} you will definitely fix the values.

I call your attention to the fact that the highest values will be found in the samples taken from a depth of 120 feet under the outcrop and more than 140 feet in from the mouth of the tunnel and that their maximum value represents a steady improvement in the ore.

The ore body thus opened is in the green-stone, the strike of the vein being apparently N. E. and S. W. and pitches at an angle of about 45 degrees, just as does the massive limestone wall which the entire line of outcrop parallels for the distance covered by our claims of six miles.

An important feature of the "Rainbow Creek" section is that the "Henry Frather" outcrop, representing the body of ore in which we are at work, follows and dips with the limestone wall under "Rainbow Creek" and merges with the limestone wall on the other side, and continues as the outcrop of the "Lizzie O" and "Louise" claims, and in the opposite direction in the same manner, follows with the limestone wall the contour of the mountain, and becomes the outcrop of the "Elizabeth" group of claims, making those claims a continuous well defined outcropping paralleling and dipping toward the limestone, and we have entered under this continuous outcrop at about the center, disclosing a rich continuous body of ore at a depth of 120 feet below the immediate outcrop.

This would indicate that the ore body extends in like manner under the other portions of this line of approximately 3500 feet of outcropping, furnishing an ore area for the development of a mine of great magnitude.

I cabled you in October in substance that I considered the "Rainbow Creek" development a Bonanza mine of high grade ore, and my conviction

in this respect has not been changed, but strengthened, by development since that time.

You will also find that there will be another mine at the "Kings" group.

Relative to the "Kings" group, our machinery base is set on the "Mineral King" claim at a point about 75 feet below the outcrop which is very prominently defined, the ore being Copper Glance of apparently very high grade mixed with Bornite; the outcrop extends from and through the "Copper King" to the east, making about 1200 feet of exposure and is very close to the limestone wall throughout.

Our tunnel work here should show results very quickly as our dead work will not exceed probably 100 feet, at the end of which we should be in the ore body in the lime.

You remember that I cabled you that it would not take us over 45 days at this point to open up a mine and I am still convinced of this. I believe that in the richness of the ore, it will prove as valuable a mine as at "Rainbow Creek".

It is to be greatly regretted that we were unable to get into active development work here last season. The "Kings" group is at a high elevation and the season for open work is short, ending by the last of August or early September and this year we had unusual snows and high winds in this period while below at "Rainbow Creek", good working weather prevailed into November.

It is necessary at the "Kings", as I cabled you, to have substantial buildings both to house and operate our machinery, as well as to provide comfortable quarters for our men. These of course we did not have this year, but as our work progresses next season they can and should be provided, so that no cessation of work will be necessary throughout the year.

Of course, you understand that weather conditions cut no figure in active mining operations in Alaska, once you have provided the proper buildings to house your machinery and men, and it is only during exploratory and development work such as we have been engaged in, that the weather conditions have to be considered at all. In other words, you can mine in Alaska in the winter just as well as you can in Colorado, Montana or Nevada when you are properly equipped for the purpose.

Road Construction: In accordance with the suggestion in my cable to you in September and your cable of authority and approval, I constructed a seven mile section of road as a convenient and easy cut-off for travel between Elliott Creek and Strelna, our railroad base. This

saves us a long detour in distance and in its construction and grade permits an easy and prompt transportation of supplies and mining material of all kinds, summer and winter. The saving of time and money it will assure, means a great deal to us from now on in working the property.

For the season of 1922 I would recommend:

That work be commenced practically simultaneously in early May at "Rainbow Creek" and the "Kings" continuing at the former the drift tunnel on into the ore body, and sinking in the main tunnel just beyond its intersection with the drift tunnel. From the shaft thus sunk, project a new level or levels into the ore body towards the contact, drifting and upraising as we proceed, with the object of blocking as well as developing the ore.

