MR 31-7 Mikado Mine (Chandalar Section)

New York, N. Y.
May 25, 1933

MR-031-07

Mr. W. R. Wade, Vice-President and Consulting Engineer
Idaho-Alaska Corporation
120 Broadway
New York City.

Dear Sir:

The examination of the Mikado mine in the Chandalar district of Alaska was undertaken during the past winter at your request, and a copy of the report on this property is attached.

Arriving in Fairbanks on January 10th, contacts with merchants were made and after several days delay, due to extremely cold weather, a flight was made to Beaver. Two miners were hired and a dog-team with driver engaged to freight our equipment from Little Squaw Creek to the Mikado claims. This dog-team, owned by Touroc Newman of Beaver, departed on the 19th of January, accompanied by the two miners. Returning by plane to Fairbanks, further supplies were purchased and after sufficient time had elapsed for the dog-team to reach Little Squaw Creek, a flight was made with the Wein Airways to Chandalar Lake.

Three months were required to reopen the Mikado shaft, and during this period monthly trips with mail and supplies were made by the Wein Airways. All available dry wood was purchased and hauled by dog-team to the Mikado claims. A boiler, stove and miscellaneous equipment were brought over from Little Squaw and and the quarters made habitable. Mr. Elis Anderson, a prospector, was most hospitable and housed us until our quarters were made comfortable.

The sampling of the shaft was completed on the morning of April 24th, and the return flight to Beaver and Fairbanks made on April 25th. This flight was the last this spring to be made out of Fairbanks on skiis, and while it would have been possible to return to Chandalar Lake the next day, it would have been extremely hazardous or impossible thereafter.

May 25, 1933

On the return trip to New York, a stop was made at Juneau, Alaska to determine the amount of assistance probably obtainable from the Government for future road construction in the Chandalar district.

The return journey was completed on May 22nd.

Respectfully submitted,

/s/ E. A. BOADWAY

E. A. BOADWAY

I N D E X

I N D E X (Cont'd.)

R E P O R T

on

MIKADO and LITTLE SQUAW VEINS

Chandalar, Alaska

* * * *

SUMMARY and CONCLUSIONS

The ore exposed in the Mikado shaft and in the Little Squaw tunnel is of a grade that could be profitably mined if found in sufficient quantities to operate a mill upon a moderate daily tonnage (i.e. 100-200 tons per day), and further work on these deposits is advisable.

The limits of the ore exposed have not been determined and no tonnage estimate can be made, but all evidence obtainable during the winter season, and from Government reports and individual statements, indicates the zones in which the ore occurs to be continuous for considerable distances.

The present high cost of freighting to this district could be greatly reduced, and government assistance is assured when justified by active development.

Sufficient timber for fuel and construction purposes for many years stands in the valley, and a power site capable of developing all the power necessary is reported fifteen miles west of the Mikado claims.

The climate does not impose any foreseen difficulties on daily mining and milling operations throughout the year if seasonal preparations are made.

RECOMMENDATIONS

That $75,000 be expended between July 1933, and April 1934, in underground exploration and development work on the Mikado and Little Squaw veins. A minor portion of this sum should be expended in examining the surface of this district prior to large expenditures for underground work.

That this exploration and development be instituted during the month of June in order that the seasonal preparations that are necessary for carrying on the work throughout the winter may be made.

That this exploration be undertaken immediately by hand and carried on until fall trail conditions permit the installation of light machine equipment.

That a preliminary survey be made of the power site and the boat channel of the Chandalar River during the coming summer season.

CLAIMS

Three groups of claims, all of which are patented or are in process of patenting, are held under option by the Engineers Exploration Syndicate. They are the Little Squaw group of nine contiguous end-to-end claims; the Bonanza group of six claims, and the Mikado group of three claims. A mill site claim, the Spring Creek millsite, held under option, is also in process of patenting.

LOCATION

These claims are situated at an elevation of approximately 3500 feet, near the crest of the mountains, in the western part of the Little Squaw area. This area in the Chandalar mining district is approximately eighty miles north of the Yukon River in latitude 67° 35' North and longitude 148° 15' West and is 200 miles north of Fairbanks, Alaska.

TOPOGRAPHY

The immediate district is mountainous, with deep-cut narrow valleys and precipitous knife-like crests on the ridges. Drainage is very rapid and the north fork of the Chandalar River is practically unnavigable. The valleys of the north fork and of Graves Creek have been broadened by glaciation and are used as routes for overland travel. The average elevation of the ridge crests is slightly over five thousand feet and the valley floors are from two to three thousand feet lower. The relief decreases rapidly towards the Yukon

River flats to the south.

CLIMATE

The average temperature of the three winter months is -15° F. Blizzards are frequent on the mountains and the winters are severe. The precipitation is light, being from 11 to 12 inches in normal years. Sled freighting is possible from November 5 to May 1. Mining operations could be carried on throughout the year but seasonal preparation is absolutely necessary.

TRANSPORTATION

All overland traffic to this district now enters through the village of Beaver on the Yukon River. River transportation to Beaver is limited to semi-monthly trips during the summer season from May 15 to September 15. Supplies from Seattle to Beaver may be shipped via Seward and Fairbanks, Alaska, or via Skagway and Whitehorse, Yukon Territory. The present rates are less via the Whitehorse route and the rates per ton to Beaver on this route, including all handling charges, are: General supplies $80; Explosives $141; Groceries $87; Machinery $61.

At present, the only overland method of transportation from Beaver to the Little Squaw area is by dog team. The rates for this distance of 125 miles are 15 cents a pound to Little Squaw Creek and 17 cents a pound to the Mikado claims, with an additional charge of 2 cents a pound for perishables. There is a well cut road suitable for winter tractor travel and spring and fall crawler trailer travel between Beaver and Little Squaw. The

construction of 10 miles of road down the Chandalar River from Caro to the head of navigation would shorten the overland haul to the Little Squaw area to a distance of 62 miles. Inhabitants of the country report that a small amount of blasting in the channel of the river would permit shallow draft boats to proceed an additional 50 miles up the middle fork of the river during high water, within 12 miles of the Spring Creek millsite. This could not be verified at the time of the author's visit in the winter season.

