

ASSESSMENT REPORTS

18973

MAP No. 105-11-13 TYPE OF WORK: Geological

REPORT FILED UNDER	Haldane Silver Mines Ltd.	
DATE PERFORMED	June-July 1966	DATE FILED Feb. 9/67
LOCATION - LAT.	64°00'N	
LONG.	135°00'W	Keno Hill Area, Y.T.
CLAIM Nos.	(OVER)	
WORK DONE BY	A.R. Archer - Archer, Cathro & Assocs Ltd.	
WORK DONE FOR	Haldane Silver Mines Ltd.	
REMARKS	<p>Claims underlain by lower Cretaceous quartzites, which are overlain by phyllitic schists and underlain by phyllitic schists and greenstone sills. Favourable zones of mineralization showings assayed in silver, lead and zinc. Further development indicated.</p> <p>Bulldozing, Drilling</p>	

HALDANE SILVER MINES LIMITED

The work on the Johnson Vein system on the N. E. side of Big Horn gulch has just been completed and we propose to start immediately on the Middlecoff Workings located on the S. W. side of the gulch.

The costs of this work will be largely normal operating expense in drifting and diamond drilling since the camp, crew and machinery already established on the Johnson Vein zone may be utilized with very little relocating expense.

The work proposed for the Middlecoff area consists of the following:

- a) Approximately 1,000 feet of drilling from the underground workings on the 3,600 foot level.
- b) Drifting on minimum of 300 feet of the 3,725 foot level and a similar or greater amount on the 3,600 foot level.

We expect this phase of the program to take two and a half months and, subject to results may be continued beyond this period, including further surface work.

All of the work proposed on this program is of an exploratory nature and will not be of a mine production development category.

**ARCHER, CATHRO & ASSOCIATES LTD.**  
CONSULTING GEOLOGICAL ENGINEERS

P. O. Box 1051  
WHITEHORSE

**Haldane Silver Mines Ltd.**

Report on  
Mt. Haldane Property  
Keno Hill district, Yukon Territory

July 18, 1966

Alan R. Archer

Consultant

Whitehorse, Y.T.

## SUMMARY

The Haldane Silver Mines Ltd. property consists of 54 mineral claims situated on the western slope of Mt. Haldane in the Keno Hill district, Yukon Territory.

The geological setting of Mt. Haldane is almost identical to that of the Keno Hill district which has produced over 155 million ounces of silver since mining started in 1913. In 1920, the Yukon Silver-Lead Mining Co. Ltd. shipped 27 tons of ore from the Mt. Haldane Middlecoff vein grading 90.47 ozs. per ton silver and 59% lead. No further work was done on the Middlecoff vein after 1920, presumably because of the fall in the price of silver at that time.

From 1964 to 1965 Silver Titan Mines Ltd. reopened most of the Middlecoff underground workings and located several short ore shoots. Bulldozer trenching located at least 5 other mineralized veins.

Further work on the property is definitely justified because of the excellent possibility of finding enough silver-lead ore to develop a high profit United Keno Hill type mining operation. A surface exploration program combined with underground development of the known mineralized areas, to cost \$250,000.00 is recommended.

## INTRODUCTION

On June 17, 1966, the writer accompanied by Dr. A.E. Aho, president, Silver Titan Mines Ltd., examined the surface

showings and much of the surface geology on the Mt. Haldane property, about 13 miles west of United Keno Hill Mines Ltd. The writer has had at his disposal all available reports, maps and assay results concerning the property. Furthermore, the writer is intimately familiar with the general district, having been Chief Geologist for United Keno Hill Mines Ltd. from February 1963 to January 1966.

