

ASSESSMENT REPORTS

MAP No. 105-D-2

TYPE OF WORK:

Geological, Geochemical

REPORT FILED UNDER

Venus Mines Ltd. (NPL.)

DATE PERFORMED

June-Sept. 1963

DATE FILED: October 29, 1963

LOCATION - LAT.

60° 05' n

Carcross, Y.T.

LONG.

134° 34' W

CLAIM Nos.

in report

WORK DONE BY

C.E.G. Brown, J.A. Kelly

WORK DONE FOR

Venus Mines Ltd.

REMARKS

Thick series of ardesite flows and breccias containing vein structures with Au and Ag \$110-\$120 per ton based on shipments of ore (Pb, Au, Ag) to Trail, B.C. in 1919. History of mine group. Mineralization occurs in veins and associated breccia. Minerals are galena, pyrite, arsenopyrite as well as

OVER

3

REPORT ON VENUS GROUP

MONTANA MOUNTAIN
WINDY ARM, YUKON

by

C. E. Gordon Brown, P. Eng.

J. A. Kelly

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REPORT ON VENUS GROUP

MONTANA MOUNTAIN WINDY ARM, YUKON

Summary

(1) Mineralization

Widespread mineralization is known to contain gold and silver content to the value of \$110.00 - \$120.00 per ton wherever the structure is suitable.

(2) Structure

A thick series of andesite flows and breccias, of mid Cretaceous age, forms a synclinal structure, probably due to subsidence into a volcanic sink or caldera. Stump breccia zones and sheeted vein type breccias are to be anticipated which could contain important orebodies.

(3) Previous Development

Underground work has been confined to a single vein zone and no diamond drilling or lateral exploration for other zones has been done. The single vein tested has shown several ore shoots and marginal shoots. Several thousand tons have been shipped for smelting. The possibility of finding other ore shoots seems reasonable.

(4) Mining Conditions

The ore structures dip at 30 to 40 degrees, in andesite rock with strong hanging walls. Open stoping is possible with a minimum use of timber.

(5) Exploration Conditions

The property must be explored by adit to obtain an underground drilling base, due to topography. A limited amount of surface drilling can be done to test the structure at depth.

(6) Property

The property can be obtained reasonably since the owners are asking 16.67 per cent interest with no cash payments.

Recommendations

Because of the combination of widespread mineralization of good grade with attractive structural conditions, it is recommended that an attempt be made to discover additional deposits other than the single vein that has been explored to date.

Recommendations (cont'd)

A preliminary program of 5,300 feet of cross-cutting and drifting, followed by 23,000 feet of underground diamond drilling, would search for new ore bearing structures throughout a thickness of 1,000 - 1,400 feet of Hutchi andesite formation which contains the exposed mineralization. An additional 500 feet in depth could be obtained by 3,000 feet of surface diamond drilling.

The cost of the recommended program would be \$404,425.00, exclusive of management costs, assaying and contingencies. It would be safe to budget for \$450,000.00.

The formation of a new company will probably be necessary, in which the vendors ask a 16.67 per cent interest, with no cash payments.

Respectfully submitted,


C. E. Gordon Brown, P. Eng.


J. A. Kelly.

October 29, 1963.

REPORT ON VENUS GROUP

(1)

MONTANA MOUNTAIN WINDY ARM, YUKON

This silver-gold property was mapped and sampled by a five-man geological crew under J. A. Kelly during the period 13th June to 5th August; 15th to 24th August, and 28th August to 6th September, 1963. The examination was conducted under the supervision of C. E. Gordon Brown.

Location and Access

The Venus Mine is located eleven miles south-east of Carcross, on the west side of Tagish Lake on Windy Arm. It is in the Yukon Territory, two miles north of the Yukon-British Columbia boundary.

Carcross, population 150, is a station on the White Pass and Yukon Railway, 67 miles north of Skagway, Alaska and 39 miles south of Whitehorse, Y. T. The village, now a tourist attraction, is located at the junction of Lake Bennett with Tagish Lake. It was formerly a transportation centre for the system of waterways extending south to Atlin, B. C., which have fallen into disuse since highway communication has been established.

The distance from Carcross to the Venus Mine by water is seventeen miles. The railway sidings and docking facilities are adequate. A barge of about seventy-five tons capacity and a gasoline-driven tug are available for the transportation of heavy equipment.

Formerly, a wagon road about sixteen miles long, extended from Carcross to the mine. This has not been used for over forty years and is now overgrown. Examination of the route showed that, with exception of two small bridges and a quarter-mile section of bedrock, no serious difficulty would be expected in re-establishing road communication at reasonable cost. The Territorial Government would view with favour an application for assistance on this project.

The property consists of a total of twenty-seven claims:

	<u>No.</u>
Crown Granted Claims	8
Reverted Crown Grants, now re-staked	10
Claims held by location	<u>9</u>
Total	27 claims

(1) Claims owned by John D. Scott, Professional Engineer,
Whitehorse, Y. T. and John Phelps, Businessmen,
Vancouver, B. C.

<u>Claim</u>	<u>Status</u>	<u>Registered Owner</u>
RUBY SILVER Lot 23, Group 6	Crown Grant	Scott & Phelps
VENUS Lot 20, Group 6	Crown Grant	Scott & Phelps
VENUS NO. 3 Lot 21, Group 6	Crown Grant	Scott & Phelps
VAULT Lot 26, Group 6	Crown Grant	Scott & Phelps
KLUANE Formerly Venus Ext, CG. Lot 140, Group 754	Re-staked 1957	Dorothy Scott
VENUS NO. 6 Formerly Lake Shore CG. Lot 40, Group 6	Re-staked 1959	John Scott
VENUS NO. 5 Formerly Nipper No. 2 CG. Lot 143, Group 754	Re-staked 1959	John D. Scott
VENUS NO. 7 Formerly parts of Red Deer CG. Lot 139, Group 754 and Blue Grouse CG. Lot 60, Group 6	Re-staked 1959	John D. Scott

VENUS NO. 8 Formerly Annex CG. Lot 76, Group 6	Re-staked 1959	John D. Scott
VENUS NO. 9 Formerly Ruby Silver Ext. CG. Lot 80, Group 6	Re-staked 1960	J. M. Scott
VENUS NO. 10	Staked 1960	J. M. Scott
VENUS NO. 12 Formerly Uranus No. 2 CG. Lot 28, Group 6	Re-staked 1960	J. M. Scott

The total area of this group is five hundred and fifty-six acres more or less.

(2) Claims owned by Matthew Watson, General Merchant,
Carcross, Y. T.

<u>Claim</u>	<u>Status</u>	<u>Registered Owner</u>
HUMPER NO. 2 Lot 145, Group 754	Crown Grant	M. Watson
BEACH Lot 142, Group 754	Crown Grant	M. Watson
NIPPER NO. 2 Lot 143, Group 754	Crown Grant	M. Watson
BIG TREE Formerly Humper CG. Lot 141, Group 754	Re-staked 1962	Clem Emminger

The total area of this group is two hundred acres, more or less.

(3) Claim owned by Drucilla M. Pooley, of Seattle, Washington, U. S. A.

<u>Claim</u>	<u>Status</u>	<u>Registered Owner</u>
MAYBELLE FRAC. Lot 78, Group 6	Crown Grant	Mrs. Pooley

The area of this claim is fourteen acres, more or less.

(3) Claims owned by Giant Yellowknife Mines Limited:

<u>Claim</u>	<u>Status</u>	<u>Registered Owner</u>
G 9 Formerly Uranus CG, Lot 27, Group 6	Re-staked 1963	M. Smith
G 10 Formerly M & M CG. Lot 25, Group 6	Re-staked 1963	M. Smith
G 3, G 4, G 5, G 6, G 7 and G 8	Staked 1963	C. Christensen
G 11 and G 12	Staked 1963	M. Smith

The total area of this group is four hundred and ninety-four acres, more or less.

Owing to the rugged nature of the topography and to the difficulty of finding the old survey posts, all re-staked Crown grants should be checked by survey. It is known that several fractional areas have not been staked.

The total area of all groups is approximately one thousand two hundred and sixty-four acres.

Terms of Acquisition

For correspondence on this subject, see Appendix "A". The principal terms requested are:

- (1) A new company of 3,000,000 shares is to be formed.
- (2) 500,000 shares are to be issued for:
 - a) Claims owned by John D. Scott and John Phelps detailed above
 - b) Claims owned by Matthew Watson, detailed above
- (3) 1,000,000 shares are to be used for financing the exploration phase of the property, which is expected to take three years and to cost \$500,000.

(4) A cash payment shall be made of \$10,000.00 three years after the date of the initial agreement. In lieu of this payment, arrangements shall be made to return control of the company to Scott, Phelps et al.

(5) Scott, Phelps et al are to elect one director to the Board of the new company.

It is understood that these suggested terms are subject to negotiation according to the requirements of financing. Meanwhile, the properties are held for a period of at least six months pending a decision. There is a verbal agreement that this report be released to the owners if it is decided not to proceed with an agreement.

It should be noted that the fourteen acre fractional claim MAYBELLE FRACTION, owned by Mrs. Drucilla M. Pooley of Seattle, Washington, is not included in the above arrangement. Separate negotiations would have to be opened to secure this ground.