No government appropriation has been made for the construction of new roads in North Alaska during the year of 1933 but a sum of $4,000 is available for the repair and maintenance of the Beaver to Little Squaw road. Government assistance has been assured when the possible future tonnage to the district warrants.

The cost of transporting supplies by tractor throughout Alaska, as determined over a period of years by the Alaska Road Commission, varies from $0.63 to $1.32 per ton mile. These figures include maintenance, depreciation, and a portion of the general overhead. For the conditions existing in the Chandalar district, a cost of $0.90 per ton mile for tractor freighting is a conservative estimate.

Freighting is carried on throughout ten months of the year by existing airplane services and the present rate is 15 cents per pound from Fairbanks to lakes in the Little Squaw area, and 10 cents per pound from Beaver to these lakes. A lake suitable

for landing is located within three miles of the Spring Creek millsite and four miles from the Mikado claims.

EQUIPMENT

A new Allis-Chalmers four-stamp mill complete with engine and boiler is stored in transit at a distance of approximately ten miles from the Spring Creek millsite. A three-stamp mill without amalgamating plates or crusher is now on the millsite. The total equipment is capable of milling 15 tons a day, but the operation of this equipment would not be profitable.

Housing facilities to accomodate ten men at the Spring Creek millsite have been erected. There are blacksmith shops and cabins that are suitable for three men each at both the Little Squaw and Mikado tunnels.

TIMBER

The valleys below an elevation of 3,000 feet support a fair growth of timber, principally spruce. At and within a distance of a few miles of Spring Creek there is an abundant supply of timber suitable for all fuel, building and mining and milling purposes, and in sufficient quantity to last for many years. Wood, in sixteen foot lengths, delivered to the Spring Creek millsite, or at Chandalar Lake, by dog-teams now costs $10.00 a cord. Delivered to Little Squaw or Mikado mining claims the cost is now much greater, but under operating conditions, when ore is being transported to the mill, this cost would not be greatly increased. Two cords of this spruce are equivalent to one ton of good coal.

WATER SUPPLY

A perennial spring at the Spring Creek millsite at the end of the present road 5 miles from the Mikado claims has a winter flow estimated to be 140 gallons per minute at 40° F. This supply could be supplemented in normal years by diverting the water of Little Squaw Creek a distance of approximately 2500 feet.

No underground or surface winter flow of water sufficient to meet milling requirements could be located on Tobin Creek, nearer than Chandalar Lake, a distance of 11 miles.

LABOR

The local supply of labor is limited and it is both necessary and desirable to import labor from outside of the district. A scale of wages below that now demanded for intermittent labor could be established. The present scale is $10.00 a day or $6.00 and board.

GEOLOGY

The formations in the Little Squaw area have been referred to the early Paleozoic period, with the slightly older lithologically classed Birch Creek schist underlying them to the south. To the north, the Paleozoic is covered by Silurian crystalline limestone and dolomites.

These early Paleozoic rocks, comprising the major portion of the Chandalar district, consist principally of schists and phyllites. These schists vary from quartzose and arenaceous to graphitic, and in the vicinity of granitic intrusions biolite schist

with garnet is developed. Associated with these schists are bodies of diorite, granitic schist, greenstones and greenstone schists. These Paleozoic intrusives entered at various times throughout the period of regional metamorphism and they are found in all gradations from unaltered to schistoze.

The early Paleozoic rocks are highly deformed and in places show intense crenulation and shearing. The structural trend of the formation is from northeast to southwest and the long axis of the granitic dikes and laccolith-like granitic bodies tend to conform to this trend.

Zones of faulting are indicated on the ridges near Crystal Peak and Caribou Gulch and at the head of Saint Mary's Creek. The faulting strikes at an acute angle to the structural trend and to the plane of schistosity. Gold-bearing quarts veins up to six feet in width are reported in many places along these and similar zones. Quartz in fissures following the cleavage planes is also found, but in the valleys and tributary valleys of Lake Tolim and Graves Creek (Little Squaw area) the quartz filling is principally in the fault zones cutting across the plane of schistosity.

There are lithological similarities between the rocks of the gold producing areas of the Seward peninsulas and the Tanuana regions and those of the Chandalar region, but absolute correlation has not been established.

Sufficiently detailed work to determine the source of the quartz veins has never been done. The presence of monzonite

and rutile in the placer concentrates indicates the possibility of a genetic connection between the gold-bearing quartz vein and an acid granitic rock. The probable source of the gold-bearing solutions was from a granitic rock tentatively classed as a diorite, many boulders of which were found in the bed of Little Squaw and Tobin Creeks well above the line of glaciation.

Several isolated lenses of quartz are known and many stringers having no definite trend are found throughout the area, but the principal gold-bearing quartz outcrops are distributed along four-east-west lines. This distribution, coupled with evidence of step-faulting indicated on the ridges, suggests a zone of shearing along which mineralizing solutions have deposited quartz that is in places gold bearing.

Along the Little Squaw zone of faulting there have been at least three periods of movement and two periods of deposition. The first faulting opened courses and cavities through and into which much barren quartz was deposited. The second movement indicated as nearly horizontal, reopened the footwall of the Little Squaw vein and a second quartz was deposited. The deposition of gold and sulphides (pyrite, arsenopyrite) was contemporaneous with this second disposition of quartz. After the close of this period, another movement de-fractured the quartz and a typical "banded" or "ribbon" appearance was developed. Occasional cavities are found with quartz crystals protruding into them, but these cavities are more often filled with a bluish sulphurous deposit.

Two periods of deposition with subsequent minor faulting are evident in the Mikado vein. It is probable that the mineral-bearing solutions emanating from an acidic mass entered and filled cavities along a reopened shear zone late in the period of regional metamorphism.

