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Geology Report

SILVER TITAN MINES LTD.

Mayo, Y. T.

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INTRODUCTION

The Silver Titan Mines Ltd. owns or has options on <sup>97</sup>90 contiguous claims and fractional claims which adjoin the northwest side of the United Keno Hill property in the Mayo District, Yukon Territory. The claims are grouped as follows:

<u>Number</u>	<u>Claim</u>	<u>Number of Claims</u>
<u>AA GROUP</u>		
80981-81000	AA1-AA20	20
82601-82602	AA21-AA22	2
81140-81145	AA 20-AA 22	<del>6</del> (AA20-AA22 incl.=partial claim)
<u>KPO GROUP</u>		
80082-80089	KP01-KP08	8 (KP0 2, 4, 6, 8=partial claims)
80092-80094	KP09-KP012	4
80362-80388	KP013-KP039	27
(80394	KP028)	1
80389-80393	KPO Fr.1-5	5
	KPO Fr.	<del>145</del> Claims
		46 Claims
<u>LEO GROUP</u>		
59710-59712	LE01-LE03	3
59714-59718	LE04-LE08	5
59849-59857	LE09-LE017	9 (LE0 13, 16, 17=partial claims)
59941-59942	LE018-LE019	2
61635	LEO FRACT.	1
62891-62892	LEO FR. 1-2	2
	LEO FR. 3	1
		<u>23 Claims</u>
		97
	GRAND TOTAL	<u>90 Claims</u>

The claim groups form an irregular band 3000-5000 feet in width and approximately 6 miles in length, lying in an east-west direction in the broad flat bottom of the South McQueston River valley. The south side of this valley is Galena Hill on which the United Keno Hill mines are located.

The Mayo-Keno Hill highway skirts the south boundary of the Silver Titan property and represents all-weather access to the property. Other lesser roads cross the property providing reasonable access to most parts of the claim groups. Nearest railhead is at Whitehorse, 245 highway miles to the south. Plane connection from Mayo to Whitehorse is provided three days per week by Canadian Pacific Airlines.

The area has been extensively mapped by the Geological Survey of Canada but because of glacial deposits filling the valleys and frost-heaved rock and glacial till covering much of the hills the surface geology is only very generally known. The mine workings of United Keno provide the best exposures for geological observations in the area. The Silver Titan claims are practically wholly underlain by glacial till and outwash deposits that cover the floor of the South McQueston River valley to depths of up to 70 feet or more. There are enough outcrops distributed throughout the property so that the general geological setting may be ascertained but any detailed work must depend on drilling or stripping for information.

At the time of the writer's examination a number of pits had been sunk through the overburden to bedrock in various parts of the property but most of these were sloughed in or filled with water. In addition, a vein, the Gerlitzki Vein, had been stripped and trenched for a length of approximately 800 feet and a width of 15 feet, and 16 diamond drill holes had been drilled to bedrock. Core was available from two holes, both from the current drill program. Most of the property had been covered by a resistivity survey in 1959, and a Turam electromagnetic survey in 1962 and the results of both surveys have been made available to the writer.

The writer made a tour of the Calumet-Hector mine of United Keno Mines Ltd. in company with the chief geologist, Mr. Manifold, and had lengthy discussions with Mr. Manifold concerning all phases of the geology of the Keno deposits. In addition I examined all the available core and significant exposures on the Silver Titan property.

The writer was chief geologist for Eldorado Mining and Refining Ltd. for six years and in addition has had over ten years' experience in mining and exploration in B. C. and the Yukon.

### GENERAL GEOLOGY

SURFICIAL DEPOSITS: The general elevation of Galena Hill is 4500 feet with a broad, flat and rolling top characteristic of most of the mountains in the area. Rock outcrops are not common and mostly occur in creek gulleys. The tops of the hills are generally treeless and covered with soil and rock float, whereas the hills and valleys below elevation 4500 feet are covered with glacial till, soil, muskeg and outwash deposits densely overgrown with buckbrush and/or forests.

Outcrops along the sides and bottom of the South McQueston River valley are rare and consist of knobs and ridges, generally of quartzite, that stand higher than the surrounding bedrock and have not been covered by glacial deposits. Drilling and stripping along the north side of Galena Hill have indicated that the overburden is ten to twenty feet in depth. Drilling in the valley bottom indicates that the overburden ranges up to 70 feet in depth.

REGIONAL GEOLOGY: The area within a 30-mile radius of Keno Hill is underlain principally by a group of stratified rocks comprised of quartzite, phyllitic quartzite, schists and minor limestone. They are included in the Yukon Group and are presumed to be of Precambrian or Paleozoic age. These rocks have been intruded by basic igneous rocks (greenstones), by later acidic igneous rocks, and finally by minor rhyolite and lamprophyre sills. For mapping purposes the rocks have been divided into lithologic units, the most distinctive being a massive, gray, blocky quartzite with individual beds ranging in thickness up to 25 feet. This unit, termed the Central Quartzite, is the principal wall rock for the silver deposits of Keno and Galena Hills. The schists are generally graphitic and occur as thick assemblages above and below the Central Quartzite, as well as in parting layers within the Central Quartzite.

The closest major intrusive bodies in the area are three granodiorite stocks about two miles in diameter located eight miles north of Galena Hill across the South McQueston River valley, (Fig. 1), and another granodiorite stock about seven miles in diameter located 15 miles east of Keno Hill. The

three small stocks intrude graphitic schists and phyllites at outcrop whereas the large stock to the east is almost entirely within quartzites.

Within both the Central Quartzite formation and the underlying schists are numerous discontinuous bodies of greenstone that are interpreted to be boudins formed by the dislocation of basic sills in the formations.

STRUCTURE: The Central Quartzite sequence is calculated by R. W. Boyle, (G.S.C. Paper 57-1), to be approximately 2350 feet thick stratigraphically with about 800 feet of this being comprised of interbedded schistose material confined principally to the top and bottom portions of the sequence. The United Keno Hill mine geologists do not entirely agree with the detailed breakdown of the sequence as proposed by Boyle but they do agree that the general sequence is as he represents it. Above and below the Central Quartzite the rock sequences consist predominantly of schists and are known as the Upper Schist and Lower Schist formations respectively.