History

The available sources of information on the history of the Montana Mountain properties are as follows:-

1. Alexander Sharp
Report dated 20th September, 1906 to MacKenzie & Mann.
This report is only useful in that it supplies assay results, presumably on much samples, for the month of August, 1906 for VENUS, VAULT and URANUS claims.
2. Livingston Wernicke
Assay map of VENUS vein as it was when examined in 1920.
3. A. A. MacKay
Report dated 28th October, 1922, with assay plan and sampling of workings as they were when examined at this date. Shipments of sorted ore and concentrates where then available are included. The examination was made for Hollinger.
4. D. D. Cairnes
C. G. S. Summary Report, 1916, General history of VENUS, BIG THING, MONTANA M & M and VENUS EXTENSION properties up to this time.

5. H. S. Bostock
C. G. S. Mem. 284 "Yukon Territory" quotes miscellaneous cut of print reports by McConnell (1905), Cairnes (1906), Cairnes (1907), Cockfield (1929).
6. E. H. Levitt
Report dated 1937 for Pioneer Gold Mines Ltd., with assay plan.
7. W. P. Erwin
Report dated 1946 for A. W. Carr of Transcontinental Resources Ltd., with assay plan.
8. J. D. Spott
Report dated 1969, gives miscellaneous information, supplemented by personal conversation.

The VENUS, URANUS, VAULT, M & M and other claims on the east side of the mountain, together with various other groups situated on the upper slopes, such as BIG THING, MONTANA and JEAN, were all staked between 1899 and 1904. In the latter year, Col. J. H. Conrad, a mining promoter from Butte, Montana, acquired most of these properties.

During the next two years, development proceeded under Conrad Consolidated Mines, not only on VENUS but on MONTANA and BIG THING as well. Two short aerial tramways were erected from VENUS and VAULT workings and a four rail tramway connected the MONTANA group with Windy Arm. The town of Conrad was built at a point four miles north of the present workings. It is reported that there were two hotels, several stores and a population of at least 500. The town was connected with Carcross by a wagon road.

In 1906, Conrad made an agreement with Mackenzie and Mann for additional financing to form Yukon District Gold Mining Company Ltd. The agreement contained the extraordinary provision that fifty per cent of the gross receipts of mining be used to repay advances secured by a mortgage. In 1909, a 100 ton concentrator was completed containing a Huntington Mill, jigs, Calkow screens, Wilfley tables and vanners. A considerable portion of the Mackenzie & Mann money was expended for sinking shafts on the MONTANA and BIG THING. The first and second levels on VENUS were driven and some ore was shipped. In 1909, the adjoining claims, VENUS EXTENSION, NIPPER NO. 2, BEACH and HUMPER were optioned from John Miller of Seattle. The extension shaft was driven at this time. In 1911, Mackenzie and Mann foreclosed their mortgage and Col. Conrad passed out of the picture.

The history of the company during the next five years is obscure due to the absence of records. It would seem that VENUS and MONTANA were closed down but that work continued at BIG THING which was later leased to Alaska Corporation of Skagway. The original owners of VENUS, J. M. Pooley and Joe Petty, had not been paid the full amount of the original purchase price of the claims by Col. Conrad, so it would appear that considerable title difficulties were encountered. Mr. W. L. Phelps, a lawyer resident in Whitehorse, was appointed agent for Yukon District Gold Mining Company Ltd., the control of which remained with Mackenzie and Mann.

In 1916, Lakinaw and Tagish Mines (J. L. Harper Syndicate) of Seattle obtained a lease and bond on the VENUS property. Mining was commenced and continued until 1920, although it is not known whether the same group of lessees operated throughout this period. The workings were left in a state of chaos with all easily available ore mined out, timbering neglected and development openings filled with waste or sorting rejects. No serious work has been attempted since this time.

The report by Livingston Wernke, to which reference is made above, was written in 1920 for F. W. Bradley of Alaska Treadwell Mining Company. Bradley had offered a total of \$315,000 for all groups the previous year, but had to wait until the lease expired. All that remains of Wernke's report is the assay plan. In any case, Bradley commenced mining in the Mayo district in 1920 and the VENUS project was shelved.

The report by A. A. MacKay, made for Hollinger in 1922, recommended driving an adit crosscut 200 feet vertically below the Venus Extension adit followed by a drift on the structure in both directions. A feature of his report was a careful sampling. Two hundred and forty samples were accurately located and described. These have been incorporated in this report, since they constitute reliable evidence which is not now available owing to progressive delapidation of mine openings. Hollinger did not act on MacKay's recommendations, presumably because the price of silver had receded from its peak of \$1.11 per ounce in 1919 to \$0.67-1/2 in 1922 and was starting the long decline to the all-time low of \$0.28 of 1932.

Other reports by E. Lovitt for Pioneer Gold Mines Ltd. in 1937 and W. P. Irwin for Transcontinental Resources Ltd. in 1947 do not add much to general picture except to provide checks on the sampling of the VENUS vein.

History (cont'd)

With the decay of the Mackenzie & Mann empire, the claims and Crown grants were gradually allowed to lapse. Mr. John D. Scott and Mr. John Phelps over a period of years, have taken up and assembled the south-eastern part of the area into a suitable nucleus for further exploration.

ORE SHIPMENTS FROM VENUS MINE

1910 - 1920

<u>DATE</u>	<u>TONS</u>	<u>Am. Oz.</u>	<u>Ag. Oz.</u>	<u>Pb. lbs.</u>
Apr. 1910 - Mar. 1911	550.000	440.000	50,600.000	68,400
Mar. - Sept. 1911	66.240	60.940	4,431.430	6,756
	31.635	23.830	2,192.600	3,549
June - Sept. 1916	43.470	23.250	2,554.030	2,994
	56.018	30.334	4,161.570	
	51.000	27.548	3,168.030	
Sept. 1916 - Sept. 1917	775.968	424.576	43,647.030	100,977
	216.093	81.925	11,615.360	
Sept. - Dec. 1917	47.084	19.775	3,725.550	
	58.070	46.453	5,522.500	17,180
	15.932	7.388	1,222.060	
Mar. - June 1918	42.820	14.239	2,332.040	
	42.150	14.714	2,942.070	
June - Sept. 1918	36.550	29.973	2,762.020	8,480
	44.363	40.814	4,507.330	11,446
	43.827	37.777	3,878.760	10,982
	44.100	39.690	3,827.920	11,025
	30.064	26.629	2,490.260	9,351
	31.367	26.052	2,438.530	3,789
	44.133	33.303	3,812.680	12,446
	6.978	5.632	433.250	1,535
	3.833	3.409	323.500	1,174
	78.472	34.292	3,960.910	
July - Oct. 1919	52.000	27.000	3,533.000	500
	58.000	47.000	2,871.000	
Oct. 1919 - Jan. 1920	66.000	40.000	3,088.000	
	50.000	31.170	3,072.700	6,333
	50.680	43.330	2,623.640	
	50.000	30.000	1,870.370	
	2,693,960	1,721,489	183,747,260	

Average grade of metals paid for
by smelter

0.639
oz/ton

63.20
oz/ton

1. The tabled record of shipments was obtained by A. A. MacKay in 1922 from the Mining Recorder's office. These records are no longer available.

2. No record exists for the period 1906 - 1909 under Conrad's operation. Cairnes (1) reports sacking of ore in 1906 at Venus Extension. The same writer (2) reports in 1916 that Conrad mined about 6,000 tons of ore which was shipped to the smelters at Ladysmith, B.C. and Tacoma, Washington. A rough measurement of the stoped areas in the mine suggests that 13,000 to 15,000 tons of vein matter have been mined. Assuming a sorting ratio of 3 : 1, probably 4,000 - 5,000 tons of shipping ore was actually extracted.

3. MacKay states that 334 tons of concentrates were shipped in the 1910 - 1920 period. Final settlement for two shipments only to Trail of fine lead concentrates are available.

<u>Date</u>	<u>Lot #</u>	<u>Au oz.</u>	<u>Ag oz.</u>	<u>Pb lbs.</u>	<u>Dry Wt. Tons</u>
17 July, 1919	23	36.767	2,521.73	12,069	40.367
15 Aug., 1919	24	37.075	2,562.30	11,782	41.173
Average Grade:		0.90 oz./Ton	62.2 oz./Ton		

It is obvious that the gravity concentration mill did not do much to improve the shipping grade.

4. Value of shipping ore at present prices (Au \$35.00; Ag \$1.30) would be \$111.02 per ton. It should be remembered that the Au and Ag smelter settlements represent payment for only 95% of the metal content. Gross Au and Ag content averaged \$116.57.

(1) - Cairnes DD C.G.S. Summary Report 1906

(2) - Cairnes DD C.G.S. Summary Report 1916

Montana Mountain is situated between Bennett Lake on the west and Tagish Lake on the east. The summit elevation is 7,280 feet. There is 5,130 feet difference in elevation between the summit and the average lake level, which is 2,150 feet above sea level.

The claims are situated on the south-east slope of Montana Mountain, extending to a maximum distance of 9,000 feet in a north-westerly direction from the lake shore of Windy Arm. The maximum elevation on any of the claim groups is 5,000 - 5,500 feet on the G group.

Extending north-westerly from Windy Arm to an elevation of 3,200 feet, a talus slope, at a uniform angle of thirty-five degrees, extends upwards to the base of a line of cliffs twelve hundred feet high. Most of the veins and workings are located in these cliffs since they constitute almost the only part of the properties where there is continuous outcrop. The cliffs are broken near the north property boundary by a deep canyon in which Pooley Creek drops steeply into Windy Arm.

Above an elevation of 4,400 feet, the topography of the north-westerly claims is of the "alpine upland" type, a dissected plateau, rising at a gentler angle towards the summit of the mountain. The surface is covered with glacial drift and boulders to the extent that there is only about five per cent of bedrock exposure.