The continuance of the drift tunnel will not only further open up the ore body under the "Henry Fraether" and "Goodyear" group, but also will get us under the "Elizabeth" outcrop and into the ore body at extreme depth there. From this tunnel, drifts, upraises and a shaft or shafts will also block the ore body in that direction.

Also the sinking of the shaft already commenced in the upper tunnel should be continued and the tunnel face extended in.

Permanent buildings should also be erected about the "Rainbow Creek" tunnel base, or the Middle Camp enabling continuous work thereafter throughout the year.

At the "Kings" the short tunnel needed should be driven, sinking, drifting and upraising into the ore body from it.

The camp construction of buildings and camp establishment should be done here as at "Rainbow Creek" for permanent all year work.

The work in the "Albert Johnston" tunnel should cover extension of work in the face of the tunnel toward the contact, and the sinking in the ore body already exposed in the vein 300 feet in from the entrance of the tunnel. This was projected at the time work was stopped in the tunnel. Similar building construction will be necessary at the "Albert Johnston" as the "Kings" and "Rainbow Creek" groups.

In addition to these buildings, a general commissary store should be erected at the Middle Camp for convenient distribution of all food and material and supplies.

I hand you herewith a detailed statement of what, in my judgment will be required to be expended for these various purposes which I consider to be maximum figures in each instance, and I would strongly recommend that as the coming year's work is pretty definitely laid out every effort should be made to keep to this program without being forced to changes or delays by any lack of fund, and also that we should be in position as to funds at all times to be able to add to men or equipment or both on short notice as circumstances may require and a plain advantage by so doing can be gained, and for all these reasons it seems to me that you should provide for 1922 a fund of \$100,000.

To carry this program into effect operations should be commenced not later than the 1st of May.

All of which is submitted.

Dated at New York, N. Y.
January 30th, 1922.

/s/ Louis G. Hinckel

REPORT OF H. A. KELJER

(on the ground in August, 1907)

NEW YORK, Nov. 1st 1907

H. I. Curtis Elliott, Esq.

Pres. Hubbard-Elliott Copper Mines Development Co.,
617, Stock Exchange Bldg.
Chicago, Ill.

Dear Sir:

As per your instructions I have this summer spent a week on your properties at Elliott Creek, for the purpose of making an examination. I beg to submit herewith my Report.

The Properties shown on the Company's official print., which accompanies this Report, are:-

Group 1.

1. Rainbow Claim
2. Nancy Hanks
3. Henry Prather
4. Goodyear
5. Lizzie G.
6. Louise
7. Mineral King
8. Copper King

Group 2.

9. Sweepstakes
10. Marmot
11. Samoleon
12. Fortuna
13. Castle
14. Retriever
15. Glendive
16. Babe
17. Flanders
18. Copper Queen
19. Regina
20. Unaletta
21. Elizabeth
22. Red Jacket
23. Curtis
24. Maria Antoinette
25. Ophir
26. El Capitan
27. Albert Johnston
28. Guthrie
29. Cliff
30. Cave
31. Lime Gulch
32. Senator

33. California
34. Wrangel
35. Katherine
36. Kotsina

Group 3.

37. Leland
38. Lawton
39. Van Dyck
40. Chance
41. Gloriana
42. Frisco
43. Ralph J.

Group 4.

44. Cliffe Millsite
45. El Capitan Millsite
46. Castle Millsite
47. Marie Antoinette Millsite
48. Lawton Millsite

Group 5.