HISTORY

Twenty years ago a placer miner named Carter, using funds taken from the placer mines of this district, sunk the Mikado shaft to a depth of 104 feet. Upon the favorable assays obtained from the quartz exposed in the shaft and upon the advice of a "practical" miner, the shaft was abandoned and a tunnel was driven to intersect the vein 200 feet below the outcrop. Thus tunnel was driven 460 feet and intersected a crushed zone at 417 feet from the portal that extended to 453 feet. Short drifts were driven for a total distance of 64 feet on the walls of this zone. As the grade of quartz encountered on the tunnel level was much below that found in the shaft, the work was abandoned and the untimbered shaft permitted to cave. William Sulzer later acquired the property along with other properties in this district, and in 1930 extended the Mikado tunnel an additional 50 feet.

The history of the driving of the tunnel raise and winze on the Little Squaw vein is an intermittent one similar to the Mikado except that a small tonnage was milled that produced about $30.00 per ton.

PLACER PRODUCTION

The recorded production of gold from the Little Squaw area between 1906 and 1923 was $295,000. Of this amount $155,000 was extracted in the last three years of this period by a small company operating during the winter season on a claim on Little Squaw Creek. The placer gold recovered was confined to relatively small "pay streaks". On Tobin Creek, "shot" gold has been found for a distance of two miles below the Mikado claims and is also found in St. Mary's Creek below an outcrop on the strike of the Mikado vein three-quarters of a mile east of the shaft.

DESCRIPTION OF LITTLE SQUAW

The Little Squaw vein, dipping 75° to the south and striking N. 75° E. has a proven length of nearly two hundred feet and a proven depth of over one hundred and thirty feet. It cuts across the plane of schistosity which strikes N. 5° W. and dips 15° E. Erosion has removed the eastward extension of the vein at the tunnel level and a minor fault cuts it off at the face of the tunnel two hundred feet to the west. A 75-foot raise to the surface and a 60-foot winze have been driven. The continuation of the vein on the surface beyond the minor fault is reported, the displacement being about fifty feet. Very little gouge is found in this fault, which strikes N. 45° W. and dips 80° E. Imperfect striations indicate the movement of the western block have been to the south at a dip of 12°.

Tunnels driven through the surface debris at levels

70 to 114 feet below the portal of the tunnel described have not encountered the vein. These tunnels were apparently started without allowing for the dip of the vein and appear to be situated too far to the north.

The values in the Little Squaw vein are contained principally in a one-foot band in the foot-wall portion of the vein. The values accompany sulphides and the foot-wall part of the vein has a banded or "ribbon" appearance. Much coarse wire gold is found in this foot-wall section. Occasional seams of sulphides are found extending from the foot-wall to the centre of the vein. Wherever these seams extend out from the high-grade foot-wall streak, the fractured quartz of the vein has been recemented with quartz and is vitreous and massive.

An ore shoot extends from near the portal of the tunnel (where it has been truncated by erosion) west for a distance of 65 feet, where a barren zone is encountered. The vein is strongest where truncated. Occasional foot-wall streaks of "ribbon ore" from one inch to six inches thick are found on the foot-wall sections of the vein beyond the end of the ore shoot, but are not of sufficient extent to be mineable. The vein at the fault in the face of the tunnel is two feet wide and contains no visible sulphides.

The winze is completely filled with ice and the raise closed at the top by snow and loose debris.

SAMPLING LITTLE SQUAW VEIN - 1932

Channel samples were taken across the back of the

tunnel over full width of the vein. These samples were cut at five-foot intervals where sulphides were visible and at ten-foot intervals elsewhere. The channels were cut from the foot-wall gouge to the hanging wall rock and one sample was made from each cut. These samples averaged approximately two pounds per running foot of channel. Occasional check samples and blank samples were cut and all samples were sealed and placed under lock.

Samples were crushed to minus 1/4 inch and quartered over a large Jones riffle. One portion was kept and assayed by Mr. Paul Hopkins of Fairbanks. The other portion was ground to minus 30 and the pulp rolled and quartered over a Jones riffle. Sets of this pulp were forwarded to Black & Deason of Salt Lake, and Dr. John Banks of New York. The results obtained from the different assayers varied greatly and Dr. Banks reground to minus 100 mesh and assayed the rejects of his pulps and obtained appreciable differences from his original assays. Dr. Banks attributes the differences to the presence of minor amounts of tellurides and much coarse wire gold. It is probable that the original sample should have been ground to minus 100 mesh before the initial quartering.

ASSAY RESULTS

See pages 9 & 10 in E. A. Boadway's Report on the Sulzer properties, dated

1932

The average of all assays is plotted on accompanying sketch. A weighted average shows the truncated ore shoot extending for 65 feet west from the portal, and averaging $35.80 a ton over a width of 4 feet. In computing this weighted average, the high values were included because of the presence of much coarse gold along the exposed ore shoot. Panning shows these values to be concentrated in the foot-wall half of the vein and panning of the surface breccia indicates the extension of the ore shoot to the surface.

DESCRIPTION OF MIKADO VEIN 4331-17

The Mikado vein as exposed in the shaft and tunnel consists of lenses of auriferous quartz in a gouge filled fault. This fault in places resembles a shear zone, striking magnetic East and West and dipping nearly vertical. In the shaft the quartz is concentrated on the North or hanging wall side of this zone.

No cross-cuts from the shaft toward the foot wall have been driven, and as holes drilled in several places intersected additional quartz in both the foot wall and hanging wall of the shaft, parallel lenses may be expected. On the tunnel level the quartz is concentrated on the foot wall of the zone which at this level is 36 feet wide.

The maximum width of the lenses in the shaft is 4½ feet with a maximum depth of 50 feet (See section sketch). These lenses and the fault cut across the strike and dip of the schistosity

of the country rock at an acute angle.