An inspection of Map No. 1 and of the photographs which accompany this report, will supplement this description of the topography.

Climate

Below elevation 4,000 feet, the climate is similar to Whitehorse. The following data are taken from the charts in the Climatological Atlas of Canada (Department of Transport, 1953).

Mean Annual Snowfall	60 inches
Mean Annual Rainfall	9 inches
Mean Annual Precipitation .....	) 15
(rainfall plus 1/10 snowfall) .....	) inches
Mean Annual Temperature	plus 32 deg. F.
Mean Annual Min. Temperature	minus 42 deg. F.
Mean Annual Max. Temperature	plus 81 deg. F.

The prevailing wind is from the west.

However, Windy Arm is subject to high winds from the south-east during the summer months. The use of small boats is dangerous and the unloading of freight at the property could be a problem in bad weather.

Above elevation 4,000 feet, the climate is alpine. The upper slopes of the mountain are subject to high winds and heavy snowfall. In this area, permafrost causes difficulty in road construction and stripping operations.

General Geology *

Montana Mountain is situated close to the western side of a belt of Permian and Mesozoic sediments, known as the Tagish Belt. This feature extends from the Pelly River south-easterly for three hundred and fifty miles to the vicinity of Telegraph Creek on the Stikine River in British Columbia, having a maximum width of one hundred miles.

TABLE OF FORMATIONS - MONTANA MOUNTAIN

Cenozoic	Pleistocene & Recent		Glacial Drift, gravel, etc.
Unconformity			
M E S O Z O I C	Upper and	Coast Intrusions	Granodiorite
	Middle	Intrusive Contact	
	Cretaceous	Hutshi Group 4500	Andesite, Andesite breccia, Tuff, Conglomerate Minor Ultrabasic rocks
	Unconformity		
	Lower Jurassic	Laberge Group	Greywacke Conglomerate
	Unconformity		
	Upper Triassic	Lewis River Group	Greenstone and Pyroclastic Rocks
Unconformity			
PALAEO-ZOIC	Pennsylvanian and Permian	Taku Group	Limestone and Pyroclastic Rocks

* Adapted from C.G.S. Mem. 312, "Whitehorse Map Area" J. O. Wheeler 1961

The geosynclinal basin in which these sediments were deposited is known as the "Whitehorse Trough". Sedimentation probably commenced in late Palaeozoic time and continued until the Lower or Middle Cretaceous. At first, sedimentation took place in deep water in a rapidly subsiding basin as evidenced by the thick series of limestones of the Taku Group. During the Upper Triassic, the western margin of the trough underwent spasmodic uplift, probably occasioned by a volcanic island arc, from which the ejectamenta went to form the pyroclastic members of the Lewes River Group. However, calcareous members of the same group, elsewhere in the trough, show that non-clastic sedimentation was still proceeding in deep waters.

During the Lower Jurassic, renewed and more violent uplift in the island arc, restricted the lateral dimensions of the trough. The Laberge Group, composed of detritus of volcanic origin, grading from coarse to fine material from west to east, was deposited at this time. Concomitant with these tectonic disturbances, a large fault block, known as the "Atlin Horst", began to be elevated in the middle of the trough, over a length of 175 miles and a maximum width of 75 miles. This accounts for the large exposure of Palaeozoic sediments of the Taku Group, which extend from Carcross, across Windy Arm and far southward into British Columbia, from which, after elevation, the rocks of the Laberge Group have been removed by erosion.

The penultimate phase of the history of the Whitehorse Trough was accomplished in Middle Jurassic to Middle Cretaceous time when the basin, having become progressively shallower, was cut off from the sea and assumed the characteristics of an inland lake. Marine sediments were no longer deposited and, in fact, deposition of any kind had practically ceased.

Finally, towards the end of the Cretaceous, the volcanic sources on the western side of the trough were re-activated. Local accumulations of Hutshi Group andesites and breccias were ejected to form relatively thick deposits around volcanic centres. At this time, considerable deformation of the rocks of the trough took place while the Atlin Horst completed its upward movement. These disturbances culminated in the intrusion of the granodiorite bodies of the Coast Range over a wide terrain to the west of the trough.

The Hutshi Group

Since the gold-silver mineralization of Montana Mountain is confined to the Hutshi Group and adjacent granodiorite bodies, this report must consider the nature and structure of these rocks in considerable detail.

The approximate dimensions of the Hutshi exposure on Montana Mountain show that the longest axis is 4.3 miles, trending north-westerly from

Windy Arm, while the width averages 2.3 miles. The exposed thickness, measured from the top of Montana Mountain to lake level, is one mile and the total thickness must be much more than this amount since the rocks extend to an undetermined depth below the lake level. The physical proportions of such a body would seem to exclude the possibility that it is a downfaulted segment of a thick series that has been removed by erosion. This impression is heightened by the fact that the nearest body of similar rocks is sixteen miles to the north and that these do not have the appearance of having been formerly part of a continuous horizon.

The rocks consist of green cherty andesite breccia, alternating with dark green flows, with a minor proportion of tuff and a small basal conglomerate. As is common in andesitic flow rocks, the attitude of individual flows is difficult to determine due to a general absence of internal structure such as pillows and recognizable top and bottom breccias. After a careful examination both on foot and from a helicopter, sufficient indications of flow structures and tuff beds were found to confirm the impression that the whole series forms an irregular syncline with axis trending north-west.

The northern side of this volcanic complex rests unconformably upon rocks of the Taku Group, possibly with faulting at the contact. The southern side appears to exhibit a faulted unconformable contact with underlying rocks of the Laberge Group. Map No. 1 and the accompanying sections show this general relationship.

(1)

It has been suggested by J. O. Wheeler that "the abundance of breccia, the basin-like structure, the faulted contact on the south and the great thickness of volcanic rocks for so restricted an area all suggest the subsidence of a volcanic centre into a caldera".

Later in this report, evidence will be adduced from the nature of the veins and hydrothermal activity to support this hypothesis.

Veins and Mineralization

Approximately twenty per cent of the total area of the property is exposed in the cliffs which run parallel to the west shore of Windy Arm. The VENUS vein is traceable for a length of 5,000 feet near the base of this steep rock exposure. Fourteen other veins were mapped in 1962 in these cliffs, several of which were unknown to recent workers although they had probably been found by the early prospectors. Approximately a dozen other veins are known to exist on the upper slopes outside the property. These include the Montana, Big Thing

(1) - J. O. Wheeler - *ibid.* p. 76.

and Jean mines.

The veins are in the andesite, tuff and breccia of the Hutshi formation. Usually, they consist of two or more parallel fractures, extending over a thickness of half a foot to eight feet. The intervening vein material consists of crushed wall rock, varying from a fine breccia to larger irregular fragments. The comminuted material has been largely replaced by silica, carbonates, chlorite and sericite. Bleaching and pyritization of andesite extends several feet beyond the limits of the fracture planes. In mining, the veins break cleanly to a smooth surface on the uppermost fracture, leaving a strong hanging wall for open stoping operations.

The ore minerals are irregularly distributed within the veins. Galena, pyrite and arsenopyrite are the most abundant sulphides. Minor sulphides are sphalerite, ruby silver and chalcopyrite. The veins have obviously undergone repeated re-openings as evidenced by the banded sulphide deposition and the comb structure with abundant vugs in the quartz-carbonate gangue.

Some of the sulphide bands consist almost entirely of galena with which much of the silver deposition seems to be associated. Others are predominantly composed of pyrite and arsenopyrite where gold content is from 0.10 to 1.00 oz/ton.

There appears to be a rough zoning of mineral deposition within the Hutshi formation. The higher veins, such as MONTANA, JOE PETTY and URANUS contain almost no gold, whereas the gold content increases at the lower elevations. The two most northerly occurrences (BIG THING and JEAN) are within a small granodiorite stock and do contain gold. Possibly this is a temperature effect associated with the intrusion of underlying granodiorite immediately prior to ore deposition.

With regard to the considerable vertical range of the known veins, which outcrop at elevations from 6,000 feet to 2,500 feet, and to the existence of pyrite and arsenopyrite as an early phase of mineralization, it would seem that the temperature of deposition must have been in the low-medium range, at least in the beginning. Later, with declining temperature, conditions became favorable for deposition of galena and silver minerals. Since the internal structure of the veins indicates deposition in open spaces, it is thought that pressure was low during sulphide formation.

Oxidation, Leaching and Secondary Enrichment

All veins are oxidized and leached to depths of 5 to 30 feet from the

surface. Within the oxidized zone, lead carbonate chalcocite and argentite are occasionally found in small patches of secondary enrichment. The chief effect of oxidation is to make sampling and examination of surface exposures ineffective, especially where old workings have been allowed to fall into disrepair. The underground exposures at VAULT and VENUS are below the zone of oxidation so that mineralization is found reasonably fresh.

The Fracture Pattern

The general pattern of vein fractures is shown in Map No. 1. A total of twenty six known veins on Montana Mountain may be roughly divided into two groups.

Group 1. Twenty veins, including VENUS, RUBY SILVER, M & M, URANUS, MONTANA, have average strike North to North 15 East and dip 20 - 40 degrees to the west. These veins occupy the north-easterly side of the Hutchi andesite or are situated just inside the granodiorite stock which intrudes the north west end of these rocks.