49. Omega
50. Hercules
51. A. B. C.
52. Glen
53. Bush
54. Darby
55. Mc Connell
56. Haughan
57. Reddington
58. Bark
59. Keeley
60. Dean H.
61. Marion

Group B
(continued)

62. Hiland
 63. Williams
 64. Twogood
 65. Pierpont
 66. Simpson
 67. Melwina
 68. Calkins
 69. Tan
 70. Eliza
 71. Milwaukee
 72. Kappa
 73. Ester
 74. St. Paul
 75. Gamma
 76. McPherson
 77. A. J. E.
 78. Delta
 79. Lennox
 80. Roswell M.
 81. Beta
 82. S. S. M.
 83. Chas. W.
 84. S. P. M.
 85. Bonnie L.
 86. Jack Pot
 87. Blackburn
 88. A. E. F.
 89. Nellie E.
 90. Big Horn
 91. Dan P.
 92. Thompson
 93. Tony S.
 94. Iowa
 95. Champlin Sr.
 96. Evans
 97. Fay
 98. Piercy
 99. Slocum
 100. Bronson
 101. Carter
 102. Strachan
 103. Hanna
 104. Lawrence
 105. James
 106. Bollenbach
 107. Wilkinson
 108. Preston
 109. Manter

Group 5
(continued)

110. Holden
 111. Faithorn
 112. Murphy
 113. Brady
 114. Mary Ellen
 115. Johnston Elliott
 116. Chas. G.
 117. George F.
 118. Mabel E.
 119. Bob Pringle
 120. Bursch
 121. Hinckley
 122. Jennie E.
 123. Stuart
 124. Pillot
 125. Swazy
 126. Dobas
 127. Tuillar
 128. Mumford
 129. Katydid
 130. Chicago
 131. Rambler
 132. Arch

Group 6.

133. Syndicate Placer.

Altogether, there are 48 patented and 85 unpatented locations, I have divided these 133 claims into 6 separate groups.

GROUP 1. consists of the oldest 8 claims, which are all patented. Group 2. consists of 28 patented claims, originally belonging to Messrs. Hubbard and Elliott and which are all to be embodied in the Company's holdings. Group 3 consists of 7 patented claims, originally owned by Messrs. L. D. Hubbard and Geo. Treat, and which now belong to the H. & E. Co. Group 4 consists of 5 patented Millsites, which likewise belong to your Company. Group 5 consists of 84 unpatented Mining Locations held by your Company by possessory title from the U. S. Government. On each of these 100 dollars worth of assessment work has to be performed annually. In performing this work, each man's work is usually figured at 10 dollars per shift. Since it is expensive to outfit and supply a camp in the interior, as long as railway facilities are lacking, it will be best to patent these claims just as soon as sufficient work has been performed on them to aggregate 500 dollars on each claim. Group 6 consists of one unpatented Placer Location, which was mainly taken up owing to the good timber (mostly spruce and birch) for heating, building, and mining purposes which is found here at no great distance from your workings and camps.

TITLES. Your property being so extensive, my time was too limited to look up all records, but you undoubtedly have a good lawyer looking after all your titles. Your ground has been properly and thoroughly surveyed by Mr. J. L. McPherson, deputy mineral surveyor of Seattle. I understand that all law-suits have been settled, leaving your property now with a clear title.

LOCATION. It will be seen from the accompanying print, that all the above-named properties lie in a solid block, stretching east and west along Elliott Creek, from its source to almost its mouth at the Kotsina River. They cover all

available ground tributary to this Creek, as well as to its tributaries on the north, viz., Deception, Rainbow, Castle, Pouch, King's and Queen's Creeks, which all run north and south. Like Elliott Creek all these small creeks have considerable fall, and carry clear snow water.

On the south side of Elliott Creek, the bluffs are too steep and high to admit of tributaries, which fact shuts out completely this South Section, as will be noticed from your locations.

THE TRIAL. Till railroad communication, which is now under way, is established, your properties can only be reached by horse-trail from Valdez.

The active town of Valdez is located at tidewater, and is built upon the terminal moraine of Valdez Glacier at the head of Prince William Sound. It has a good harbour with wharf facilities, and is the distributing point for this entire section of country., i. e., the Interior, known as the Copper River Mining District, as well as for Prince William Sound points. Six large steamers arrive here monthly from Seattle. The Northwestern Steamship Co., operates 4 of these over what is known as the outside passage, a distance of 1250 miles, stopping on the way only at Katalla. The Alaska Coast Co., operates 2 steamers monthly over the inside passage, between the islands and the mainland, calling in at a number of thriving places along the route, which is some 1700 miles long. The former takes 4-1/2 days to the trip, while the latter requires 9 days.