The principal structure in the area appears to be a major anticline whose axis trends S15°E from the Davidson Range, across the Patterson Range to the east end of Mayo Lake. This structure has been later deformed by a system of overturned faults and folds whose axes trend S65°W from the Davidson Range down the valley of the South McQueston River. The principal fold in this system is termed the McQueston Anticline. In addition, the schistose layers above and below, as well as within, the quartzite bands have been intricately locally dragfolded in directions complementary to the major folds.

Late faults with vertical displacements as much as many hundreds of feet cut all the formations in the area and trend northeastward to northwestward. They both displace and merge with the ore-bearing fractures in the district, most of which trend northeastward, parallel or sub-parallel to the trend of the axis of the McQueston anticline mentioned above.

ECONOMIC GEOLOGY: The first mining of silver in the Mayo district began in 1913 from which time until 1942 about \$21 million worth of silver shipping ore had been mined, mostly by the Treadwell Yukon Corporation from diverse deposits on Galena and Keno hills. After a few years of no production the United Keno Hill company was organized in 1945 and began production in 1947 from the old Treadwell mines. United Keno now own all the operating mines in the area and

hold about 500 mineral claims along a length of twelve miles. From 1947 to 1961 (Sept. 30) the company has produced the following amounts of metals:

SILVER	70,360,430 oz.
LEAD	270,965,870 lbs.
ZINC	206,692,535 lbs.

In addition the mines produced around 30 million pounds of cadmium.

The gross revenue from production of silver, lead, zinc and cadmium from United Keno Hill Mines for 1960 was \$8,793,284 from 176,745 tons of ore (About \$50 per ton.) The annual production of metals is generally as follows:

SILVER	7,240,000 oz.
LEAD	20,000,000 lbs.
ZINC	15,000,000 lbs.
CADMIUM	2,400,000 lbs.

Published reserves to September 30, 1960, were 512,577 tons @ 38.4 oz. Ag, 6.4% Pb, and 4.8% Zn.

All of the production has come from vein zones which lie within the major quartzite bands of the Central Quartzite formations. These vein zones strike northeastward and dip southeastward at about 65°. Individual veins range in widths from one to ten feet but zones of multiple veins and/or replaced breccia zones occur to widths as great as 70 feet. Over thirty veins have been exposed in the 15 miles of quartzite from Keno to Galena Hill but recent underground work has indicated that these are apparently all branches and/or faulted segments of about four main vein zones that strike northeast across the quartzite formation which trends east-west and dips 20°-30° to the south. (See Fig. 2.) These vein zones are broken by many southeast and southwestward-striking faults which have right hand horizontal displacements up to 1000 feet with a result that the zones are strung en echelon in an east-west direction. The vein zones themselves have faulted the rocks they cut in left hand displacements up to 1000 feet.

Geology of the Galena Hill vein zones: The Silver Titan property is immediately adjacent to that of United Keno Hill and one productive mine of the latter company, the Silver King, is a few hundred feet from the boundary of the two properties.

The object of the exploration of the Silver Titan property is to find ore-bearing structures similar to those that occur on the United Keno Hill property. This search is severely hampered by the fact that essentially all of the Silver Titan property is covered by overburden, therefore, the methods employed in the exploration must necessarily be geophysical, geochemical or drilling. With this problem to contend with it is essential that the character of the known ore-bearing structures of United Keno Hill be understood as fully as possible in order to best interpret the significance of results obtained by the methods used in the search. The brief description given below of the salient features of the United Keno Hill ore structures is intended solely as an aid for Silver Titan exploration and is not meant to be a comprehensive description of these structures.

In the quartzites and most greenstones the vein zones are breccia-shear zones or sheeted shear zones with all types of transitions between these two types. Widths of mineralized zone range from 5 to 70 feet, depending on the proximity of branching structures and the intensity of the intervening brecciation. The zones tend to narrow sharply in the schists and thin-bedded quartzites to tight slips, fractures or breccia faults and are often nothing more than gouge-filled faults a few inches in thickness in these rocks. With minor exceptions all the orebodies are found in the vein zones where they are within the thickbedded quartzites of the Central Quartzite member. Most of the orebodies occur at or near junctions of vein structures or next to a contact with schist, phyllite or thin-bedded quartzite, where the vein zones tend to widen out within the thick-bedded quartzite. Within the Central Quartzite the vein zones are complex but they maintain relatively straight strikes for lengths of over a mile; however, individual veins or branches usually curve away from and into the main zones. Zones of brecciated wallrock are very common throughout the vein systems, especially at junctions, bends and between different vein faults. Such breccias are cemented by quartz and/or siderite and commonly by the ore minerals. Slickenside surfaces and subsidiary fractures are features of the vein zones in both barren and ore-bearing sections.

Some vein zones have been traced by drifting and drilling for lengths exceeding 6000 feet and it is evident that with continued underground development the continuity of the zones will be proven to be even more extensive. Of a length of 6000 feet any given vein zone at any one level contains ore over about 10 percent of its length and that is generally within the Central Quartzite. Within a productive portion of a vein system, where several orebodies occur, approximately 30-50% of the vein length is productive.

Most of the orebody portions of the vein zones are comprised of quartz and/or siderite and/or quartzite breccia with lenses, veins and/or disseminations of ore minerals, ie, galena, sphalerite, freibergite and pyrite. Large masses of solid metallic minerals form high grade portions of the orebodies but extensive bodies of solid metal are not common when the entire vein system is considered.

The principal ore-bearing mineral is freibergite, which is the silver-bearing form of tetrahedrite. The silver-bearing quality of the galena at Keno is attributed mostly to intergrown freibergite. Ruby silver, native silver and earthy secondary silver minerals also provide ore in the near-surface oxidized portions of the veins.

The principal significance of these features to the search for veins on the Silver Titan ground is as follows:

1. The vein zones in the area are reasonably straight and continuous for lengths of thousands of feet.
2. Within schists and thin-bedded quartzites the vein zones may be so narrow, a few inches of gouge, etc., that they could escape detection by geophysical methods or by drilling.
3. Although the vein zones generally maintain widths in excess of a few feet, within the quartzites they are, more often than not, comprised of quartz, siderite, chlorite and brecciated wallrock with no sign of ore minerals and no feature that would register strongly on geophysical surveys.

4. The objectives of exploration of the Silver Titan property should be:

- (a) Find, either by drilling or geophysical indications, major continuous vein or shear zones with the same general attitude and character of those on the hills to the south.
- (b) Probe, by drilling, the most likely locations along the zones for orebodies; such locations would include branching zones, sharp changes in strike and contacts between massive quartzite and less competent rocks.