Group 2. Six veins, including HUMPER, RED DEER, NIPPER NO. 1 & 2, have average strike North 70 West to West and a somewhat steeper dip of 40 - 60 degrees to the North. These veins occupy a central position in the Hutchi andesite.

Reference has made above to the synclinal structure of the Hutchi andesites. The two groups of veins correspond closely to the north-easterly and south-westerly limbs of the syncline. The fractures appear to follow flow boundaries, in part, but also to traverse individual flows, at a small angle, often accompanied by brecciation and change of strike.

Obviously, extensive fracturing and brecciation might be expected to increase towards the axial plane of the syncline. Evidence that this may have, in fact, occurred is the increase in the number of vein splits as the axis is approached. At the north end of the north limb, the M & M and Vault are simple vein fractures, whereas vein splits and stockworks are observed to increase throughout the Venus workings and the Extension shaft. In the same way, on the west limb, the Humper and Nipper veins have split. Also there are two or three quartz stockworks on the axis of the structure. This location is worth investigation in case a large fractured area might be discovered which was open at the appropriate time to receive mineralization.

The correspondence of vein and flow structure suggests a common origin for both features. During the subsidence of the andesite flow into a volcanic sink or caldera caused by withdrawal of liquid magma at depth, fracturing and brecciation took place on the limbs and axis of the synclinal structure so formed. Subsequent to the volcanic phase, an intrusion of granodiorite, possibly in or near the original centre of vulcanism, formed a cupola from which volatiles could penetrate the fracture pattern. Mineralization continued throughout a period of declining temperature, in a low pressure environment, accompanied by periodic adjustment of the fractures to slump caused by removal of magmatic material at depth.

Sampling Results

Main Vein

During the period of forty-three years since the property was operated, the condition of the mine workings and open cuts has progressively deteriorated. The results of five previous samplings, which were made when the workings were fully accessible, are available from earlier reports. These indicated that certain sections were mineralized. They did not, however, provide a true appreciation of the ore value since the best parts of the vein had already been extracted by leasers at the time these reports were made. In 1963, when less than half the drifts and none of the stopes and raises were available for inspection, the best that could be expected was to obtain a check on the general distribution of values, as indicated by previous sampling. The following tables give the general statistics of the vein and the condition of the workings in 1963.

The main vein strikes due North to North 10 degrees East and dips West at an angle of 35 - 40 degrees.

Details and location of samples are given in Appendix "B" and Fig. 4 sampling results from previous reports are shown in the assay section Fig. 3.

Exploration of Main Vein

<u>Section</u>	<u>Length ft.</u>	<u>Depth ft.</u>	<u>Not Expl. ft.</u>	<u>Results</u>
Vault	420	250		2 levels ca. 300 feet. Last 63 ft. .23 Au 29 Ag 2.16'W
Unexplored			680	
Venus No. 1	45	50		Shaft & drift .89 Au 25 Ag 1.42'
Unexplored			750	
Venus No. 2	1445	330		2 levels 180' oreshoot in upper level. 2 shoots in S drift .36 Au 8 Ag 2.18'W 205'L .31 Au 13 Ag 2.49'W 213'L also 300'L of sub ore in N drift.
Unexplored			150	
Maybelle	310	100		Av. .06 Au 7 Ag 2.25'W 260'L
Unexplored			240	
Venus Ext. Shaft	30	110		Av. .65 Au 9 Ag 1.95'W
Venus Ext. Adit	560	120		.22 Au 5 Ag 3.37'W 340'L
Unexplored			750	
Nipper	<u>10</u>	5		.14 Au 49 Ag in open cut
	2370		2320	

Total length of vein 5,350 feet

Explored by drift 2,670 feet or 53.3%

Condition of Workings

(19)

<u>Section</u>	<u>Drift Length</u>	<u>Accessible 1963</u>	<u>%</u>
Vault: Upper	380	380	100
Lower	380	380	100
Venus 1	100	Nil	Nil
Venus 2: Upper	182	40	21
Lower North	708	430	60
Lower South	737	418	57
Maybelle	310	Nil	Nil
Venus Ext. Shaft	185	Nil	Nil
Venus Ext. Adit	645	Nil	Nil
	3,527 feet	1,648 feet	

43.7% of drifting was accessible in 1963 of which almost half was in Vault section.

Vault

(a) Upper Adit. This is 380 feet long, at elevation 3,250 feet. Werncke's assay plan indicates that the last 66 feet averaged 0.23 Au 28.76 Ag across 2.16 feet. Fourteen samples were taken, of which four were within the oreshoot. These assayed:

<u>Width</u>	<u>Au</u>	<u>Ag</u>
3.0	0.67	80.0
1.5	0.29	12.0

Two samples lost.

(b) Lower Adit. This is also 380 feet long, driven at elevation 3100 feet. Thirteen samples were taken, all carrying low values. It will be noted from the section that this adit was not carried far enough to penetrate the downward extension of the oreshoot at the face of the upper adit.

Venus No. 1 Shaft

Werncke obtained an average of 0.89 Au 25.26 Ag across 1.42 feet for 50 feet of shaft and 45 feet of drift. In 1963, the workings had caved and were not accessible. The vein at the surface is completely leached and oxidized, a sample across 4.0 feet: Nil Au Tr Ag.

(a) Upper Level. A cross-cut 100 feet long intersects the vein at elevation 3,314 feet. An oreshoot 182 feet long was mined to within a few feet of the surface. No records exist of previous sampling on this level, which indicates that it has been in its present condition of disrepair since 1920. In 1963, forty feet of the level and stopes were accessible. Ten samples were taken which assayed:

<u>Width</u>	<u>Au</u>	<u>Ag</u>
3.0	.14	4.51
1.5	.09	12.39
1.2	.07	2.39
3.5	.13	14.00
3.0	.03	.03
3.5	.19	7.22
2.5	.53	16.75
2.0	.12	6.28
1.5	.12	Tr
2.0	.25	26.32

Several samples of bleached andesite wall rock and of the crushed siliceous zone bordering the vein were taken which returned low values. Highest assays were obtained in banded light and medium grey quartz vein material containing galena and arsenopyrite.

(b) Lower Level. A cross cut 450 feet long at elevation 3,142 feet intersects the vein.

In the South Drift, 737 feet long, 418 feet is now accessible, the average of eighteen samples taken by MacKay and Werneke indicates an oreshoot starting 190 feet from the cross cut, 213 feet long, width 2.49 feet 0.3 Au 13.35 Ag. This shoot has been stoped to within a few feet of the surface, 200 feet up the dip of the vein. The average width of the vein was at least six feet in the centre of the stopes. A winze extends from the centre of the stopes to a depth of 230 feet. The vein splits below the stopes and the winze follows the steeper split. The upper branch dips at 35 degrees and is exposed in a sublevel (see Fig. 4, Sec. AA). In the winze, the vein narrows to six inches for seventy-five feet; beyond this point, further examination was abandoned due to dangerous conditions.

Twenty-three samples were taken in the stopes and sublevel.

These assayed:

(21)

<u>Location</u> (see Fig. 4)	<u>Width</u>	<u>Au</u>	<u>Ag</u>
Vein in South Drift between crosscut and south raise	) 1.0	0.14	0.90
	) 2.0	0.02	0.93
	) 1.2	0.01	0.9
	) 2.0	Tr	Tr
	) 1.5	0.05	3.45
	) 1.0	0.02	1.0
	) 2.0	0.10	3.26
Stope Pillar	3.5	0.08	4.72
Stope Pillar	) 1.5	0.59	36.9
	) 1.5	0.17	4.3
	) 3.5	0.01	0.87
End of accessible portion South Drift	) 5.5	0.24	5.62
South Winze	) 2.0	0.08	2.83
	) 6.0	0.16	20.50
	) 2.5	0.09	Tr
	) 3.0	0.15	4.95
Sub level	) 3.0	0.13	3.37
	) 1.5	0.25	2.77
	) 3.0	0.01	2.57
	) 2.5	0.10	3.34
	) 6.5	0.08	4.72
Lower vein - South Winze below sub level	) 3.0	0.03	0.74
	) 1.0	0.03	Tr

At a distance of 490 feet from the crosscut, a second crosscut is indicated from the average of thirteen samples by MacKay and Werneke. This is 205 feet long and extends to the south face of the level. It has width 2.18 feet 0.36 Au 8.42 Ag. The stope extends 140 feet above the level with 30 feet of underhand stoping. The drift was obstructed beyond the first stope so that it was not possible to enter the second, in 1933.

In the North Drift, 708 feet long, 430 feet is now accessible. Previous sampling indicated two sections of 290 feet and 120 feet in which occasional high assays were obtained. Several attempts were evidently made to stope these areas which were not very successful. Thirty-three samples were taken as follows:

<u>Location</u> (see Fig. 3)	<u>Width</u>	<u>Au</u>	<u>Ag</u>
North Drift to car slash)	1.5	Tr	Tr
)	3.0	Tr	Tr
)	1.5	0.07	5.07
)	2.0	0.01	3.30
)	2.0	0.02	3.3
)	3.0	Tr	Tr
)	1.0	Tr	Tr
North Drift car slash to stope sub level entrance)	4.5	Tr	Tr
)	4.5	0.04	3.51
)	4.5	0.06	1.07
N. Stope sub level)	5.0	0.02	2.20
)	5.0	0.05	7.25
North Stope)	5.0	0.02	2.24
)	3.0	0.21	16.10
)	2.5	0.03	2.20
)	4.0	0.12	10.36
)	6.0	0.03	2.89
)	2.5	0.01	4.95
)	2.0	0.04	1.60
)	2.5	0.03	2.88
)	2.0	0.05	2.95
)	3.0	0.02	2.75
)	4.0	0.01	7.40
N. Drift Stope Pillars)	3.0	0.11	2.34
)	4.0	0.03	Tr
N. Drift N. Stope to N. Winze)	4.0	0.03	2.12
)	3.0	0.01	1.53
)	2.5	0.04	3.5
)	2.0	0.01	Tr
)	2.0	2.0	1.30
)	2.5	0.02	2.03
)	2.0	0.02	2.03
)	2.5	0.03	1.42

This adit 310 feet long, at elevation 3,025 feet, was sampled by MacKay, Lovitt and Scott. The vein is reported to be well mineralized and to average 0.06 Au 7.42 Ag over 2.25 feet for a length of 260 feet. It was inaccessible in 1963.