There is a military cable from Seattle to Valdez via Juneau. From Valdez this telegraph line goes into the Interior to Eagle City, a distance of 450 miles. This telegraph line follows the Military Trail which forms the semi-monthly mail route through the Copper River Country and to Fairbanks. This is the only all-American route to the Yukon.

To reach your property during the open season, this trail is used for 80

miles, i. e. 1-1/2 miles beyond the Tonsian Bridge Station. Fairly good road houses are encountered at every 10 miles along this Trail. Between Valdez and the first road house, called Camp Comfort, the Low River has to be forded, which, during very high water is difficult. In the next 10 miles Keystone Canyon, where the trail work has been heavy and costly, has to be passed. At the end of these second 10 miles, Wortman's Road House is reached, which lies at the foot of the Coast Range. From here the Trail crosses the summit over Thompson Pass at an elevation of 2800 feet, after which the next Road House is reached at a distance of 30 miles from Valdez. In this distance, as well as through Keystone Canyon, is by far the heaviest work on any proposed line of railway. After the Coast Range is once crossed, railroad construction presents far less difficulties. The country from now on is more of a rolling nature in which the road can follow a number of streams, 20 and possibly 30 miles is considered a fair days' journey for a pack-train under ordinary conditions.

At 80 miles inside we leave the Military Trail, taking up an Indian or Prospector's Trail to the southeast, which leads to Copper River Crossing, at a distance of 25 miles. Here the Siwash Indians make a business of taking men and packs across in boats, while the horses are swum. The trail is again taken up on the other side and followed for another 15 miles to Willow Creek, where Hubbard and Elliott's private trail starts. This leads over a good bridge across the Kotsina River, and over a steep hill, finally to your main camp at the mouth of Rainbow Creek, a further distance of 11 miles, making in all 130 miles by trail from Valdez, or about 130 miles by railroad.

In winter this route is shorter, since frozen rivers are followed, and soft boggy ground becomes passable. All the season's supplies are sledged in during the winter months, which I estimate should be done at from 12 to 15 cents per lb.

A shallow-draft steamer, such as was recommended in 1902, is now running on Copper River during the summer months.

TRANSPORTATION. From these descriptions it will be realized that much cheaper methods of transportation will have to be provided to extensively develop and operate mines at this distance, to replace the present trail.

Two proposed railway lines are now in course of construction from Coast points, to tap the mineral resources of this section of country. One from Valdez, taking approximately the trail route above described. The other is to run up the Copper River from near its mouth at Cordova, both approaching your property at the junction of the Kotsina with the Copper River. After completion, I am figuring on a freight rate for your ores, from the mouth of the Kotsina to the Coast, not to exceed 5 dollars per ton.

Mr. McPherson's party have this summer surveyed the distance from your Main Camp at Rainbow Creek to this nearest railroad point, and you have no doubt by this time his detailed findings as to costs etc. I understand he advises a rope tram said to be 17.3 miles over the hills along Elliott Creek towards Copper River. My own rough estimate of costs would be 12,000 dollars per mile of tramway and 25,000 dollars per mile of narrow-gauge railway.

Plenty of water power can be had on Elliott Creek, since it carries a large volume of water and has a fall of 2300 feet from the mouth of Rainbow Creek to the Kotsina River, a distance of 6-1/2 miles. I am not prepared to say how the volume of water holds out in winter.

CLIMATE. The snow is not very heavy in winter along Elliott Creek, and the climate it seems is not severe. In summer it is delightful, and the location is beautiful and excellent for mining purposes. There is considerably less rain here in summer than along Coast points.