#### PROPERTY LOCATION

The property is located on the western slope of Mt. Haldane in the Keno Hill district, some 220 miles due north of Whitehorse, Yukon Territory, and 13 miles west of Elsa, administration and milling centre of United Keno Hill's underground operations. Mt. Haldane is a prominent, rugged peak some 6,000 feet high on the south side of the McQuesten River and is separated from Galena Hill to the east by a wide glacial valley. Both the north and east sides of Mt. Haldane rise steeply from the respective valley floors. The west side of the mountain is divided into two high ridges by a deeply cut creek valley called Bighorn Gulch which terminates in a tight cirque-like valley on the southwest side of the peak.

The property is accessible by 13 miles of secondary road that turns west off the all-weather Mayo-Keno Hill road 15 miles north of Mayo.

The property consists of 54 mineral claims straddling Bighorn Gulch, that except for the Star 1 and Star 2 claims which lie 1,500 feet east of the main group, are contiguous.

The claims are registered as follows:

<u>Name</u>	<u>Grant Number</u>	<u>Expiry Date</u>	<u>Ownership</u>
Ted 1	83663	Aug. 27, 1970	Silver Titan Mines Ltd.
3	83665	"	"
5	83667	"	"
7	83669	"	"
9	83671	"	"
11	83673	"	"
12	83674	"	"
Ted Fr. 13	83675	Aug. 27, 1969	"
14	83676	"	"
15	83677	"	"
16	83678	"	"
18	83679	"	"
19	83680	"	"
20	83681	"	"
30	83691	Aug. 27, 1970	"
17	83707	Sept. 13, 1970	Peso Silver Mines Ltd.
D.B. 5	83407	May 25, 1970	Silver Titan Mines Ltd.
7	83409	"	"
9	83411	"	"
11	83413	"	"
May 1	83415	May 25, 1970	"
2	83416	"	"
3	83417	"	"
4	83418	"	"
5	83419	"	"
6	83420	"	"
7	83421	"	"
8	83422	"	"
9	83423	"	"
South 1	83425	May 25, 1970	"
2	83426	"	"
Middlecoff	55320	Feb. 20, 1969	E. Bleiler
Jo	55321	Feb. 20, 1970	M.H. Ewing
John	55322	"	M.H. Ewing
Bybil	55323	"	E. Bleiler
Lowell	55324	Feb. 20, 1969	E. Bleiler
Andy	55357	Oct. 13, 1969	E. Bleiler
Whistler	55358	Oct. 18, 1968	M.H. Ewing
Gopher	55359	"	E. Bleiler
Moon Glow	59960	Oct. 13, 1969	M.H. Ewing
Horn 1	83295	Apr. 16, 1970	M.H. Ewing & E. Bleiler
2	83296	"	"
3	83297	"	"
4	83298	"	"

<u>Name</u>	<u>Grant Number</u>	<u>Expiry Date</u>	<u>Ownership</u>
Horn 5	83299	Apr. 16, 1970	M.H. Ewing & E. Bleiler
6	83300	"	"
7	83301	"	"
8	83302	"	"
9	83303	Apr. 20, 1968	"
10	83304	"	"
15	83305	"	"
16	83306	"	"
Star 1	83556	July 31, 1966	J. Strebchuk
2	83557	"	"

### HISTORY

#### General

Lode silver-lead deposits were discovered by placer prospectors in the Keno Hill district in the early 1900's. The district remained undeveloped until 1913 when sporadic mining began on a rich vein outcropping in Galena Creek canyon on Galena Hill. Discovery of the No.9 (Keno) Mine on the summit of Keno Hill in 1919 and its subsequent operation by the Yukon Gold Company sparked a major staking rush which marked the beginning of major development in the district. Commencing in 1921, Treadwell Yukon Company Ltd., under the capable leadership of Livingston Wernecke began acquiring claims in the area and quickly gained control of the major deposits on Keno Hill, built a concentrating mill, and was shipping over 1 million ounces of silver per year by 1925. Treadwell Yukon continued to operate until late 1941 when falling metal prices, declining ore reserves, shortage of

labour and the untimely death of Mr. Wernecke forced operations to cease. Over 40 million ounces of silver were shipped by Treadwell from 1923 to 1941.