All of this exploration, of course, would best be concentrated in the area of the massive portion of the Central Quartzite band.

### SILVER TITAN PROPERTY

All of the Silver Titan property, which is made up of the AA, Leo and KPO groups of claims, lies along the floor of the South McQueston River valley on strike with the Central Quartzite band which trends westward from the United Keno Hill property (Fig. 2.) The only outcrops on Silver Titan ground are in a few isolated locations. The symbols indicating the strike and dip of the bedding that appear on the Silver Titan ground shown in Figure 2 accompanying this report represent the approximate number and locations of outcrops on the property. All of the outcrops, with the exception of those along the Gerlitzky trench, are thin or thick bedded, gray to white quartzite. The wall rocks along the Gerlitzky trench are thin bedded quartzite intimately interbedded with graphitic schists and phyllites. The scattered outcrops, plus drill core, confirm the presence and position of the Central Quartzite throughout the Silver Titan property (Fig. 2.)

#### MINERAL OCCURRENCES: Gerlitzky Vein

To the writer's knowledge only two exposures of silver mineralization occur on the Silver Titan property; one is a reported specimen of leached quartzite from a pit dug about 1400 feet north of the Gerlitzki Vein, this is reported to have assayed 15 oz/ton in silver, the other is the Gerlitzki Vein. The Gerlitzki Vein has been exposed by a bulldozer trench for a strike length of 500 feet. It has been carefully and well mapped and sampled in 1962 by the geologist for Silver Titan, Mr. John McAndrew, and in addition was sampled and probed by ten diamond drill holes to depths of 40-70 feet below outcrop by United Keno Hill Ltd. in 1959. The writer examined the exposures in the trench and cut two check samples from the vein. The geology shown in Figure 4 is that done by Mr. McAndrew and checked by the writer.

The vein, as exposed in the trench, is a sinuous, widening and narrowing, complex shear zone comprised predominantly of sheared graphite and crushed quartzite, vein quartz and fracture zones of brecciated, oxidized and leached quartzite. Near the northeast end of the trench the zone is mineralized

by veins containing quartz, carbonate, sphalerite and galena which appear to be related to a system of gash fractures branching to the north from the main zone. The vein zone strikes northeastward and dips to the southeast at 60°. This attitude corresponds almost exactly to the Silver King 206 Vein, the nearest ore producer, which lies 3400 feet to the southeast.

Grade: Sampling by Mr. McAndrew indicates that traces of silver occur along the exposed length of the vein and values ranging from a few to 40 ounces/ton occur for a length of 170 feet, principally at the galena-sphalerite mineralization. One sample, #14809, cut across a zone of gash fractures returned an assay of 266 oz/ton of silver for a length of two feet. The other samples taken in the silver-bearing part of the vein range in values from 1.0 to 40.0 oz. Ag/ton over various widths. For economic considerations about 30 feet of vein length in the vicinity of the 266 oz. assay could be termed of ore grade and width in United Keno Hill.

Sampling by United Keno Hill in 1959 indicated a length of 120 feet assaying from 5 to 20 ounces across widths of from 6 to 12 feet. One sample ran 73 oz. across 6 feet and another 854 oz. across 0.5 feet, both over DDH L3 approximately in the position of McAndrew's sample #14809.

The writer's samples, taken directly over DDH L3 returned the following results (compared with McAndrew's samples in the same location):

Number

CAMPBELL	9907	23 oz. Ag/ton across 1 ft. Galena-quartz vein.
	9908	13.4 oz. Ag/ton across 1 ft., 0.16 oz. Au/ton. Sphalerite gash veins.
McANDREW	14813	33 oz. Ag/ton across 1 ft.
	14814	9 oz. Ag/ton across 4 ft.

All ten of the diamond drill holes intersected and crossed the vein zone but core recovery was only 15-20% within the vein zone which ranged in true width from 10 to 15 feet at the intersections. The highest core assays were obtained from DDH L3, under the high grade portion of the trench, in which the following results were obtained across the vein zone.

<u>Footage</u>	<u>Oz. of Ag/ton</u>
73-75	16.6
75-80	Tr.
80-82	8.2

All but one of the other core intersections returned a few ounces of silver/ton across vein widths. Sludge assays corresponded in general to the core assays. The United Keno Hill geologists feel that the sludge samples are the most dependable indication of values and they have found from experience in the mine that the existence of ore will be invariably detected in sludge assays.

The complete report on the drilling of the Gerlitzki Vein by United Keno Hill has been made available to the writer and is titled "The Investigation of the Leo Claims, 1959." The core from the drilling was not available to the writer.

The relation of the Gerlitzki Vein to the Silver King veins is shown in Figure 3.

GEOPHYSICAL SURVEYS:

Three geophysical surveys have been made on major portions of the Silver Titan ground; (1) A resistivity survey by Mining Geophysics Corporation in 1956; (2) A long wire resistivity survey by Geophysical Engineering and Surveys Ltd. in 1959 (on portions not covered by the first survey); and (3) A terrain electromagnetic survey on the eastern half of the property by Hunting Survey Corporation Ltd. in 1962. The results of the last two surveys have been made available to the writer and have been closely studied by him.

Application: Both the resistivity and electromagnetic methods are used to determine differences in electrical conductance of subsurface formations. Under good topographic conditions, (as at Silver Titan), and properly interpreted, they are each capable of detecting even slight differences in conductivity in rocks. Both these surveys have been used at Silver Titan with the paramount objective of detecting veins comprised predominantly of sulphide minerals, on the assumption that these represent the United Keno Hill type of

orebodies. In actuality such orebodies are not usual in the Keno deposits and the poor results of similar geophysical surveys over the Keno property has been reported to the writer by the company's geologists. The absence of strong anomalies due to such sulphide bodies would only indicate the possible absence of very high grade metal orebodies.

It is known from exposures that graphite is a common constituent not only of the vein zones but also of the schistose beds within the quartzite formation. Due to the high conductivity of graphite these bodies would likely register strong anomalies on electrical geophysical surveys. In addition, sharp changes in bedrock topography particularly effect the resistivity results. This complexity of possible conductors in this area is the probable explanation for some of the intricate patterns of anomalies obtained by the geophysical surveys.