Two ages of auriferous quartz are found with the younger quartz appearing near and at the bottom of the shaft. The older quartz is shattered in places, while the younger quartz, although showing minor faulting in and parallel to the vein, is hard and breaks clean from the enclosing rocks and gouge. Adjacent to the older quartz the gouge in places carries appreciable values in gold.

Pyrite and arsenopyrite are abundant, and panning gave a concentrate of these minerals vaying from one to five per cent of the total by volume. These minerals are somewhat disseminated throughout the older quartz but are arranged in zones in the younger quartz, giving it a banded appearance.

The oxidized zone in this district is very shallow, and in the shaft extends to a depth of about 50 feet but is not pronounced below a depth of 25 feet.

Only one surface pit or trench could be located under winter conditions but the statements of several men and quotations from government reports are that several pits and outcrops showing auriferous vein material have been cut or found extending over a length of 3,000 feet along this East-West zone.

Quoting A. G. Maddren in the U. S. Geological Bulletin #532, published in 1913:

> "On the Tobin, Little Mikado and Mikado claims of the Mikado group, the quartz has been exposed by open cuts in six places over a distance of 3,000 feet, and in all of these the quartz near the surface contains rich values in gold.*******

**** a shaft has been sunk on the vein to a depth of about 100 feet. The average thickness of this vein is about 4 feet***** It is reported that the average assays from the quartz removed in sinking this shaft give $112 to the ton."

Brunton surveys place the bottom of the shaft as approximately 100 feet above the tunnel level and on the north wall of this crushed zone.

The conclusion drawn from the examination of the vein and fault as exposed in the Mikado workings and from the best reports and information obtainable is that the lenses may be expected to be repeated at unknown intervals for a considerable length and depth along this east-west zone.

SAMPLING MIKADO VEIN

The Mikado shaft was reopened by thawing down through the debris filling along the west end of the former shaft. Sufficient dry fuel for thawing out the entire cross section of the caved shaft could not be obtained and consequently the vein on the east end of the former shaft was exposed only at irregular intervals.

Channel samples containing approximately 2 pounds per running foot of sample were cut at 3 feet intervals down the west side of the shaft and on the east side of the shaft wherever exposed. Occasional blank samples and check samples were taken. All samples were sealed and placed under lock and key, but the locked container remained accessible to all men employed. At several points in the

shaft, the hanging and foot wall were drilled and blasted, and the additional quartz exposed was sampled. A surface pit was located approximately 200 feet southwest of the shaft and open fires used to thaw it to a depth of 3 feet. A six foot disintegrated vein was exposed and channel sampled. Channel samples were cut on the quartz lenses, showing in the drifts on the tunnel level.

MIKADO ASSAYS 1731-12

All original samples were delivered to Mr. Hopkins at the Alaska School of Mines where they were ground to minus 20 mesh before making the initial quartering. The portion of the pulp saved was ground to minus 60 mesh, and 3 pulp samples cut from it. One of these was screened and assayed by Mr. Hopkins and the metallics gathered on the screen were assayed separately and the results combined. Another set of these pulp samples along with several check samples was expressed to and assayed by Black & Deason of Salt Lake City. A third set was stored in Fairbanks.

In both the Little Squaw samples that were assayed in 1932 and in the Mikado samples, the average of the assays reported by Black & Deason averaged materially higher than those reported by Hopkins. In all computations the average of the results of the two assayers was used, but the author is inclined to give greater weight to the assays of Black & Deason, as they are commercial assayers and their work for a period of years as referee assayers has been satisfactory to interests with whom the author has been associated.

The results as plotted on the accompanying assay plan show an ore shoot in the Mikado shaft which, when eliminating 90% of the extremely high assay of #6, averages $49.50 per ton. The average width for this section is 35 inches and extends from a depth of 10½ to 64½ feet. The continuation of this section for the next twelve feet of depth to 76½ feet averages $18.00 over an average width of 43 inches. From a depth of 69 feet to 87 feet, a lense of vein material constitutes the hanging wall of the shaft and nine samples taken at the upper and lower portions of this lens averaged $37.00 per ton. A four-foot cross-cut into the hanging wall at the bottom of the shaft (depth 99 feet) exposes a vein averaging 16 inches wide. Two channel samples cut across this vein assayed $79. and $439. and a 75-lb. bulk sample assayed $178. a ton. A sample of the quartz on the surface of the dump, roughly representing the last material removed from the shaft, assayed $138. a ton.

At the intersection of the tunnel and the crushed zone, assays of samples taken across the quartz concentrated on the south wall of the zone average $1.00 per ton. Eight feet east of this point, on the back of the drift driven along this wall, the back averaged $10.60 over a width of 76 inches and the face 8 east assayed $5.50. The highest assay on the tunnel level was $56. over a width of 8 inches in this south drift.

A 47-foot drift on the north or hanging wall of this zone intersected no appreciable amount of quartz, and the face assayed only $0.40.

The samples taken from the surface pit assayed $0.80 over a width of 6 feet. This pit is not on the line of the strike of the vein exposed in the shaft. This relation is shown on the surface plan accompanying this report.

The conclusions drawn from the sampling of the Mikado claims is that ore of minable widths and values but of unknown length and depth is present, and that the Mikado tunnel has intersected the vein at a comparatively lean section of the tunnel horizon.