In 1945 Frobisher and Conwest interests formed the Keno Hill Mining Co. Ltd. and purchased the Treadwell plant and property in the Keno Hill district. The company was later reorganized as United Keno Hill Mines Ltd. and after 18 years of continuous operation had mined over 100 million ounces of silver to the end of 1965.

Total production for the Keno Hill district is 155 million ounces of silver from 3.4 million tons of ore, at an average grade of 45.6 ounces per ton silver to December 31, 1965.

#### Mt. Haldane

Silver-lead ore was found on Mt. Haldane prior to the first discoveries on Keno Hill, possibly even prior to the Galena Creek discovery in 1906. W.E. Cockfield (G.S.C. Summary Report, 1918) reported that two short adits had been driven on a vein on the southern side of Bighorn Gulch (Middlecoff Vein). He further reported that several other veins had been traced, one for a distance exceeding 2,000 feet, by surface float. In 1919, the property was taken over by the Yukon Silver-Lead Mining Co. and a third adit was driven 125 feet below two existing adits. The workings were described by Cockfield in 1919 as follows:

"The third adit is 125 feet below the second, and

320 feet to the north. It is 135 feet long to the point where it taps the vein, and a drift following the vein has been run in a southerly direction for a distance of 305 feet. 40 feet from the point where the adit taps the vein, a winze was sunk on the vein to the fourth level, a distance of 55 feet measured along the slope, and 100 feet beyond a incline has been sunk to a depth of 90 feet. The fourth level was driven from the incline to the winze and extended north a few feet?

An ore shoot was reported to have been found in the incline but no indication of overall grade or size was given. Five select samples were taken by Cockfield from the ore shoot and these averaged 31.7 per cent lead and 37.9 ounces per ton silver. Cockfield mentioned that it was the intention of the owners to stop out and sort for shipment the ore occurring between the third and fourth levels. However, no further reports are given on this property by the Geological Survey of Canada during the years following 1919 and no stoping operations are recorded. A smelter statement on file in the Mayo, Yukon Territory, mining recorders office records a 27.202 ton ore shipment made by the Yukon Silver-Lead Co. in 1920. This shipment graded 90.47 ounces per ton silver and 59% lead and was probably obtained by handsorting the material stockpiled on the adit dumps.

The Wolf claim, about 1,500 feet northeast of the Yukon Silver-Lead adits, was worked by hand by Mr. A. Johnson

starting in 1918. A short adit was driven into the vein (Johnson Vein) and two shipments of ore were made through the Treadwell Yukon Co. in 1926 and 1927, of which 1,484 tons graded 141.75 ounces per ton silver and 60.8% lead, and 0.815 tons assayed 120.6 ounces per ton silver and 52.5% lead.

No further production is recorded for the Middlecoff or Johnson veins and it can only be assumed that the drastic decline in the price of silver in 1921, combined with the very high grade ore discovered elsewhere in the Keno Hill district in 1920, diverted interest from Mt. Haldane.

Silver Titan Mines Ltd. began acquiring claims on Mt. Haldane in the fall of 1963 and since that time the old adits have been cleaned out, mapped and sampled under the direction of Dr. A.E. Aho. A well organized program of soil sampling combined with bulldozing located and exposed a number of additional veins in the area.

## GEOLOGY

### General

Nearly all of the economic mineral deposits in the Keno Hill district are found in the Central Quartzite formation. This formation has recently been identified as Lower Cretaceous (Dirk Kompleman-Kluit unpublished thesis, Tombstone Area, Dawson) and is about 3,500 feet thick on Galena Hill. The quartzites are overlain by phyllitic schists and underlain by phyllitic schists and greenstone sills. Greenstone sills are also found in the quartzites, usually in the central

to lower portion.