Venus Extension Shaft

This opening consists of a shaft 110 feet deep and a drift 80 feet long. Thirteen samples, taken by Werneke, indicate an overall average of 0.65 Au 9.29 Ag across 1.95 feet. In 1963, the shaft could only be entered for forty feet, as far as the drift, where water was encountered. Eight samples were taken; assays were:

<u>Width</u>	<u>Au</u>	<u>Ag</u>
2.0	0.20	1.6
2.5	0.11	1.2
1.0	0.04	4.8
1.0	0.46	6.0
2.5	0.17	0.83
2.5	0.71	9.0
3.0	0.19	1.10
2.0	0.88	3.30

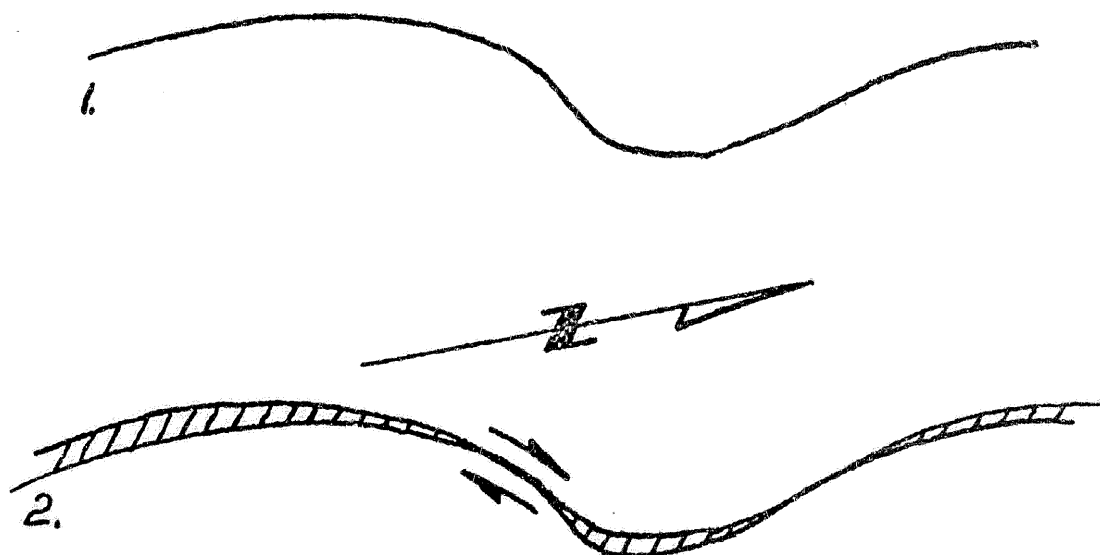
Venus Extension Adit

This adit, 545 feet long, at elevation 2,850 feet, was sampled by MacKay, Lovitt, Irwin and Scott. It has a maximum depth below outcrop of 120 feet. Apparently, the initial 205 feet of vein was leached, but values gradually improved. The last 340 feet averaged 0.22 Au, 5.47 Ag across a width of 3.37 feet. In 1963, this adit was inaccessible.

All 1963 samples are recorded on the 1" - 20' assay plan Fig. 4. All earlier samples are recorded on the 1" - 50 ft. assay section, Fig. 3.

Oreshoots in Venus Vein

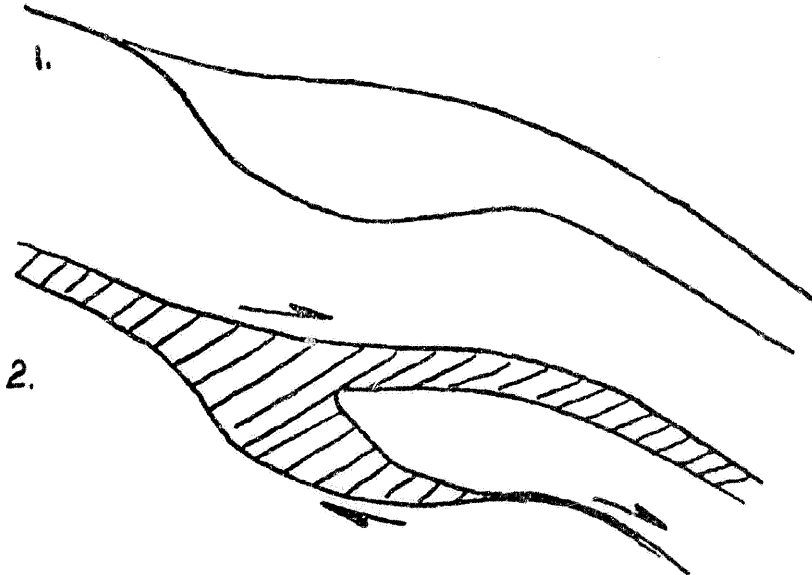
Several small oreshoots, pitching down dip, occur in the Venus vein. They are apparently located in spaces, opened by movement, along a sinuous fracture zone. A diagrammatic representation of the possible movement on the walls of the vein is shown below, considering the movement horizontal.



However, in addition to horizontal movement, it would seem that there was a vertical component as well. Referring to Fig 3, section AA shows the vein in cross-section at the south winze. It seems that the vein occupies an open space resulting from the movement of the hanging wall down, relative

Oreshoots in Venus Vein (cont'd)

to the footwall. The hanging wall of the lower branch appears to fit the footwall of the vein in the winze.



It seems reasonable to believe that wide and gentle changes in strike, in the same direction, have tended to encourage the formation of larger oreshoots. Highest values seem to occur near the ends of the oreshoots, perhaps due to the damming action caused by the restriction of the vein opening.

It is obvious from inspection of the assays and plans, displayed in Figs. 3 and 4, that the Venus vein by itself could not be considered as a basis for mining operations. It should rather be regarded as being a relatively minor unit in a larger mineralized structure, which has been explored simply because it happened to cross a rock exposure in an otherwise drift covered terrain. Some pertinent information is gained from a study of this vein:

1. The Venus Vein is the only structure upon which development has proceeded deep enough to display unoxidized material. Most other veins have leached vein matter on surface, so that it is impossible to tell what is below the zone of oxidation, and the same is true of the Venus vein on surface.

2. The mineralization, as shown by shipment records of sorted ore, is worth from \$110.00 to \$120.00 per ton in gold and silver. Since the containing structure in the Hutahi group is a large one, it is reasonable to hope for larger bodies of ore of this grade, if a suitable local environment can be found.

3. Alteration of wall rocks is quite extensive, showing that powerful hydrothermal conditions were operative at the time of vein formation. In this regard, it is worth quoting Paul Billingsley referring to M. K. Rodgers, "It was not assays done that guided Rodgers; rather he was influenced by the broad picture as it might show intensity and strength of mineralization. He demanded in a prospect widespread, strong alteration, big pervasive mineralization, as well as good values." (1) Some of these features are present on Montana Mountain, although certainly not as strongly as at Butte where Rodgers did most of his early work.

Other Veins of Group 1 (Strike N - S)

Ruby Silver. This vein is exposed in a trench and incline, 150 feet south. The workings are caved. The vein consisted of coarse crystalline quartz with a six inch mineralized band containing ruby silver, galena and arsenopyrite. Three samples assayed:

<u>Width</u>	<u>Au</u>	<u>Ag</u>
0.5	0.21	97.73
2.5	Tr	3.63
1.5	Tr	1.48

Red Deer. A stockwork of lenses and pods of quartz, exposed in an open cut showed low assays. The vein, divided into three sections, assayed:

<u>Width</u>	<u>Au</u>	<u>Ag</u>
2.0	0.03	5.01
3.0	Nil	0.26
1.5	Tr	0.62

M & M. This vein is in the north wall of Pooley Canyon. Refer to Figs. 1 and 3. Cairnes reported a shipment of value \$165.00 in 1908. Width varies from 6" to 3.0' along the exposed length. Ten samples from pits, short inclines and a 90° tunnel assayed:

<u>Width</u>	<u>Au</u>	<u>Ag</u>
1.0	.02	0.71
3.0	.02	2.61
0.5	.03	2.64
1.0	.01	3.24

(1) - Billingsley & Hume "Ore Deposits of Nickel Plate Mountain"
C. I. M. M. Bull. 1941 - p. 529.