TABULATION MIKADO ASSAYS

Sample No.	Value $ Ton Gold Hopkins	B & D	Average	Width inches	Remarks
1		138.20		--	Surface of shaft dump
2	35.58	42.80	39.19	18	Shaft - see sketch for locati
3	33.49	35.20	34.34	15	"
4	19.12	15.20	17.16	20	"
5	11.95	12.00	11.98	13	"
6	344.76	332.20	338.48	11	" reduced in computation to 33.85
7	2.86	3.40	3.13	15	"
8	10.92	10.80	10.86	20	"
9	22.72	29.60	26.16	10	"
10	81.50	92.40	86.95	24	"
11	58.04	70.20	64.12	13	"
12	.00	.60	0.30		Blank schist
13	87.93	105.40	96.67	28	Shaft
14	1.63	1.80	1.72	15	"
15	27.44	29.40	28.42	28	"
16	51.30	55.80	53.55	28	Cut just above #15
17	12.26	14.60	13.43	8	Shaft
18	95.16	101.40	98.28	30	"
19	79.24	84.40	81.82	8	"
20	95.50	112.60	104.05	40	"
21	32.32	39.80	36.06	26	"
22	40.55	44.60	42.57	53	"
23	88.10	101.40	94.75	54	"
24	10.49	11.20	10.84	18	"
25	45.04	41.20	43.12	56	"
26	18.78	28.20	23.49	28	"
27	11.89	13.20	12.54	2	"
28	15.15	15.60	15.38	25	"

Sample No.	Value $ ton Gold			Width Inches	Remarks
	Hopkins	B & D	Average		
29	5.26	6.80	6.03	22	Shaft
30	0.23	0.40	0.32	19	"
31	26.24	24.20	25.22	15	"
32	1.26	1.40	1.32	6	Tunnel
33	7.78	7.00	7.39	16	Shaft
34	7.46	8.00	7.73	11	"
35	12.86	13.80	13.33	44	"
36	59.87	62.80	61.34	12	"
37	142.20	143.60	142.90	14	"
38	0.46	0.40	0.43	32	Tunnel level
39	1.32	1.00	1.16	40	"
40	1.32	1.20	1.26	36	"
41	1.84	1.60	1.72	34	Shaft
42	2.95	3.00	2.97	30	"
43	0.43	0.40	0.42	24	"
44	0.00	0.20	0.10	9	"
45	0.43	0.40	0.42	10	"
46	15.98	13.60	19.79	18	Tunnel level
47	5.69	5.60	5.65	45	"
48	12.52	16.40	14.46	13	"
49	59.84	51.40	55.62	8	"
50	6.12	5.00	5.56	30	"
51	0.83	0.40	0.61	48	"
52	0.26	0.60	0.43	30	"
53	20.52	22.40	21.46	40	Shaft
54	88.36	69.20	78.78	17	"
55	17.29	21.20	19.25	19	"
56	438.98	438.80	438.89	15	"
57	174.12	182.20	178.16	Bulk	"
59	14.58	15.80	15.19	28	"
60		5.00			Rough cut above #59
62	1.26	1.40	1.33	32	Surface pit
63	0.43	0.40	0.41	36	"
64		1.40		36	Check on 62
65		1.00			Blank schist
66		0.20			"
66-A	35.24	40.00	37.62	36	Shaft
67	16.12	19.00	17.56	8	"
68	0.23	0.60	0.41	14	"
69	31.39	35.20	33.30	14	"

NOTE: Gold was taken at $20 per ounce in computing these values.

BONANZA VEIN VK 31-16

The Bonanza vein is 4,000 feet south of the Little Squaw vein, as shown on the accompanying map. No extensive work has been done on this vein, but seven to ten foot widths of quartz are reported exposed by widely separated trenches and pits over a length of 2,000 feet. One pit was found on the east end of the Woodchuck claim and the vein was sampled zt the collar. No mineralization was evident, but neither the foot-wall nor the hanging wall was sampled as they were completely covered by frozen overburden. The six feet sampled assayed only $0.30, but the bottom of this pit is reported to be in the footwall of the vein. The dump indicates this to be true as a grab sample of the dump assayed $3.00. Float was traced for 150 feet west along this wind-swept ridge, but deep snows prevented the location and examination of the other pits. High-grade float was found in Robbins Gulch below the Eneveloe claims, and it is reported that rich surface placer was found in the creek below the Jupiter claim.

STAR GROUP VK 31-16

This group is described by Irving McReed, a U. S. Minerals Surveyor, as one of the most promising in the district. Deep snow prevented any examination of these claims.

SCHULTZ VEIN

This vein is obtainable by option under favorable terms. It was completely snow covered but is reported by several men as exposed for over a hundred feet in length and averaging three and

one-half feet wide. A 57-foot shaft, a short tunnel and two trenches, all showing free gold, have been opened along this vein. The vein narrows to four inches to the west and has not been found beyond this point. Specimens reported to have been taken from surface trenches carry considerable visible gold. This vein is located on the ridge at the head of Little Squaw Creek. Other veins are reported by inhabitants but have never been prospected.

TONNAGE ESTIMATES

Of the various groups of claims only the Little Squaw group has open workings suitable for making an estimate of probable ore.

The continuation of the Little Squaw ore shoot through from the tunnel to the surface was verified by panning talus and float on the surface directly above the sheet. This block of ore is termed "assured ore".

I believe that there is reasonable assurance that this shoot will extend to a depth of fifty feet below the tunnel level; this is termed "probable ore". As there is no information regarding the depth to which "ore shoots" extend in this district, no estimate is made of the "possible ore". Instead of predicting or limiting the "possible ore", a block called "indicated ore" is shown and it has been limited to a depth of 100 ft. below the tunnel level, and a block to a similar depth below that portion of the vein reported stoped near the portal. The assumption is made that the "probable ore" and the "indicated ore" will be of a grade similar to that exposed.

Assured ore	700 tons	
Probable ore	1000 "	
Indicated ore	2300 "	
Possible ore		No knowledge of extent of ore shoots in this district
	4000 tons at $33.00	

The total value of this tonnage at $33.00 a ton is $132,000.

No tonnage estimate can be made for the Mikado vein from the information now available, but geologically the conditions appear favorable.

AMALGAMATION TESTS

Amalgamation tests were run by Mr. Hopkins at the Alaska School of Mines on both ages of quartz of the Mikado vein. Tests on a composite sample, taken from the rejects of samples cut in the older quartz, gave an extraction of 76% when ground to minus sixty mesh.

The extraction on a portion of the bulk sample taken from the younger quartz in the bottom of the Mikado shaft was 77% at minus twenty mesh and 89% at minus sixty mesh.