Two gentle anticlinal folds have been recognized in the district. The north-south trending Mayo Lake anticline is the major fold, the western limb of which forms Keno Hill. Superimposed on this western limb is a smaller fold called the McQuesten anticline. This anticline extends westward from the east side of Keno Hill and its axis follows the McQuesten Valley. Galena Hill and Mt. Haldane are on the southern limb, which dips about 30 degrees to the south.

All of the ore mined in the district has come from vein faults in the southern limb of the McQuesten anticline and nearly all economic deposits have been found where these faults cut the Central Quartzite formation. The vein faults usually strike north-east and dip steeply to the southeast and most of them have normal left lateral displacements ranging from a few feet to several thousand feet. The majority of the vein faults are complex and show indications of many periods of movement and several stages of ore deposition. The vein faults are themselves offset by northwest striking cross-faults. These cross-faults usually dip moderately to the southwest and all have normal right-hand displacements. The cross-faults have movements ranging from a few feet to several thousand feet and are all unmineralized.

Most of the mineralization in the Keno Hill district occurs as simple open-space filling in the vein fault structures.

There are no recognizable chemical controls and there is no evidence that mineralization is a near surface feature. The following are some of the ore controls that are recognized, all describe situations whereby structures with open spaces might be produced.

1. Vein faults cutting brittle rocks (ie. quartzite).
2. Vein junction areas.
3. Proximity to cross-faulting.

In addition to these controls it is the authors opinion that the main requirements for ore mineralization are:

1. The vein has been faulted under tension.
2. The mineralizing fluids, during the time of faulting, must have contained ore mineral (many well mineralized open structures contain no ore minerals).

The main ore minerals in the Keno Hill district are silver bearing galena and sphalerite. Sphalerite is only economic as a by-product in mining the argentiferous galena. The silver content of the galena is largely due to associated silver bearing tetrehidrite and pyrargyrite. Gangue minerals commonly associated with the ore minerals are siderite, pyrite, arsenopyrite and quartz. Any particular mineralized vein will usually have a fairly constant ratio of ounces silver to per cent lead even though this ratio may vary widely in individual ore shoots within the vein system.

#### Mt. Haldane

The mineral zone of Mt. Haldane consists of a 4,000

foot thickness of the Central Quartzite formation that strikes approximately east-west, dips 25 degrees to 30 degrees south and, as already mentioned, is part of the south limb of the McQueston anticline. Phyllitic schists lie above and below the quartzite, being mainly sericitic on the footwall side and chloritic and graphitic on the hangingwall side.

A zone of north-south striking vein faults cuts Mt. Haldane west of the peak and has been traced through Bighorn Gulch for almost 2 miles. The vein zone seems to coalesce into one main fault structure south of Bighorn Gulch while to the north it branches out into at least five separate veins. The overall strike of the zone is about N 10 degrees E, dipping about 60 degrees W. The vein fault zone has an apparent right-hand movement of 6000 feet as indicated by the horizontal displacement of the quartzite formation.

The slope on the north ridge along Bighorn Gulch is covered by frost riven rubble possibly exceeding 50 feet in depth in places. Much of the rubble has been carried from further up the slope by rock glaciers and rock slides. The slope on the south side of Bighorn Gulch shows some outcrop and probably has a shallower cover of overburden. Most of Mt. Haldane has been untouched by recent glaciation although local alpine glaciation must have existed at one time in Bighorn Gulch.

MINERAL OCCURRENCE & DESCRIPTION OF SHOWINGS

General

At the time of the authors visit to the property, all three adits were inaccessible due to sloughing and all of the bulldozer trenches had either sloughed or were filled with snow. Abundant vein float was available for observation in the material removed from the trenches and on the adit dumps. The following descriptions of the various showings are, therefore, based mainly on geological information and assays obtained by Silver Titan Mines Ltd. during the period 1963 to 1965.