Since the vein zones are often graphitic shears, (highly conductive), in their barren sections and vein minerals, (non-conductive), in their productive sections the best application of the geophysical surveys is to locate the vein zones, but not necessarily orebodies, and thus establish targets for exploratory drilling. The drilling targets along any zone may well be the areas where the anomalies are weakest or nonexistent, ie, ore-vein minerals.

Resistivity Survey: The resistivity survey of the western two-thirds of the Silver Titan property detected two narrow anomalous zones that trend east-northeast west of the Gerlitzky Vein. They are parallel to the Gerlitzky Vein and may represent its main continuation to the west. A number of weaker but similar trending anomalies were detected in the northwest corner of the property.

These anomalies are of interest mainly because of their trends, which are practically identical to that of the Silver King and Gerlitzky veins. In addition, they appear to be offset by north-northwest trending structures, also detected in the survey, which could be cross faults similar to that known at the Silver King.

Two pits tested an anomaly that occurred west of the Gerlitzki Vein but they revealed only graphitic schists.

Electromagnetic Survey: This survey produced sharper anomalies than did the resistivity survey but most of them were in complex patterns that suggest effects produced by both shear zones and beds of graphitic schists. The geology of the area and results of the little drilling that has been done suggest that most of the anomalies are due to graphite, either in beds or shear zones. This feature is not encouraging in the direct search for orebodies but it is useful in that it will help in finding possible vein zones.

In the presentation of the survey results Hunting Surveys divide the many anomalies into seven groups by areas. Each group has a complexity of anomalies, ranging from strong to slight, but which generally trend in a north-east to east direction, approximately the direction of the vein zones in the district. The area of these anomaly complexes extends 3000 feet to the north-west of the Gerlitzki Vein, 5000 feet to the northeast and 3000 feet to the southwest. The easternmost anomaly complex, ("A" in the Hunting report), was probed by four diamond drill holes in 1956 (Fig. 3.) It is evident from the logs that a vein zone of ten or more feet in width was intersected in at least one of the holes and traces of silver, gold and zinc were found with the minor amount of quartz and pyrite that constituted the total recovery from the hole at the vein zone. This vein zone is roughly on strike with the Gerlitzki Vein 5000 feet to the southwest.

An intricate pattern of strong and weak anomalies was detected in the area of the Gerlitzki Vein (Area F.) The anomalies are probably due to the interrelation of the Gerlitzki zone with other zones and with graphitic beds in the quartzite.

A number of concise, strong linear anomalies was found in an area 2400 feet north of the Gerlitzki Vein, Area D, and two drill holes explored one anomaly and intersected a major graphitic shear zone with considerable quartz, carbonate and pyrite. Core recovery in the zones was generally good, although some sections several feet in length were lost.

From these results it is clear that the electromagnetic survey has detected major shear (vein) zones. It is now primarily a problem of establishing the strike and dip of the zones by drilling and then exploring

them in the most favourable environments, ie, at zone intersections and splits and within the main quartzite sections. In this regard it is of interest that in the plot of the anomalous areas by Hunting Surveys a band with no anomalies in it, 1000 feet in width, runs east-northeastward across the property. This corresponds exactly to the projection of the Hector-Calumet quartzite from Galena Hill (Fig. 3.) It is possible that the vein zones that have been found on either side of this band, such as the Gerlitzki and the ones in areas A and D, are conductive graphitic shears within the thin bedded quartzites, thus providing strong anomalies, but they may be quartz-carbonate veins within the quartzite and therefore provide no anomalies. This type of vein zone is more likely to be ore-bearing according to conditions observed at United Keno Hill.

DRILLING:

Drilling has been done at three places on the Silver Titan ground, all in the eastern end of the property. Location of all holes is shown in Figure 3.

1. 1956 Four holes drilled into resistivity anomalies  
3000 feet northeast of Gerlitzky vein, (Area B.)
2. 1959 Ten holes drilled into the Gerlitzki Vein, (Area F.)
3. 1962 Two holes drilled into electromagnetic anomaly 2400  
feet north of Gerlitzki vein, (Area D.)

AREA F: The general results of the Gerlitzki Vein drilling have already been discussed. The core was not available to the writer but the drill report was and the results were evaluated. All ten holes crossed the vein but core recovery was consistently low. The vein was intersected by the holes at intervals of 50 feet along a length of 500 feet. Traces of silver were obtained from the strong vein zone throughout that length.

AREA B: The core from the four holes drilled in 1956 was not examined by the writer but Dr. Aho's logs are appended to this report. The results of this drilling were:

- DH 1 - Hole abandoned in overburden because of broken casing.
- DH 2 - Through 50 feet of overburden into massive quartzite.  
Was abandoned at 118 feet because of caving.

- DH 3 - Through 78 feet of overburden into thin-bedded quartzite. Practically no core recovered from 256 to 342 feet but sludge returned pyrite, quartz and traces of sphalerite and galena assaying 2 oz. Ag/ton. Probably in a vein zone.
- DH 4 - Through 28 feet of overburden into massive quartzite and graphitic quartzites. Hole abandoned at 272 feet because of caving but was 50 feet short of projected vein zone.

From these results it is concluded that the Central Quartzite member underlies this area and that a strong vein zone trends parallel to the geophysical anomalies where intersected by DH 3.

AREA D: One hole was completed and one was nearly completed in the investigation of an electromagnetic anomaly in Area D. All the core was examined by the writer and copies of the logs of the two holes, (T1 and T2), are appended to this report.

Both holes intersected a shear zone 10-15 feet in width comprised of graphite and calcite with some quartz and pyrite. Core recovery from the vein zone was good (60-80%) considering the material and would appear to be representative. No sign of ore minerals was found. The shear zone appears to strike northeast and dips about 60° to the southeast. Projected to the surface it lies between Anomalies 4 and 5 on the Hunting Surveys plan and it appears to be the cause of one or both of those anomalies.

Hole T2 is predominantly in graphitic schists with minor quartzite whereas T1, 400 feet to the southwest, is in quartzites. This suggests that the footwall contact of the Hector-Calumet Quartzite lies near DH T 2 and strikes approximately northwest and dips southeast at 30°-45°.

DRILL RESULTS:

Gerlitzki Vein: Although no ore values were obtained from the Gerlitzki drilling the intersections in the ten holes proved the existence of a strong vein zone, 10 - 15 feet in width, dipping 60° to the southeast, with a proven length of 500 feet. Intersections indicate that the vein zone does not die out to the southwest but turns into the southeast wall of the trench. (See Fig. 4).