<u>Width</u>	<u>Au</u>	<u>Ag</u>
1.0	.04	2.17
1.5	.08	17.40
1.0	.02	69.54
1.0	.02	202.74
1.5	.01	17.00
0.5	.03	21.55

Uranus. Shipping ore from this vein was reported by Sharp in 1906 to assay 0.19 Au 33.2 Ag. Most pits and inclines are now caved and covered. Four grab samples of quartz debris from caved trenches assayed:

<u>Au</u>	<u>Ag</u>
1.25	27.42
0.02	0.89
0.07	28.62
0.02	2.92

Cliff Vein. This was found this year in the course of mapping. It is situated above the Venus mine and was traced over a distance of 175 feet. It is similar to the Venus vein, composed of coarse crystalline quartz with galena and arsenopyrite. Four samples were taken, as follows:

<u>Width</u>	<u>Au</u>	<u>Ag</u>
1.0	Tr	0.23
2.0	Nil	18.37
2.5	Nil	1.55
1.0	Nil	0.76

Other Veins of Group 2 (Strike E - W)

Hammer Vein. This vein was opened by an incline and shaft, and two shallow open cuts, over a total length of 450 feet. The strike is N80 - 95°E and the dip is 60° to the north. Four hundred feet south of the shaft, the vein splits (see Fig. 2). All exposures are highly oxidized. Argentite, assaying several hundred ounces silver is reported by Cairnes to have been shipped from

this vein, but none is now visible. Assays were:

<u>Width</u>	<u>Au</u>	<u>Ag</u>	<u>Remarks</u>
3.5	Nil	12.33	) Extremely leached qtz.
1.5	Nil	16.87	) very porous between
1.0	Nil	1.90	) metals

Nipper No. 1 Vein. Two short adits open this vein over a total length of 400 feet. Strike is N 78° - 90 and dip 55° N. All workings show an advanced oxidation. Veins also outcrop in exposed volcanics above north cross-out. Assays were:

<u>Width</u>	<u>Au</u>	<u>Ag</u>	<u>Remarks</u>
1.0	Nil	1.49	) Leached
1.0	Nil	0.28	) and
1.5	Nil	4.61	) oxidized
3.5	Nil	0.53	) material
3.0	Nil	0.61)

Nipper No. 2 Vein. A fifty foot adit follows this vein, at shallow depth, on strike N 70 - 80° W and dip 55°. The quartz contains galena, arsenopyrite and tetrahedrite. Assays, at twenty foot intervals, were:

<u>Width</u>	<u>Au</u>	<u>Ag</u>	<u>Remarks</u>
1.5	Nil	0.63	) 6" - 8" qtz in 1' wide
1.0	Nil	0.32	) shear zone
1.0	Nil	0.42	) highly oxidized

Lakeshore Vein. A vein, strike N 60° E and dip 20° N, is poorly exposed at the camp site. A low assay was obtained.

Veins No. 7. A stockwork of pods and veinlets is exposed for 150 feet, a new discovery in 1933. Near this vein, a well-defined contact between andesite and volcanic agglomerate was observed. Assays were:

<u>Width</u>	<u>Au</u>	<u>Ag</u>	<u>Remarks</u>
2.5	Tr	2.61	4" vein and stringers in 3' wide zone
3.0	Nil	1.41	Advanced weathering, no metallics observed.

Joe Petty. This vein is located 1,000' north of Uranus vein on the north side of the middle fork of Pooly Creek (see Fig. 1). Several pits, a partially caved incline and a short adit expose the vein over 1,500 feet on a strike of N 80 - 85° E and a dip of 50° N. Highly oxidized crystalline quartz averages 2.5 feet width. Assays were:

<u>Width</u>	<u>Au</u>	<u>Ag</u>	<u>Remarks</u>
2'	Nil	0.53	Vein persistent and shows no signs of pinching out - probably eastward extension of Stewart - vein split in several places - stockwork near - axial plane ?
2.5'	Nil	0.23	
2.0'	Nil	2.78	
1.0'	0.04	9.07	
3.0'	Tr	7.35	
3.0'	Nil	1.07	
1.5	Nil	0.88	
2.5	Nil	0.79	

Montana. This vein belongs in Group 1 strike north 13 degrees west, with the relatively low dip of 10 - 20 degrees west. A drift and a shaft follow the vein, which is reported to be up to five feet wide. The workings are full of ice. In the dumps, the quartz is coarsely crystalline and drusy along wall rock contacts, well mineralized with galena, pyrite and arsenopyrite. Eighteen grab samples from the dumps averaged: Nil Au. 14.9 Ag.

Big Thing and Jean veins occupy small tension fractures in the Coast Range granodiorite stock. Both veins are covered and entrances to the Big Thing workings are blocked by ice. Best assays of grab samples from dumps and trench debris were as follows:

	<u>Au.</u>	<u>Ag</u>
Big Thing - dump	0.22	3.70
Jean - debris from discovery trench	5.10	13.75

The Big Thing vein strikes N 85° E and dips 30 - 40° N. The dominant sulphide mineral is pyrite.

The Jean vein strikes N 35° W and dips 70° E. Major sulphides are pyrite, galena and sphalerite.

Future Exploration

The hypothesis of ore deposition, advanced in this report, warrants further investigation with a view to determining whether more important bodies of the same type of mineralization can be found in the axis of the primary structure or in the adjacent parts of the limbs to north and west. The attitudes of the limbs with relation to the topography evidently preclude a program of surface diamond drilling since the dip is at 30 - 40 degrees into a steep hillside, 3,000 feet in height. Consequently, an adit will be necessary to obtain an underground diamond drilling base.

The map of Fig. 2 to a scale of one inch to two hundred feet, shows the known surface exposures projected to a plane at the horizon of 2,700 feet elevation. It is proposed to recommend the driving of an adit cross-cut, on or about this elevation, along the axis of the synclinal structure. Drifts north and west on the limbs of the structure would also be driven. Diamond drill stations are to be excavated at two hundred foot intervals to enable the structure to be explored for a distance of 500 - 700 feet above and below the drilling base.

The proposed program would require 5,300 feet of lateral openings and 23,000 feet of underground diamond drilling. A further 3,000 feet of surface diamond drilling is suggested from the lake shore to investigate the Hutshi formation to an additional depth of five hundred feet.


The program will require the camp to be placed in an excavated area on the lake shore. The portal will be at an elevation of approximately five hundred feet higher than the camp, connected by one mile of tractor road.


It is suggested that the operation be completed in two years, working eight months of the year, and closing down for the months of December to March.

Cost

A preliminary estimate of the cost is given in Appendix "C". The total cost, exclusive of management, assaying and contingencies would be approximately \$404,425.00. This estimate was made, as far as possible, from Giant Yellowknife records and reflects the probable cost of the operation if it were conducted at Yellowknife. Wages, freight and other variables appear to coincide fairly well between Yellowknife, N.W.T. and Carcross, Y.T. Therefore, the estimate ought to be considered valid. It should be safe to budget for \$450,000.00 for this operation.

Respectfully submitted,


C. E. Gordon Brown, P. Eng.


J. A. Kelly.

October 29, 1963

APPENDIX 'B'

SAMPLING RESULTS IN DETAIL
VENUS MINE

Location	Au. oz ton	Ag oz ton	Width in ft.	Notes
Upper level				
10' north of x-cut	0.14	4.31	3.0	Oxidized, brecciated qtz & wall rock.
10' north of x-cut	0.69	12.39	1.5	Banded vein qtz. dissem. arseno, galena in centre.
" " "	0.07	2.18	1.2	Vein qtz - outer zone
22' " "	0.18	14.00	2.5	Vein qtz - in stope pillar
23' " "	0.19	7.22	3.5	Brecciated qtz. oxidized zone and vein qtz.
32' " "	0.53	13.75	2.3	Vein qtz - in stope pillar
36' " "	0.03	1.5	2.0	Vein qtz - in stope face
42' " "	0.12	Tr	3.0	Oxidized, brecciated zone.
42' " "	0.24	26.82	2.0	Banded vein qtz - in stope pillar
Main level				
North Drift				
15' north of x-cut	Tr	Tr	1.5	Vein qtz
30' " " "	Tr	Tr	2.5	Vein qtz and clay in shear
30' " " "	0.07	5.07	1.5	Vein qtz with dissem. sulfides
43' " " "	0.01	3.30	2.0	Vein qtz
53' " " "	0.02	1.60	2.0	Vein qtz
83' " " "	Tr	Tr	3.0	Oxidized qtz & brecciated wall rock No vein
93' " " "	Tr	Tr	1.0	As above - no vein
145' " " "	Tr	Tr	4.5	White fractured vein qtz
165' " " "	0.04	3.51	4.5	" " " "
182' " " "	0.06	1.07	4.5	" " " "
North Stope				
- sub level	0.02	2.20	5.0	Vein qtz
" "	0.05	7.25	5.0	" "
south wall	0.21	16.10	3.0	" "
" "	0.03	2.20	2.5	" "
" "	0.12	10.36	4.0	" "
north wall	0.03	2.63	6.0	" "
" "	0.01	4.95	2.5	" "
" "	0.04	1.60	2.0	Crushed oxidized qtz & wall rock

APPENDIX "B"
(cont'd)