In both cases where the sample was ground to minus sixty mesh, the tailings assayed over $18. Two amalgamation tests run on the quartz from the Little Squaw vein, which contained much visible gold gave an average extraction of 90%.

The 15-ton stamp mill now stored in transit is not satisfactory for the treatment of these ores. Economical grinding to the fineness indicated as necessary cannot be accomplished in this mill.

These tests indicate the advisability of further tests

of finer grinding and additional treatment beyond the simple amalgamation first considered as suitable for the ore of this district.

MILLSITES

The Spring Creek Millsite, now being patented, is situated in the Graves Creek valley five miles northeast of the Mikado claims and two and three-quarter miles northeast of the Little Squaw claim. This millsite was located on a perennial spring that was estimated to have a winter flow of 140 gallons per minute at 40° F. It is probable that this flow could be supplemented by diverting the flow of Little Squaw Creek half a mile east of the millsite. This millsite is at an elevation 1000 feet lower than the Little Squaw tunnel and 1900 feet lower than the Mikado tunnel.

TRANSPORTATION OF ORE

An aerial tramway is proposed to convey materials and ore between the Mikado and Little Squaw veins and the Spring Creek millsite. The line of this proposed tramway will cross the Bonanza vein and pass near the Star and Schultz veins and with a small additional investment might be used to service these latter properties.

In conjunction with the Leschen Company's staff, the cost of the complete installation of the suggested aerial tramway, capable of handling ten tons per hour, has been estimated to be $110,000. The power required is estimated to be 25 H. P. and the operating cost is estimated to be $0.15 per ton mile.

POWER

A flow of water and drop sufficient to develop at least 1,000 H. P. is reported to exist a few miles below the outlet of Chandalar Lake on the Chandalar River. From observing this section under winter conditions from an aeroplane and from government reports, it is the author's opinion that this information is correct, but that it should be verified at the first opportunity.

This power site is 15 miles from the Mikado claims and 20 miles from the Spring Creek millsite.

The cost of the complete installation of the generating plant, transmission line and substation equipment for a 750 H. P. plant is estimated to be $250,000.

ESTIMATED OPERATING COSTS

Many factors that would influence the cost of operating in this district are not accurately determinable with the information now available. The following costs have been estimated by making what was considered due allowance for these undeterminable factors.

The following costs have been estimated on a basis of 200 tons per day. These costs do not include depreciation and capital charges.

Development	$2.50
Mining	7.00
Tramming (cable way)	0.75
Milling	2.50
General Expense	0.75
Total	$13.50

CAPITAL REQUIREMENTS AND SCHEDULE

The following schedule and capital requirements are made subject to revision as conditions in the field indicate as advisable, especially so if not undertaken at the seasons suggested.

Underground (some surface) Exploration

June 15	$ 4,000
July 15	6,000
Aug. 15	9,000
Sept. 15	8,000
Oct. 15	8,000
Nov. 15	6,000
Dec. 15	6,000
Jan. 15	5,000
Feb. 15	5,000
Mar. 15	8,000
Apr. 15	10,000
Total	$75,000

Being guided by conditions as found in the field, the progressive expenditure of the sum recommended under the supervision of a competent engineer should block out sufficient ore and provide sufficient geological and other information to determine the most profitable scale of mining and milling the veins on these properties.

Throughout the following summer, the transmission line, power house, mill and tramway equipment would be purchased and transported to the head of navigation; the foundations for these units and living quarters should be prepared. All equipment should be transported to the properties and erected as soon as road construction or the advent of fall conditions permit.

Capital Summary:

Exploration and Development (1933-34)	$ 100,000
Aerial Tramway	130,000
Hydroelectric installation (750 HP)	175,000
Transmission lines and substations	75,000
200-ton Mill	200,000
Mining equipment	15,000
Roads, tractors, & misc. equipment	35,000
Camps and equipment	25,000
Additional development 134-5	40,000
Contingencies	25,000
Total	$820,000

The schedule of expenditures necessary to cover these phases of the work cannot be accurately determined at this time, but it is probable that approximately $50,000 per month would be needed from May to October 1934, and $25,000 per month from November to February 1935, inclusive. The remaining $150,000 should be available in March and April of 1935.

This program would be considerably shortened by the expected cooperation of the Territorial government in providing suitable summer roads in this district or by using airplanes for freighting at a slight increase in the estimated costs.

OPERATING PROFITS

Although no appreciable tonnage has been blocked out, the sections sampled indicate the possibility that millheads might be maintained at $30.00 a ton.

If the proposed underground exploration and development work blocks out and indicates sufficient tonnage to operate on a 200-ton per day basis, the maintenance of $30 millheads would provide an estimated profit of $16.50 per ton, or a daily profit of $3300. Of

this amount, 15% of the net operating profits derived from ore from the Mikado would be applied under the option to the total purchase price of $300,000 until the $300,000 is fully paid.