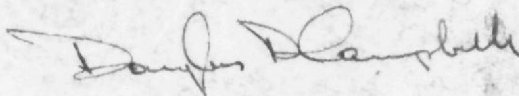
Considering the size and continuity of the Gerlitzki vein and the existence of silver in it, above DH L3, it is strongly recommended that another hole be drilled through it below the DH L3 intersection. With a modern swivel core barrel and face ejection bits the core recovery should be well above the 20% of the old drilling and a check could be made on the old results.

The Hector-Calumet Quartzite lies 1000 feet to the northeast along the strike of the vein and the Silver King Quartzite lies to the southwest; it is reasonable to drill exploration holes into the Gerlitzki vein where it is projected into the quartzites, even though these are areas of weak electromagnetic anomalies.

AREA B: The intersection of DH3 in this area suggests the existence of a vein zone which could be the faulted extension of the Gerlitzki Vein. Exploration drilling of this vein should be carried on with modern core recovery equipment to check the early traces of ore minerals. Further holes along this zone to the southwest would be deeper into the quartzite and in more favourable prospecting ground.

AREA D: The proving up of a major shear zone by the DDH T1 and T2 intersections suggests that a further probing of this zone should be done to the southwest in Area E, where the electromagnetic anomalies are numerous, weaker and apparently cross-faulted, according to the Hunting interpretation.

Respectfully submitted,



Douglas D. Campbell.

DOUGLAS D. CAMPBELL  
CONSULTING GEOLOGIST  
119 MARINE BUILDING  
VANCOUVER B. C.

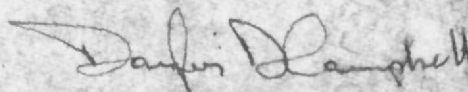
September 7, 1962.

CERTIFICATE

I, Douglas D. Campbell, with business and residential addresses in Vancouver, British Columbia, do hereby certify that:

1. I am a consulting geological engineer.
2. I am a graduate of the University of British Columbia, (B.A.Sc., Geological Engineering, 1946), and of the California Institute of Technology, (PhD., Economic Geology and Geophysics, 1955).
3. I am a registered Professional Engineer of the Province of British Columbia.
4. From 1946 until 1957 I was engaged in mining and mining exploration in Canada and the United States as geologist for a number of companies. I was chief geologist for Eldorado Mining and Refining Co. Ltd. when I retired in 1957 to begin private practice as a consulting geologist.
5. I personally visited the property of Silver Titan Mines Ltd. from August 20 to August 23, 1962.
6. I have not received, nor do I expect to receive, any interest directly or indirectly in the properties or securities of the Silver Titan Mines Ltd.

Respectfully submitted,



Douglas D. Campbell, B.A.Sc., Ph.D., P. Eng.

Vancouver, B. C.

September 1, 1962.

APPENDIX

- (a) Drill logs T1, T2.
- (b) Drill logs S1, S2, S3, S4.
- (c) Assay sheet - samples 9907-08.

## SILVER TITAN MINES LTD.

## DIAMOND DRILL RECORD

by Douglas D. Campbell

DH T 2  
400 ft. N51°E of DH T10-70 - BX  
70-173- AX  
N34°W  
-62°

Probing anomalies in Area D.

0-46.5	OVERBURDEN	
46.5-80	GRAPHITIC SCHIST	Black and greasy, very platy and broken, thinly laminated, relatively hard graphite-quartzite schists. Disseminated pyrite is common, along with white quartz stringers. Sections of core ground to graphite mud. (60-65) - Mostly laminated quartzite (15° to core). (70-77) - Graphite shear.
80-99	QUARTZITE	Hard, compact, fine grained watery quartzite, med. blue-gray in colour. Sparsely cut by fine white quartz stringers. Finely, discontinuously laminated at 70°-80° throughout. Core doesn't break easily along banding. Competent rock. Excellent core recovery.
99-113	SHEAR ZONE	Chips and powder of black graphite and white calcite with considerable mud. Core recovery is good considering the material.
113-132	BANDED QUARTZITE	Med.-dark gray, hard, fine grained, finely black and pale gray laminated quartzite with core very badly fractured parallel to and across laminations into chips and polygons.  Locally pyritic but quartz and calcite veinlets are not too common. Core recovery is good although very badly broken.
132-136.5	QUARTZITE	As (80-99).
136.5-156	GRAPHITIC SCHIST	Platy, scaly, broken, quartz-graphite schist with foliation at 80°-70° to core. Some quartz partings.
156-165	QUARTZITE	As (80-99) only core fairly badly broken along and across laminations.
165-174	GRAPHITIC SCHIST	As (136.5-156).

Still drilling at time of logging.

## SILVER TITAN MINES LTD.

## DIAMOND DRILL RECORD

by Douglas B. Campbell

DH T1  
 N63° 54' 18"  
 E135° 35' 56"  
 Collar El. 2185

0-200 - AX  
 200-245 - EX  
 N32°W  
 -55°

Probing anomalies in Area D.

0-61	OVERBURDEN	
61-80.5	PHYLITIC QUARTZITE	<p>Gray-black, hard, badly broken, very finely laminated, (45°-60° to core), fine grained quartzite with hair-line graphitic and argillaceous partings throughout every 1/16". Lenses of white quartz also common up to several inches thick.</p> <p>Very fine pyrite is irregularly disseminated along bedding and in occasional cross fractures.</p> <p>Core very badly broken along partings. Core recovery about 70%.</p>
80.5-98.5	SHEAR ZONE	<p>Crumbled graphitic quartzite, graphite and white calcite, also much compact graphitic mud. Pyrite is not uncommon in some of the graphite schist. Main components of zone seem to be graphite and calcite. (94-96) - Hard, white bull quartz.</p> <p>Core in small pieces or mud. Recovery about 80%.</p>
98.5-105.3	NO CORE	
105.3-146	QUARTZITE	<p>Relatively uniform and solid core of hard, pale blue-gray, fine grained watery quartzite very finely but discontinuously laminated. (60°-70° to core). Rock very competent.</p> <p>Rock is brecciated both parallel to laminations and at angles to it and has been healed with vuggy veinlets of white quartz up to 1/4" thick.</p> <p>Pyrite is thinly dispersed as disseminated fine grains throughout quartzite.</p> <p>Core recovery very good, essentially 100%.</p>
146-160	BANDED QUARTZITE	<p>Essentially as above only darker gray coloured and more definitely banded with dark gray and white beds and core is very broken along and across the lineation.</p>
160-174	ALTERED QUARTZITE	<p>As (105.3-146) only rock intricately criss-crossed and chopped up by vuggy calcite-filled cracks and talcose shear fractures. Both contacts gradational. Recovery good.</p>

## SILVER TITAN MINES LTD.

## DIAMOND DRILL RECORD

by Dr. A. Aho

DDH S1 July 14, 1956Brng. NW  
Inclin. -50°

0-104 OVERBURDEN Sand and silt.