GEOLOGY. Starting from Valdez we pass over slate and shales, till the Coast Range of Mountains is crossed. After that greenstone and amygaloid rocks constitute the country formation, which at Elliott Creek are overlaid by chittistone limestone. The latter averages several hundred feet in thickness and was determined by Mr. Oscar Rohn of the U. S. Geological Survey to belong either to the carboniferous or to the Devonian age, so that the underlying greenstone would probably belong to the Silurian period. This greenstone shows much movement and is heavily fissured. Above the limestone is found a heavy capping of conglomerate, traversed by porphyry dykes. Some shale or slate occurs in this conglomerate, and likewise to the south of the Creek, together with some limestone.

The copper-bearing district extends from here to the Bonanza Mines, a distance of 50 miles in length and probably 12 miles wide. The ores occur either in greenstone near the lime, as is the case in your properties, or they occur in lime near greenstone, as is the case at the Bonanza.

Little depth has been attained in any of the properties along this entire belt, which is only natural under present circumstances, i.e. without railroad facilities.

Your prominent ore occurrences are all north of Elliott Creek near the lime contact, which runs N. 75 degrees W., and has a northerly dip of 80 degrees. With the exception of the Leland and Lawton, all outcrops are in greenstone below the limestone. These outcrops are often covered by large rock slides, or by the soil. The ore occurs in 3 ways:

The lower outcrops, particularly the Goodyear, Henry Frather, and also the Elizabeth, exhibit distinct walls. These outcrops are much fractured or faulted, which may be a surface condition only. The following sketch shows the outcrop as exposed by the Elizabeth cut.

The Mineral King and Copper King outcrops belong to this class, though the lode formation there is somewhat less distinct.

All these veins, however, make toward the lime contact and may continue along this contact. Not enough development work has been done to prove this, though ore has been found along the contact.

The 2nd ore occurrence is still closer to the limestone on the Guthrie and Albert Johnston Claims, the greenstone being heavily impregnated with bornite. The ore here is one of replacement in shape of a large mass, without defined limits.

The 3rd occurrence is on the Leland and Lawton, above the lime, and along a porphyry dyke in the conglomerate. This is the only outcrop showing extensive oxidation.

MINERALOGY. The most striking feature in this district, as well as along Prince William Sound, is the almost total absence of surface oxidation. Glacial action has undoubtedly scoured off all the softer oxides, exposing only the clear sulphides in the hard undecomposed matter.

The principal copper minerals found on your property are chalcopyrite, bornite and glance, together with some native copper and oxides. The lode matter is calcitic in your veins and greenstone in the masses.

Judging from your present ores, it seems to me that much of the bornite will with depth turn into chalcopyrite. This may make them of lower grade but more amenable to water concentration.

THE MINING CLAIMS IN DETAIL. Of your 133 claims above enumerated I shall describe the few most characteristic ones only, i.e., those upon which work has been done in a manner to admit of sampling them. I will divide your ground for that purpose into three separate sections:-

1. THE LINES AROUND YOUR CAMP

Elizabeth. Most of your workings are on this Claim. Your main camp is at the foot of the hill, on Elliott Creek, and at the mouth of Rainbow Creek, where you have several excellent log houses. The elevation here is 3600 feet above sea level, and the distance to the mouth of Elliott Creek (Kotsina) is 6-1/2 miles.

There is a large opencut on this claim, at a point A shown in sketch on page . The vein is disturbed here as shown, with widths of 9 and 14 ft. respectively. The western portion is covered by much slide-material, while its eastern end disappears under the soil. Considerable good ore remains on the dump. This ore contains bornite and chalcopyrite and carries considerable calcite. Here I took the following samples:-

	<u>Au.</u>	<u>Ozs. Ag.</u>	<u>% Cu.</u>
No. 21. average of ore on dump	0180	2.40	19.8
22. " of 9 ft. taken at B	tr.	1.40	14.7

A diamond drill hole was bored here with good results prior to starting the tunnel below, but I was unable to obtain its record.