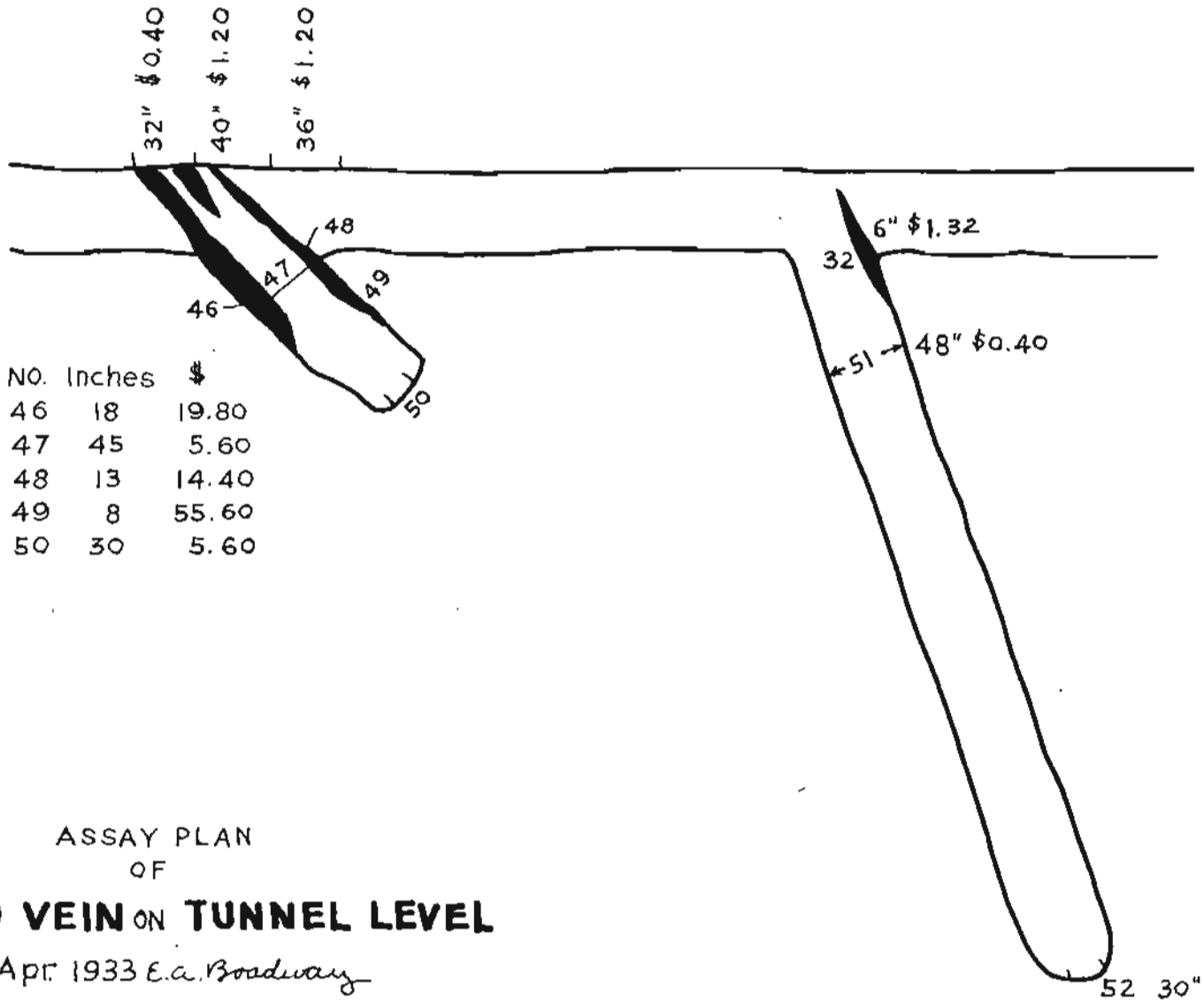
From the net operating profits derived from ores from the Bonanza and Little Squaw ores 10% must be applied to retiring the mortgage against the Little Squaw mine of $147,005. Fifty per cent (50%) of the net operating profits go direct to the Engineers Exploration Syndicate, or assignees, for management of the property, and the remaining 40% to the Chandalar Gold Mines, Incorporated. Under the options held, the Engineers Exploration Syndicate, or assignees, will own 50% of the stock of the Chandalar Gold Mines as soon as the sum of $150,000 has been expended on the development and equipping of the properties of the Chandalar Gold Mines, Incorporated. This sum of $150,000 will be spent in the schedule outlined before the properties are producing, and the Engineers or assignees will then be entitled to 70% of the net profits from the Little Squaw mine, and 75% of the net profits after the mortgage is retired.

APPENDIX

The conclusions drawn in the latter part of this report under the headings of "TRANSPORTATION OF ORE", "POWER", "ESTIMATED OPERATING COSTS","CAPITAL REQUIREMENTS and SCHEDULE", and "OPERATING PROFITS" are based upon insufficient data to warrant their being interpreted as definitely obtainable.

The subjects discussed under these headings are included for the specific purpose of pointing out the possibilities of the district and the probable capital expenditures necessary to obtain these possibilities, if warranted by the initial underground exploration.