END

DDH S2Brng. NW  
Inclin. -50°

0-64 OVERBURDEN Sand, silt and gravel.

64-103 QUARTZITE Fine grained, light blue-gray quartzite with indistinct lineation and some graphite partings. Minor disseminated pyrite @ 84'.

103-118 SAND Broken quartzite (?).

END

DDH S3Brng. NW  
Inclin. -55°

0-90 OVERBURDEN Sand, silt, gravel and boulders.

90-142 THIN-BEDDED QUARTZITE Graphitic, pyritic fine grained quartzite. Recovery 45%.

142-191 QUARTZITE Compact, hard quartzite. Recovery 56%.

191-255 THIN-BEDDED QUARTZITE As (90-142). Core recovery 40%.

255-342 VEIN ZONE (?) Very minor recovery of mostly quartz and pyrite. Only recovery (271-288) and (324-330, 20% recovery).  
Frohberg panned = 0.10 oz. Ag., tr. Pb, Tr. Zn.  
Poli panned = 0.12 oz. Au., 1.9 oz. Ag, tr. Pb, 0.3% Zn.

END

DDH S4Brng. N45°W  
Inclin. -45°

0-40 OVERBURDEN Silt.

40-100 THIN-BEDDED QUARTZITE Thin laminated quartzite with occasional quartz stringers and dissem. pyrite.

100-175 QUARTZITE More massive quartzite but poor recovery (144-150). No core but graphite sludge.

175-235 QUARTZITE SCHIST Thin bedded quartzite interbedded with graphite partings. 50% recovery.

235-272 GRAPHITIC SCHIST Slaty graphitic rock and interlayered quartzite. Some pyrite stringers.

END

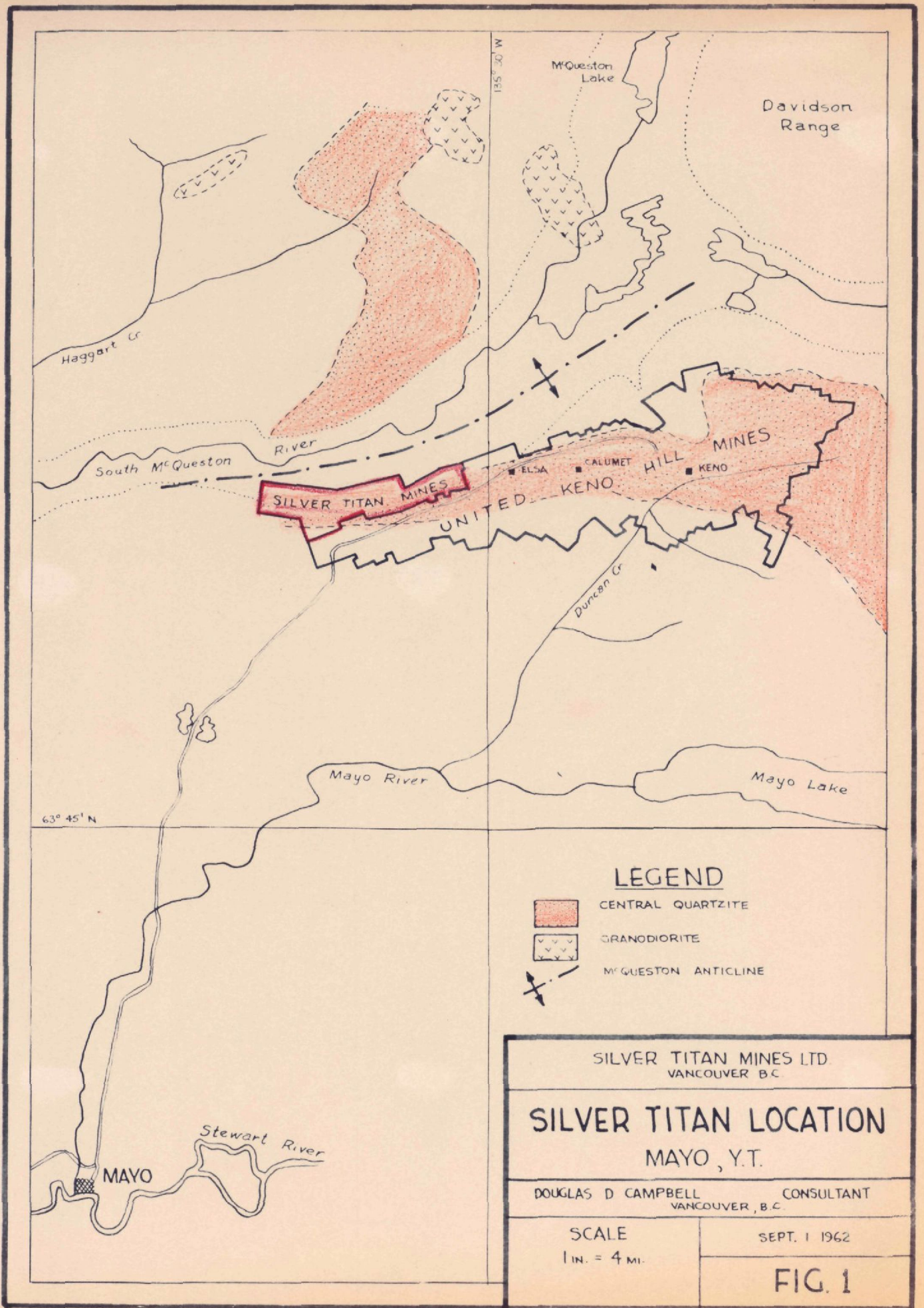
174-211      PHYLLITIC QUARTZITE      As (61-80.5) with laminations @ 80° and abundant white quartz stringers. Pyrite common.

Vuggy calcite cracks and chlorite and graphite shear zones break up core. Core recovery is good but most of core is powder and small pieces.