Location	Au. oz ton	Ag oz ton	Width in ft.	Notes
North Stope				
north wall	0.06	2.68	2.5	Vein quartz
" "	0.05	2.95	2.0	" "
" "	0.02	2.75	3.0	" "
pillar	0.01	7.40	4.0	" "
197° N	0.11	2.34	3.0	Stope pillar vein qtz
217° N	0.03	Tr	4.0	" " " "
242° N	0.03	2.12	4.0	" " " "
257° N	0.01	1.53	3.0	" " " "
283° N	0.04	3.5	2.5	Vein qtz with clay seams
322° N	0.01	Tr	2.0	Vein qtz
337° N	0.02	1.30	2.0	" "
367° N	0.02	2.08	2.5	" "
400° N	0.02	2.03	2.0	" "
410° N	0.06	1.42	2.5	Vein qtz with coarse arsenopyrite in lenses and seams.
South Drift				
35° south of x-cut	0.14	0.90	1.0	6" qtz in 1.0' shear zone.
100° S	0.02	0.93	1.0	As above
124° S	0.01	0.90	1.0	As above
152° S	Tr	Tr	2.0	Vein qtz
170° S	0.05	3.45	1.5	" "
180° S	0.02	1.0	1.0	" "
230° S	0.1	3.23	2.0	" "
245° S	0.03	4.72	3.5	Vein qtz - in stope pillar
290° S	0.59	36.9	1.5	Vein qtz with coarse galena
290° S	0.17	4.3	1.5	Quartz stockwork with sericite and chlorite.
280° S	0.01	0.87	3.5	Vein qtz - sheared
340° S	0.25	5.62	3.5	Brecciated massive vein qtz.
South Winze				
20°	0.08	2.83	2.0	Vein qtz
40°	0.06	20.5	6.0	Vein qtz with seams of arseno and galena.
60°	0.09	Tr	2.5	Vein qtz
70°	0.15	4.95	3.0	Vein qtz with heavy arseno min.
sub level				
15° S	0.13	3.37	3.0	Vein qtz
35° S	0.01	2.57	3.0	" "
65° S	0.10	3.34	2.5	" "

APPENDIX "B"

(cont'd)

Location	Au oz. ton	Ag oz. ton	Width in ft.	Notes
South Winze				
Sub level				
65' S	0.08	4.72	6.5	Vein qtz with galena
67' S	0.25	2.77	1.5	Vein qtz with galena in S.W. drift
South Winze				
Below sub level				
20'	0.08	0.74	3.0	Vein qtz
40'	0.08	Tr	1.0	Shear zone - no vein

APPENDIX "C"ESTIMATE OF COST

- Object: (1) 6,300 feet 8 x 8 cross-cut and drift in andesite with necessary car and diamond drill lashes.
(2) To perform 23,000 feet of underground diamond drilling, 3,000 feet of surface diamond drilling.
- Basis: As far as possible, costs of similar work at Giant Yellowknife Mines Limited are used. Wages, materials and freight costs are similar.
- Operation: (1) Camp facilities are for boarding 30 men with office and change house.
(2) Compressor requirements are two portable gyroflow units of 500 - 600 c.f.m. each
(3) Electrical plant to be two 15 Kw skid mounted 120/240 v. 1 ph. diesel generator sets at portal and camp.
(4) Power house to be simple frame building with rock fill floor.
(5) Camp site and portal to be separated by 6,000 feet tractor road at 8% grade.
(6) Transportation of diesel oil and mine supplies to portal by tractor haulage from beach.
(7) Where possible, second-hand material estimated, prices from Nelson Machinery Co. Ltd., Vancouver catalogue.
(8) Work to be done as fast as possible - 3 shifts.
No work winter months Dec. - Mar.
(9) Two seasons estimated to complete program.
(10) No estimate for management, assaying or contingencies.

A. UNDERGROUND MINING

The estimate is based on the cost of underground development at Giant Yellowknife Mines Limited, Yellowknife, N.W.T.

Work Statistics

<u>MINING</u>	<u>SIZE</u>	<u>REQ'D</u>	<u>EQ. FT</u>	<u>TONS</u>	<u>FT. DRILLING</u>
<u>Portal Slash</u>	1725 cu. ft. Includes trim slash and bench trim	1	4.5	150	5,000
<u>Drift Advance</u>	8 x 8 - 5.56 tons/ft. Normal advance 7.8 ft/rd in good ground. 3 man crew could alternate 8' with 10'	5,300	5,300	29,000	180,200
<u>D.D Slash-Side</u>	Included in car slash				
<u>D.D Slash-Back</u>	15 Tons ea.	23	31.0	345	1,000
<u>Car Slash - Small</u>	40 Tons ea. 3 holes with first round, 3 with second.	21	75.5	840	3,000
<u>Car Slash - Large</u>	150 Tons ea. 3 holes with each round	3	40.5	450	1,500
<u>Charging Sta Slash</u>	150 Tons	1	13.5	150	1,000
			5,645.0	30,925	191,700

Labor Requirements

<u>MINING</u>	<u>WORK CONTENT</u>	<u>MAN-SHIFTS</u>	<u>REMARKS</u>
<u>Portal</u>	Drill blast initial slash	6	Preparing trestle and dump not included. Assumes previous work with bulldozer has left clean face.
	Hand Muck trim slash and bench	8	
	Hand Muck - drill and blast round	2	
	Hand Muck and trim portal, instal first set	<u>4</u>	
	Total Portal	20 m. s	
<u>Main Crosscut</u>	793' advance @ 2.6'/m. s	306	3 man crew: 2 men muck drill & blast, 1 man tram, dump, ditch, track reline extend trestle air and water pipe.
	3 small car slashes, additional	3	
	Car storage slash and charging station	<u>8</u>	
	Total Crosscut	317 m. s	
	<u>Branch Drifts</u>	4,500 advance @ 2.6'/m. s		1,730	3 man crew switches, extra track, headers & vent pipe
23 back slashes)		<u>30</u>	
17 car slash - small)			
3 car slash - large)			
Total Drifts		1,760 m. s	
<u>Track</u>	Reline & ditch boards		
	5,300' @ 36.8'/m. s	144	
	26 switches laid	13	
	20 switches lifted	5	
<u>Pipe</u>	Air, water & vent pipe installed by drift crew	-	

Labour Requirements (cont'd)

<u>MINING</u>	<u>WORK CONTENT</u>	<u>MAN-SHIFTS</u>	<u>REMARKS</u>
<u>Ditching</u>	5,300' @ 20' / m. s inc. sumps	135	
<u>Drift Timber</u>	Est. @ 8% or 424' of drift timber inc. pins, stalls, caps, blocks & wedges, & rock bolts	130	

DIRECT MINING COST - Labour

	<u>M. S.</u>	<u>Days Pay loaded</u>	<u>Average Bonus</u>	<u>Total \$</u>	<u>Cost per Foot</u>
Drift crew labor	2,040	19.45	16.50	\$73,333	\$13.63
Slashing	57	19.45	16.50	2,049	0.39
Track	168	18.60	10.00	4,794	0.90
Ditching	135	18.60	10.00	3,710	0.71
Timber	130	19.60	10.67	3,890	
<u>Loaded Labor and Bonus</u>	<u>2,530</u>			<u>\$87,781</u>	<u>\$16.55</u>

DIRECT MINING COST - Materials, Expendable

	<u>Ft/Adv.</u>	<u>Total Cost \$</u>	<u>Cost/Foot \$</u>
<u>Explosives</u> - part AMEX II - drifting - part FORCITE 40%	5,300	16,801	3.170
<u>Explosives</u> - 1935 tons @ - slashing - \$0.18/ton	5,300	948	0.056
<u>Track</u> - Rails 20#, bolts, ties, spikes, kick switches	5,300	13,794	2.600
<u>Drill Steel</u> - Copeo 191,700 ft. drilling @ 1.0¢/ft.	5,300	1,917	0.360

DIRECT MINING COST - Materials, Expendable, (cont'd)

	<u>Ft/Adv.</u>	<u>Total Cost</u>	<u>Cost/Foot</u>
		<u>\$</u>	<u>\$</u>
<u>Bits</u> - Copco 191,700 ft. drilling @ 1.5¢/ft.	5,300	2,875	0.542
<u>Pipe</u> - 4" and 2"	5,300	9,975	1.882
<u>Drift Timber</u> 8% of 5,300 424 feet	5,300	772	0.145
<u>Vent Pipe</u> - 20" plastic	5,300	2,628	0.496
<hr/>			
Expendable Materials:		49,110	9.261
<hr/>			
<u>UNDERGROUND LABOUR AND MATERIALS:</u>		\$136,742	\$25.821
<hr/>			

MAINTENANCE

Rock drills, parts cost 0.714/100'	\$
for 188,400 ft.	1,345
Labor, 25% of parts cost	336
Mucking Machines, parts cost 2.04/ton	
for 30,835 tons	629
Labor, 35% of parts cost	157
Trammers - maintenance low not estimated	-
Lubrication - oil and grease	<u>300</u>
Total Maintenance	\$2,467

SUMMARY OF UNDERGROUND COSTS

	<u>Advance</u>	<u>Total Cost</u>	<u>Cost/Ft.</u>
MINING - Labor	5,300	\$ 87,781	\$16.560
MINING - Materials	5,300	49,910	9.261
MINING - Maintenance	<u>5,300</u>	<u>2,457</u>	<u>0.465</u>
	5,300	\$140,153	\$26.443
EQUIPMENT (50% Salvage)		<u>42,132</u>	
TOTAL COST OF MINE OPENINGS		<u>\$182,290</u>	

EQUIPMENT

2 Anloaders	\$ 126
2 Little Mancha Trammers - Type B, 24" gauge with 4 battery boxes and slide rails second hand	9,900
2 3 Kw. Motor Generator sets with charging panels - second hand	1,790
4 Batteries - new	6,800
12 Side dump cars, 2-ton with coupling pins second hand	8,000
2 Gilchrist jacks	250
4 Joy airleg drills, type AL-60M - new	3,583
2 Eimco 21 Mucking machines second hand	7,100
10 Labricators	380
Track equipment: rail bonders, hammers, punches, gauges, wrenches	258
2 Bit grinders - new	480
2 Pipe cutters and vice	150
1 Victaulic groover - rental	250
Misc. bit sharpening supplies, grinding wheels, dressers and knockers	300
Hoses: 1/2" 1" 2"	1,200
Pipe hangers and gads for 5,300 ft.	675
Misc. underground tools: wrenches, shovels, hammers, axes, picks, scaling bars, saws, rock bolts, etc.	<u>851</u>
Total Underground Equipment:	\$42,132