A tunnel was driven lower down this hill 1080 ft. above your camp, with the object of striking the vein 70 ft. below the out, vertically. With its northerly dip of 60 degrees, which is apparent at the surface, this tunnel should have located the Elizabeth vein at 190 ft. in. At the time of my visit in August, this tunnel had reached a length of 216 feet. Its face was just getting into ore, while on the east 8 feet of replacement ore, with bornite (similar to that of the Guthrie and Albert Johnston) had been encountered. Besides, at 120 feet in, a narrow quartz vein not visible on the surface had been crossed.

My advice would be to continue this tunnel well through the vein shown in the out above, then raise on the vein to the surface. After that, continue your tunnel in quest of additional veins, which, judging from surface indications, should exist.

The Goodyear, etc. To the east of the Elizabeth, on the Rainbow Creek side of this hill, lie the Goodyear, Henry Prather, Lizzie G., and Louise Claims. All these show outcrop similar to that on the Elizabeth. With exception of the assessment work, nothing has been done on these Claims. These outcrops are very distinct and show considerable movement. The samples which I took here are:-

	<u>Au.</u>	<u>Ozs. Ag.</u>	<u>% Cu.</u>
No. 14 Goodyear outcrop	tr.	0.60	18.8
12 H. Prather upper outcrop	tr.	0.	20.8
13. do. lower outcrop	tr.	0.20	12.3
15. Lizzie G. dump, vein much broken	tr.	0.40	12.2
9. Louise, upper showing	tr.	0.80	11.5
10. " lower showing irregular	tr.	0.20	13.4

The strike of these veins is from N. 10 degrees to 40 degrees W, with a northerly dip of about 45 degrees.

I should advise driving a tunnel from this section of ground westward towards the Elizabeth. This will determine these veins underground, with the chance of not only obtaining higher assays than on the surface, but also of locating other veins either not cropping out or perhaps covered by rock-slides.

Uniletta. This claim lies between the Elizabeth and Henry Prather. It has a shallow trench out along a soft, indistinct outcrop, containing much oxidized iron and running N. 80 degrees E.

Nancy Hanks and Rainbow. These Claims have been located to take in the contact of the greenstone and lime. This contact material is heavily iron-stained and very pronounced. Good ore has been found here in places, but as yet too little work has been done upon the contact to say much about it. I should advise exploring this contact to considerable extent.

The Maria Antoinette. This claim lies to the west of the Elizabeth.

Upon it were two surface trenches exposing a well-defined lode of oxidized ore.

2. CLAIMS AT WEST END

Albert Johnston & Guthrie. These Claims show a large, irregular mass, but little fissured. The greenstone here is mineralized by replacement; the ore being an impregnation of the country rock by bornite. It is impossible to determine the extent of this zone or mass, or to say if and at what depth this bornite will change into chalcopyrite.

The Albert Johnston is on the east side of Deception Creek. It has a tunnel of 27 feet into the hill, while the Guthrie is situated on the west side of this Creek, with a 10 ft. tunnel. The mineralization continues between these tunnels for a distance of at least 125 feet crossing the creek.

This tunnel work was done some years ago, when your lower camp at the mouth of Deception Creek was running. The elevation here is 2880 feet and the distance from the upper camp is 2-1/2 miles.

The Leland and Lawton. Still further west, and somewhat to the north, are situated the Leland and Lawton claims. These have the only mineral showing on your property, not occurring in the greenstone, but are contained in conglomerate on an horizon above the chittistone lime. In going to these claims from the Guthrie, we pass the greenstone first, then the lime and lastly the conglomerate. Before arriving at the lode, however, which has been traced for considerable distance by 3 parallel cross trenches, we cross a belt of slate before finally arriving at a well-defined porphyry dyke crossing the conglomerate in a N. 40 degrees W. direction. The outcrop runs along the contact of the two latter; it is soft and oxidized, showing considerable malachite.