211-245      BANDED QUARTZITE      As (146-160) with many chloritic partings. (225-245) - Many white quartz and calcite bands parallel to bedding and generally heavily pyritic.

Foliation changes from 80° to 45° and back to 90° to core.

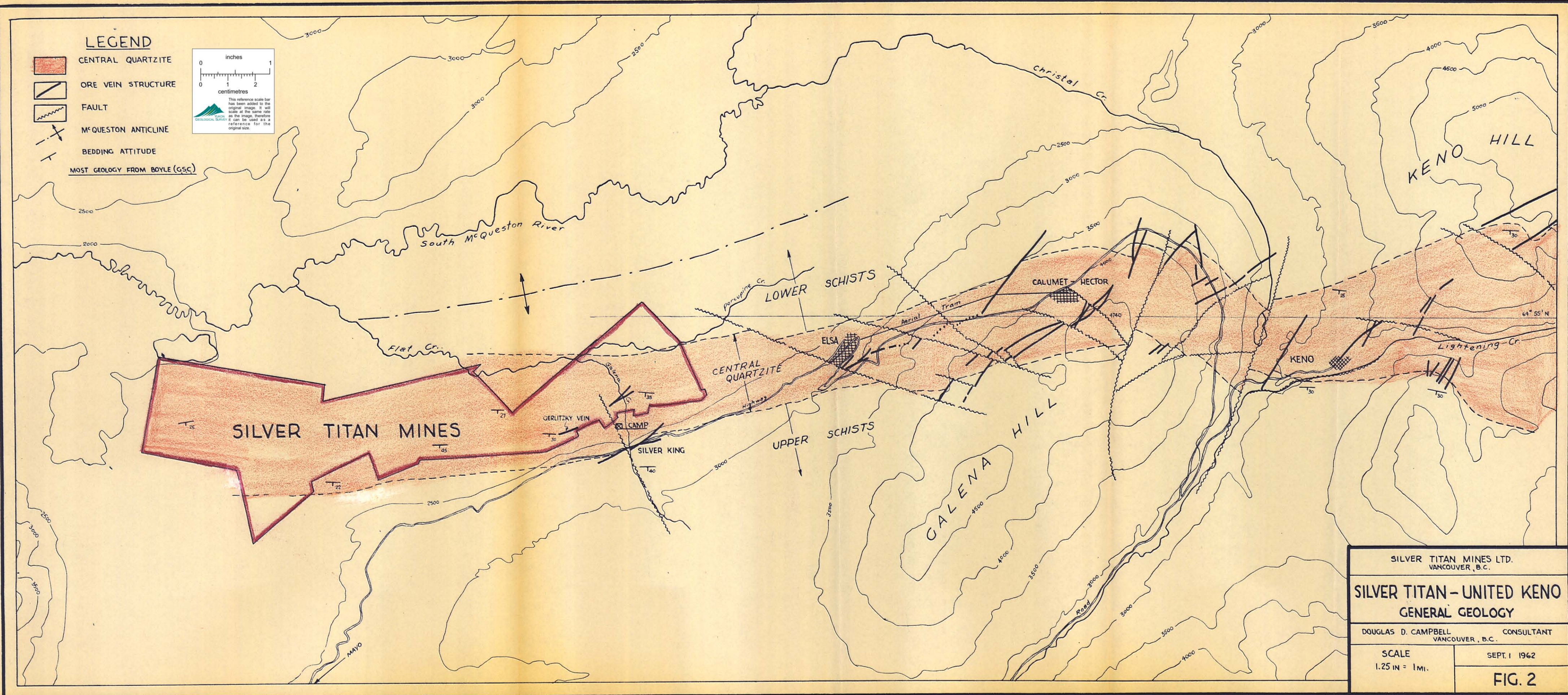
END

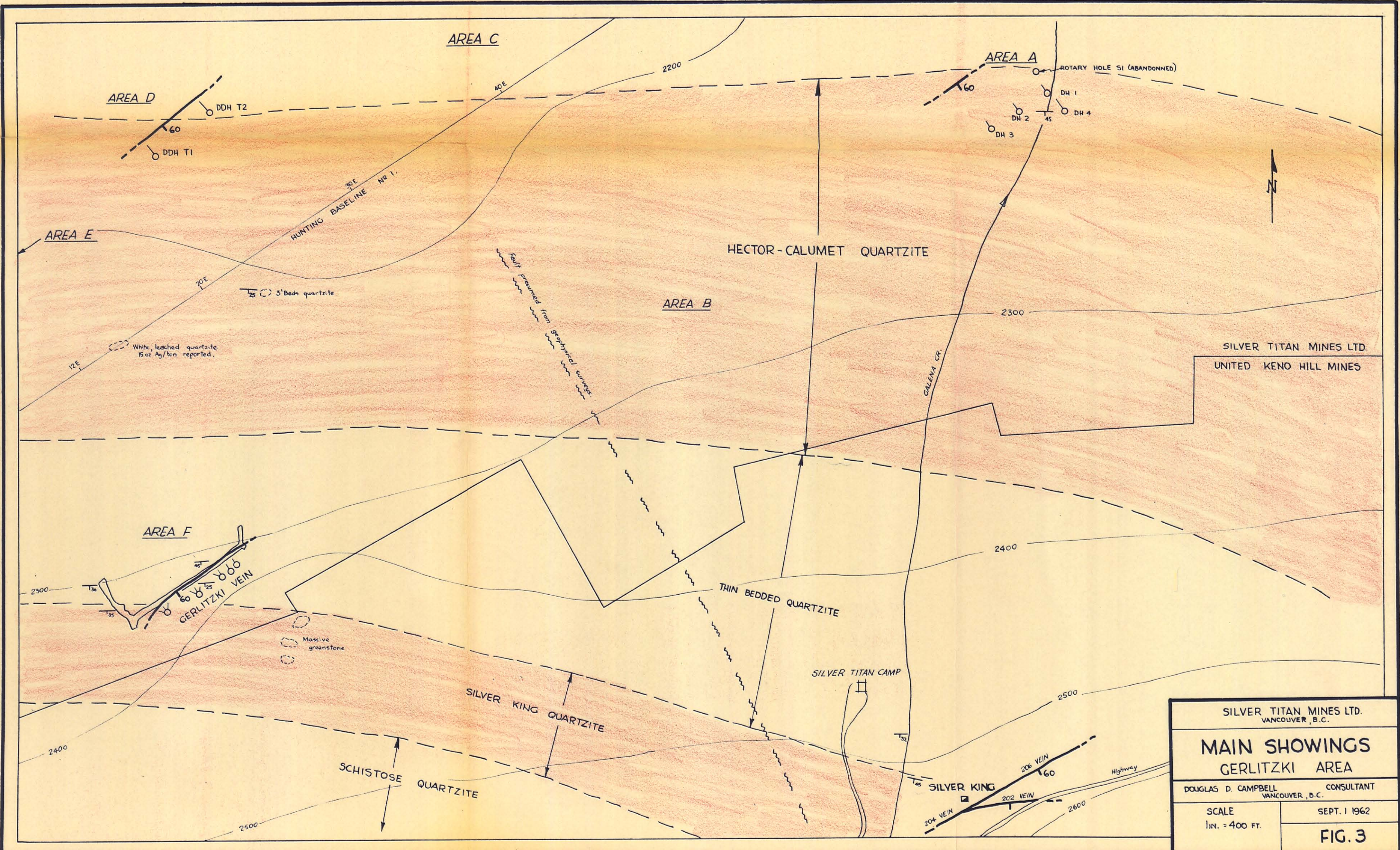


**LEGEND**

- CENTRAL QUARTZITE
- GRANODIORITE
- M'QUESTON ANTICLINE

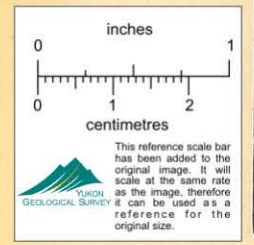
SILVER TITAN MINES LTD. VANCOUVER B.C.	
<b>SILVER TITAN LOCATION</b> MAYO, Y.T.	
DOUGLAS D CAMPBELL	CONSULTANT