B. DIAMOND DRILLING

Underground Drilling EXT core 23,000 ft. on each of 23 sections, spacing 200 ft. @ 1.65	\$37,950
Surface Drilling EXT core 500 ft. on each of 6 selected sections, 3,000 ft. @ 3.95	11,850
Core boxes for 26,000 feet EXT core	1,740
Materials and labour for core rack	200
	<hr/>
	\$51,740

C. COMPRESSED AIR & POWER

2 - CIR Portable Rotary Compressors, Model R-600 or equivalent, 600 c.f.m. ea. \$9,000 sec. hand	\$18,000
1 - 15 Kw. Ruston & Hornsby Diesel Generator 115/230 v. 1 ph. 60 cye. Generator set, with exciter, radiators and control panel, skid mounted or equivalent second hand	2,500
1 - 3' x 6' Welded steel air receiver, second hand	475
1 - 300 amp. gasoline powered electric welder on wheels, second hand	750
24 - miners lamps, with charging rack complete second hand	480
1 - Building, 40 x 24, frame construction, skiplap or corrugated iron, covered, rough floor, approx. labor and materials	2,000
1 - 1500 telephone to beach office, labor and materials	300
Installation of compressor piping, electrical wiring, benches and miscellaneous equipment, labour and materials (approx.)	500
Misc. tools and supplies not estimated for in underground list: oil tank	<hr/> 1,200
	\$20,215

D. ROAD AND TRANSPORT

1 - used Caterpillar D-6 Diesel Tractor, 18" grousers hydraulic angledozer and controls, Hyster towing winch	\$19,000
1 - used 4 wheel drive 1-ton Dodge, G. M. C or Ford Truck	3,000
1 - Nodwell type trailer RNT-75 capacity 5.1/2 tons, and stake body	6,400
1 - stone boat, labour and materials	<u>600</u>
	\$29,000

E. PETROLEUM PRODUCTS

For Mining:

	<u>Gals.</u>	
<u>Fuel -</u>		
46 days one compressor @ 60% load factor @ .49 lbs/Bhp/hr.	3,974	
195 days two compressors @ 60% load factor	33,696	
300 days 15 Kw. generator set @ 90% load factor	<u>6,430</u>	
Total diesel fuel for power house	44,150	
Approx. equiv. to drums	1,000	
Approx. drums per week	29	
Cost @ 0.297 per gal. f.o.b. Carcross		\$13,113

Lube Oil -

For compressors @ .08 gal/hr.	850	
For generator set @ .02 gal/hr.	<u>144</u>	
Total Lube Oil for power house	994	
Cost @ \$1.36 per gal. f.o.b. Carcross		1,352

For Camp:

400 days 15 Kw. generator set, fuel oil @ 60% load factor	5,760	1,711
Generator set lube oil	232	316
Heating oil for 16 spare heaters: 400 days @ 2 gal/heater/day @ 0.295 per gal. f.o.b. Carcross	12,800	3,776

For Bulldozer:

300 days @ 4 hrs. total 1200 hrs.		
Fuel @ 2.5 gals/hr.	3,000	891
Oil @ .05 gals/hr.	60	82
Grease @ .30 lbs/hr.	36 lbs.	<u>40</u>

Total \$21,291

Cost/10% \$4.02

F. PREPARATION AND CAMP INSTALLATION

(1) Surface Preparation at Camp Site

<u>WORK CONTENT</u>	<u>M. S</u>	<u>Loaded Wages/m. s</u>	<u>Cost</u>
20,000 cu. yds bulldozer excavation	9	20.67	186
Surface labor, 3 men building dock crib, d & b toe of excavation etc.	27	16.60	454
Materials for dock crib: 20 logs 1" x 16" 2520 FBM @ 60.00 plus drift bolts			160

(2) Road

5,000 feet of 12 foot tractor road between camp and mine, 8% grade	12	20.67	248
Surface labor on road, d & b where necessary	36	16.60	605

(3) Surface Preparation at Portal

Portal and power house excavation: 610 yds. earth, 300 yds. rock			
Bulldozer	5	20.67	104
3 man crew	15	16.60	252
Explosives @ 18¢/ton			73
Instal dumping trestle & bumper log labor materials 5,000 FBM	12	16.60	202
			<u>450</u>
			2,744

(4) Purchase and Installation of Camp Buildings

Trailer type camp complete, consisting of 3 bunkhouse units for 50 men, first aid room, office & sleeping room, kitchen-dining room, recreation room, wash-house dry: Units make up under one roof 30 x 150 ft. Delivered and installed by Alberta Trailer Co. Ltd. with water supply and sewage disposal. Approx. price - full quote not yet received

\$46,000

(4) Purchase and installation of Camp Buildings (cont'd)

1 - 15 Kw. Ruston & Hornsby Diesel generator set, 115/220 v. 1 ph. skid mounted with control panel	\$ 2,500
1 - building 10 x 12 prefab construction for generator set: labor and materials	1,000

G. FREIGHT

All costs of expendable supplies are estimated on prices f. o. b. Yellowknife ex-Edmonton, since the basis of calculation is cost of operation from Giant Yellowknife records. A comparison of the basic rates is as follows:

<u>Edmonton to Yellowknife</u>	<u>Price per 100 lbs.</u>
Mining machinery, rails, pipe, etc.	\$ 2.78
Cement	3.68
Explosives	5.15
<u>North Vancouver to Carcross</u>	
Mining machinery, rails, pipe	
Cement, etc.	\$ 2.70
Canned goods, flour, sugar	2.51
Hardware	3.05
Explosives	6.93

Since the purchase price of many items, such as pipe, rails, explosives, steel, in which ocean transportation is a factor, is lower in Vancouver than Edmonton, it is thought that, as a first approximation aggregate of laid down prices in Yellowknife, N. W. T. may be considered to be the same or slightly higher than in Carcross, Y. T.

Freight Vancouver - Carcross on 78 Tons
of non-expendable supplies & equipment
@ \$3.70 per 100# or \$54.00 per ton \$4,212

Transportation Carcross- Venus Mine

Items to be moved are as follows:

	<u>Approx. Weight Tons</u>
Expendable supplies	132
Underground equipment	34
Air and Power equipment	27
Road equipment	20
Oil products	<u>399</u>
Total	452 Tons

G. A. Simmons owns a gasoline tug with 75 ton barge (nominal), 75 ft. x 25 ft. at Carcross. Rental on this equipment is \$40 per hour, time for round trip five hours, cost \$200. Average loading approx. 55 tons.

Transportation Carcross - Venus Mine (cont'd)

The aforementioned materials would require approx. 8 trips. In addition, seven trailer type camp units would require an additional 3 trips.

Total trips - 11 @ \$200 \$2,200

One trip with tag alone per week required for general camp service:

Total trips - 43 @ \$50 \$2,150

TOTAL FREIGHT **\$3,552**

Cost per foot \$1.62

H. SUPERVISION AND SURFACE

	m. s.	rate \$	loaded rate \$	Total Cost \$
Engineer - foreman	1. 1/2 yrs	650 mo.	787 mo.	18,306
Mechanic 1st Class	400	18.72	22.69	6,806
Buildozer Operator *	360	17.28	20.69	6,201
Surface Labor *	300	16.20	16.60	5,040
				\$ 33,883
			Cost per foot	\$5.39

* Plus work detailed under "Preparation"

Note (1) No wages or supplies are included for Cook or Cooks Helper. This is because all wages are loaded by 18% extra. This is current practice at Giant Yellowknife to cover the following items:

- Loss on cookhouse
- Travel of personnel
- Holidays
- Unemployment insurance
- Fuel bonus
- Cost of living bonus
- Other fringe benefits

The first four items would apply to this operation, but not the last three. Average loading is over \$3.60 per shift. Added to board charge of \$2.75 per day, this loading is adequate to include cook house operation.

(2) No wages are included for compressor operators. Since portable air compressors are specified the third man of the 3-man mining crew will have time while tramming for regular inspections.

SUMMARY OF COST ESTIMATE

	<u>Cost</u>	<u>Cost/foot</u>
A. UNDERGROUND MINING		
Labour	\$ 87,781	\$16.56
Materials	49,110	9.27
Maintenance	11,487	0.47
E. PETROLEUM PRODUCTS	2,291	4.02
F. PREPARATION AND CAMP INSTALLATION		
Surface work on Camp, Road & Portal	2,744	0.51
G. FREIGHT	8,562	1.62
H. SUPERVISION AND SURFACE	33,833	6.39
<hr/>		
LABOR AND EXPENDABLE SUPPLIES	214,859	33.94
<hr/>		
B. DIAMOND DRILLING	51,740	
<hr/>		
A. UNDERGROUND MINING		
Equipment	42,132	
C. COMPRESSED AIR & POWER	26,215	
D. ROAD & TRANSPORT	29,000	
F. PREPARATION & CAMP INSTALLATION		
Camp Buildings	49,500	
<hr/>		
EQUIPMENT (At least 50% salvage value)	145,847	
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TOTAL EXPENDITURE	\$404,425	

Note:

Does not include management, assaying or contingencies