3. THE EAST OR UPPER END

Copper King and Mineral King exhibit several excellent mineral showings with better defined walls than the Albert Johnston, but less so than the Elizabeth, etc. Little work has been done upon them, partly because they are too far removed from your working camp, being at a distance of over 3 miles away.

On the Copper King, the mineralization is in shape of a lense, 8 to 15 feet wide by 30 ft. long, and running east and west, with a northerly dip of apparently 75 degrees. The extension of this ore body has not yet been traced.

I have taken here the following samples:-

	<u>Au.</u>	<u>Ozs. Ag.</u>	<u>% Cu.</u>
No. 1. 8 ft. across the steep cliff, much bornite	0.40	1.20	16.9
No. 2. 27 ft. along the lense	0.40	0.80	13.2
No. 3. 15 ft. across the west end	tr.	0.80	8.9

On the Mineral King there are two large outcrops and the lode formation is somewhat more defined. There is considerable copper glance here. The following 3 samples represent these outcrops.

	<u>Au.</u>	<u>Ozs. Ag.</u>	<u>% Cu.</u>
No. 4. Upper showing, black ore from centre	tr.	0.80	20.3
No. 5. Upper showing 8-1/2 ft. across by 40 ft. long	tr.	0.80	28.0
No. 6. Lower showing, 8 ft. across	0.40	0.50	10.4

There is a good tunnel location here.

I consider the prospects of both these claims very promising, and trust that you can arrange to do more work on them in the near future. This will require the establishment of a new camp. Both claims are not far below the lime contact.

The Swazay and Van Dyck. These claims are to the north west of the above claims, and but little work has been done on them. A shallow trench

through the top soil on the Swazey has exposed more or less good chalcopyrite, but during my visit this trench was in poor shape to sample. The Van Dyck, like the Nancy Hanks, is located along the line contact, and I understand some very good bunches of ore were extracted from the soft contact material.

This covers the salient features of your principal claims. Your ground is so extensive, and in many places difficult to get over, that it would require an entire season to visit all your claims with their numerous mineral showings.

The work. From my above descriptions it will be realized that altogether much scattered work has been accomplished all over your ground, actual development work by tunnels, drifts, etc. is as yet limited. Until the advent of a railroad, development work must continue to proceed slowly throughout the Copper River Section.

The greenstone is hard but not difficult to work, and requires little timbering, nor will there be much water to be handled. Your many powerful outcrops point to large quantities of fine ore.

Metallurgy. Your product will consist entirely of smelting ore. Reduction works to insure a proper mixture of ores, as well as to obtain fuel at low rates, should be located somewhere along the Pacific Coast, and preferably near the railroad terminal. Such a smelter would either be operated by your Company or by others who would gladly purchase such ores at a reasonable tariff.

Shipping rates. After the arrival of a railroad, you may figure on the following rates per ton, which I base largely upon those now in existence for the larger shipping mines along Prince William Sound:-

For mining, at the rate of at least 50 tons daily	3.00 dollars
Transportation to railroad terminal	.50 "
Freight to Coast, 110 miles	4.00 "
For treatment at Smelter	<u>3.00</u> "
Total fixed charges per ton	10.50 "

RECOMMENDATIONS: I recommend therefore:-

(1) That you continue to develop the Elizabeth, Henry Prather, etc., ground by two tunnels such as above described, and that you further explore the contact, both in summer and winter.

(2) That you establish another camp near the mouth of Queens Creek to develop the Mineral King lodes by tunnel.

(3) That you proceed as far as possible with the tramway and spur to connect with the main railroad at the mouth of the Mobsina River.

CONCLUSIONS Summing up the situation at Elliott Creek, I find that you have a large number of fine outcrops on your property, which show high copper values.

I see no reason why, after the advent of economic transportation, your property should not develop in depth fully as well as it now shows on the surface.

Yours respectfully,

(signed) H. A. KELLER.

This Report is accompanied by one print of your claims.

K.