VANCOUVER, B.C.	
SCALE 1 in. = 4 mi.	SEPT. 1 1962
<b>FIG. 1</b>	

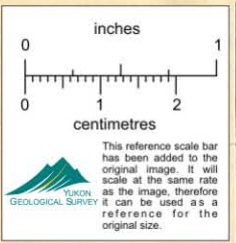
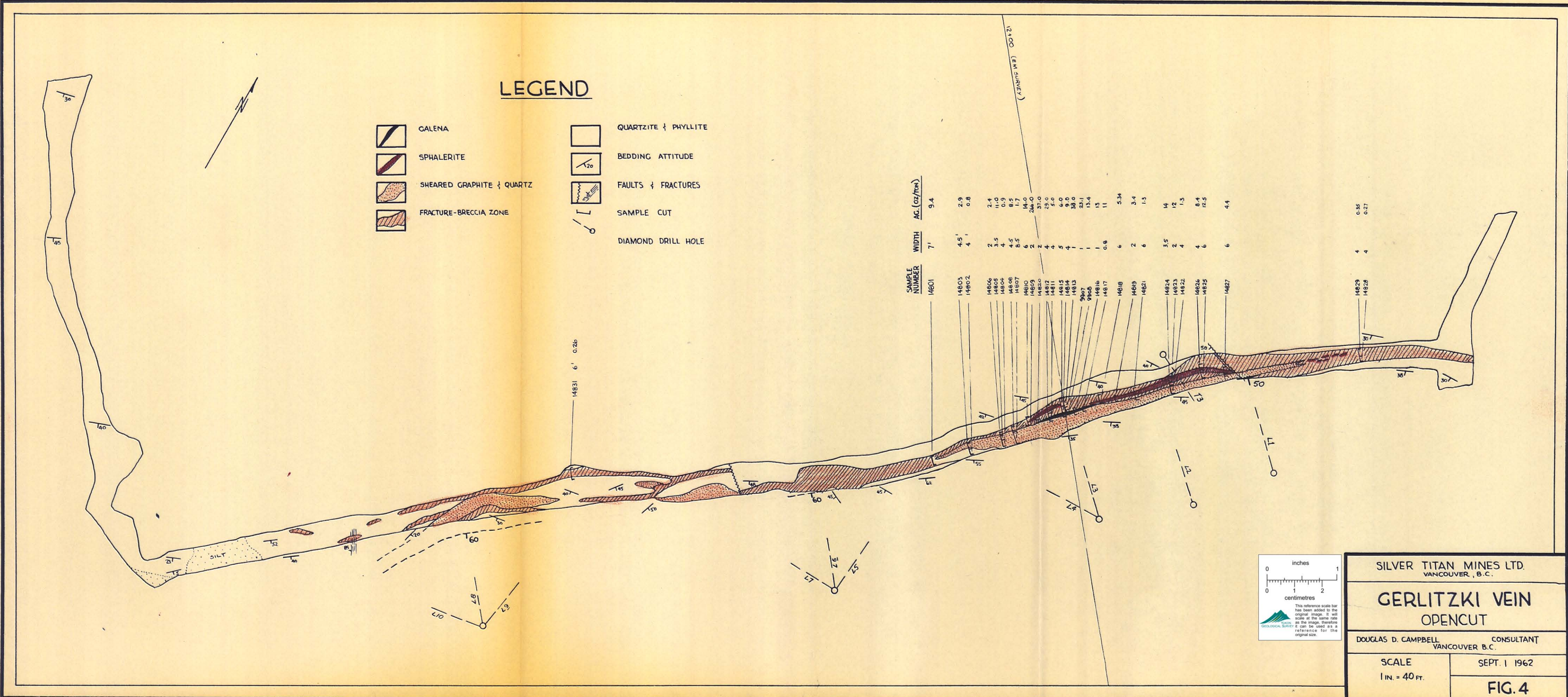




SILVER TITAN MINES LTD.  
UNITED KENO HILL MINES

SILVER TITAN MINES LTD. VANCOUVER, B.C.	
<b>MAIN SHOWINGS GERLITZKI AREA</b>	
DOUGLAS D. CAMPBELL VANCOUVER, B.C.	CONSULTANT
SCALE 1 in. = 400 FT.	SEPT. 1 1962
<b>FIG. 3</b>	





SILVER TITAN MINES LTD.  
VANCOUVER, B.C.

**GERLITZKI VEIN  
OPENCUT**

DOUGLAS D. CAMPBELL CONSULTANT  
VANCOUVER B.C.

SCALE  
1 IN. = 40 FT.

SEPT. 1 1962

**FIG. 4**