/s/ E. A. BOADWAY



NO.	Inches	$
46	18	19.80
47	45	5.60
48	13	14.40
49	8	55.60
50	30	5.60

ASSAY PLAN
OF

MIKADO VEIN ON TUNNEL LEVEL

Apr. 1933 E.a. Boadway

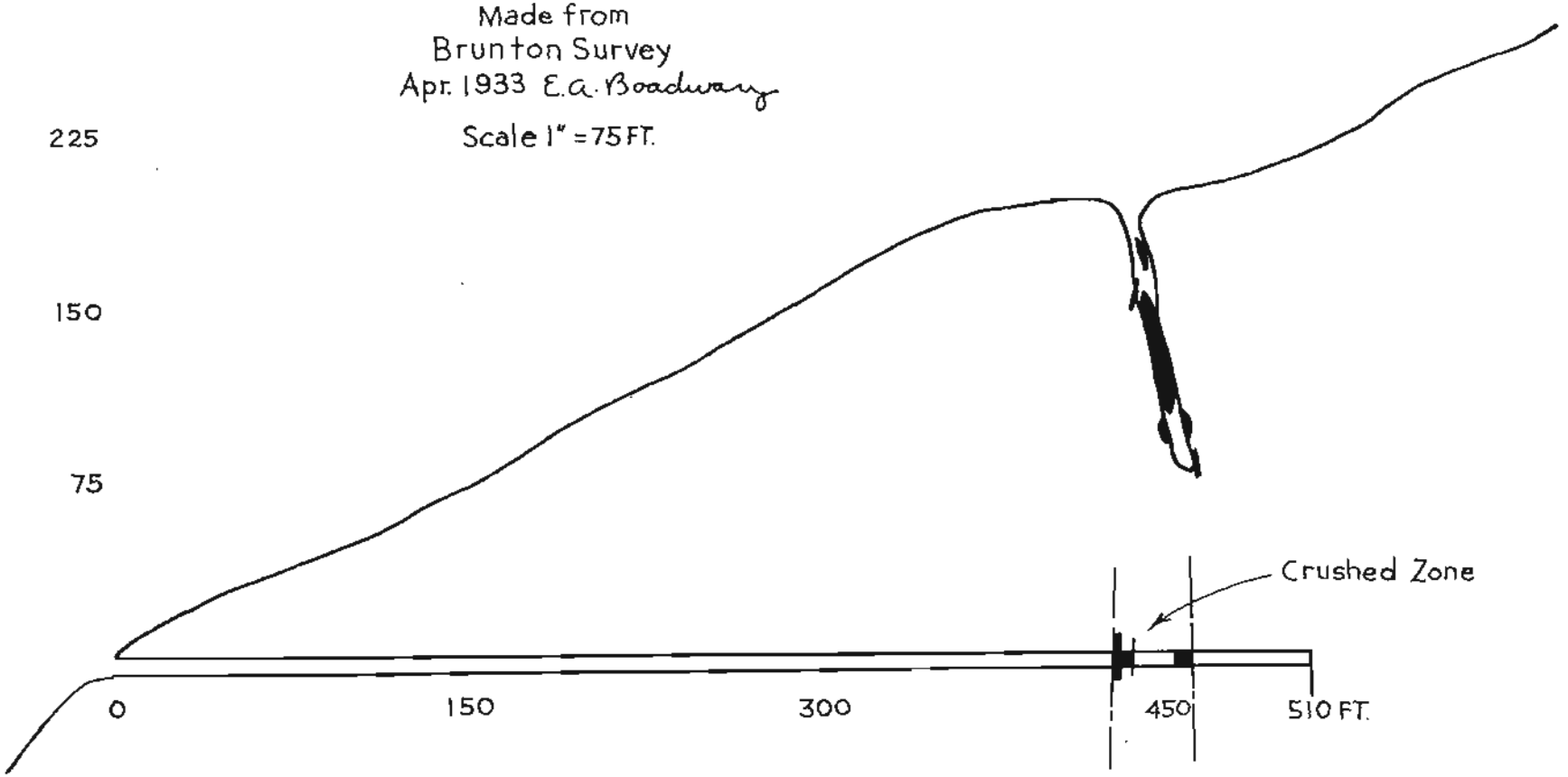
Scale 1" = 10 FT.

SECTION

MIKADO VEIN, SHAFT AND TUNNEL

Made from
Brunton Survey
Apr. 1933 E.A. Boadway

Scale 1" = 75 FT.

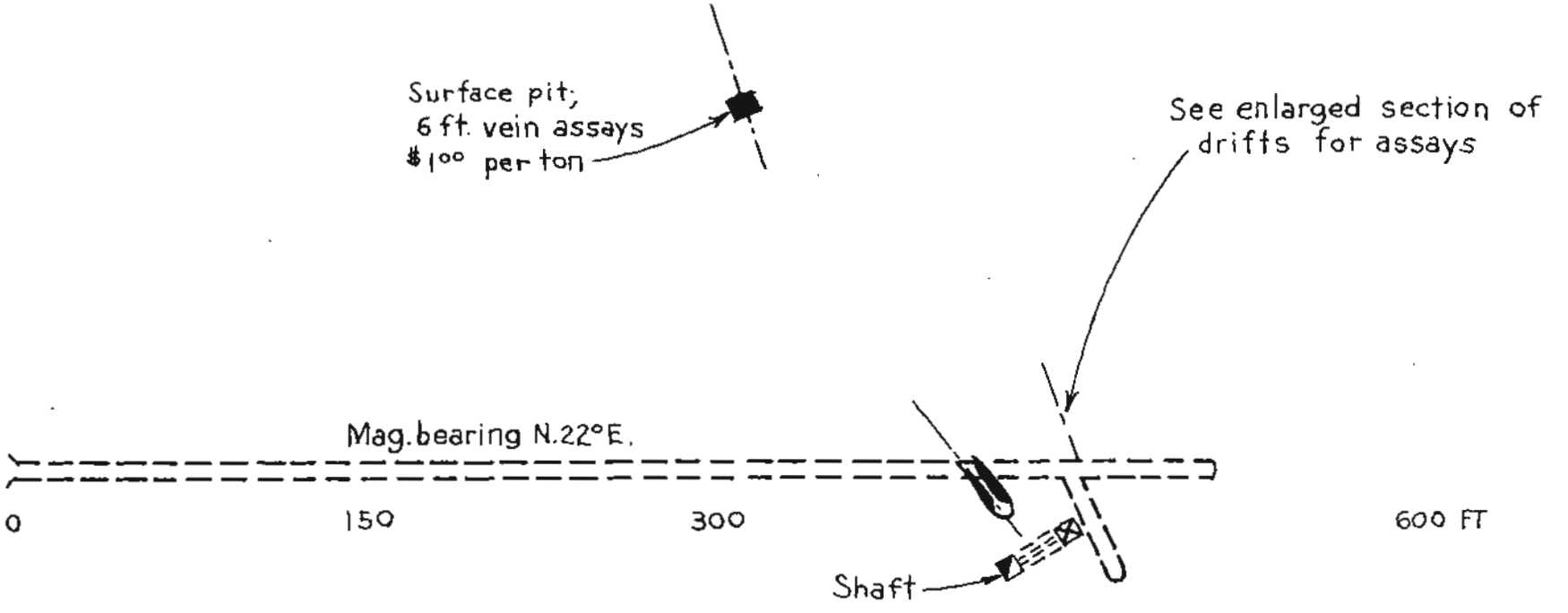


LEGEND:-

Quartz ▭

Fault —·—

Note:- This section is perpendicular to the strike of the vein.



PLAN OF

MIKADO SURFACE
AND
UNDERGROUND WORKS

From Brunton Survey
Apr. 1933 E.a. Boadway

Scale 1" = 75FT.