Middlecoff Workings

The uppermost adits are 40 feet apart in elevation and the lower adit lies 125 feet below the central adit and about 50 feet above Bighorn Gulch. All three adits were re-opened by Silver Titan Mines Ltd. and were surveyed by tape and Brunton compass, mapped and sampled by Dr. A.E. Aho. The upper adit was driven on the vein for its entire length of about 40 feet. No definite ore shoot was identified but a select sample of galena from the collar of the adit assayed 318.0 ounces per ton silver and 74.8% lead, and a two foot width of mineralization near the end of the adit assayed 97.8 ounces per ton silver and 15.8% lead. The middle adit was driven 25 feet west to intersect the vein and then followed the vein zone a further 90 feet. A sample from the face of the adit over a 5.3 foot width assayed 13.6 ounces

per ton silver and 8.1% lead. The lower adit was cross-cut 125 feet west to intersect the vein zone and then was drifted a further 310 feet south. A footwall vein, the "A" vein, was intersected 125 feet from the collar and was drifted approximately 40 feet south at which point the adit turned right, dropped the "A" vein, and drifted along the "B" vein. Assays from a 20 foot length of the "A" vein averaged 27.4 ounces per ton silver, 20% lead and 0.75% zinc over a 2.7 foot width. The old incline shaft, sunk on the "B" vein, some 175 feet from the adit collar was reopened and sampled to a slope depth of 45 feet at which point the incline became inaccessible due to broken timber and cave. The 45 foot length averaged 22.6 ounces per ton silver, 18.0% lead and 1.2% zinc over an average width of 3.2 feet.

The Middlecoff zone is complex with a number of vein splits lying both to the footwall and hangingwall of the adits. The average strike is almost due south and the dip of the "A" vein is about 75 degrees west while the "B" vein dips flatter at 55 degrees west. The vein zone is cut off at the end of both the middle and lower adits by a fault, the Swing fault, striking about N. 10 degrees W. and dipping 55 degrees west. It is not certain if this is a true cross-fault or an unmineralized vein fault. The Middlecoff vein has been traced 5,000 feet to the south by surface lineaments and by the offset of the quartzite and overlying schist. No recent surface work has been done along this southern extension

and no mineralized sections are known.

### Johnson Vein

The Johnson Vein lies on the north side of Bighorn Gulch approximately 1,500 feet northeast of the Middlecoff workings. The vein strikes about N.10 degrees E. and dips steeply to the west. A trench 400 feet south of the old adit intersected 5 feet of vein material assaying 13.8 ounces per ton silver, 5.5% lead and 1.5% zinc. A grab sample of galena from the vein assayed 156.8 ounces per ton silver and 39.7% lead.

### Main Zone

The main zone is exposed in several trenches on the north side of Bighorn Gulch about 3,000 feet northeast of the Middlecoff workings. The exposures are on a steep hillside which at this point is parallel to the vein strike or almost due north. The vein dips 70 degrees to 80 degrees down the hill and in several areas the hangingwall section of the vein appears to have sloughed down the hill leaving steep slickensided bluffs that likely define the footwall of the vein. One trench exposed the vein for a length of 50 feet. The vein is 25 feet wide and averaged 4.4 ounces per ton silver, 0.6% lead and 1.6% zinc over this length and width. The main vein was further exposed in a trench some 300 feet south at which point it was 3.5 feet wide and assayed 22.8 ounces per ton silver, 5.3% lead and 1.4% zinc.

### Other Showings

A trench about 600 feet east of the Middlecoff workings exposed vein float from which selected samples assayed 12 ounces per ton silver.

Several areas of vein float material were found by trenching immediately north of Bighorn Gulch and trenching uphill from the Johnson Vein located two areas with mineralized vein float that assayed between 4 and 11 ounces per ton silver. Although, <sup>together</sup> bulldozing has indicated the presence of 5 separate, sub-parallel vein zones on the northern slope of Bighorn Gulch. Most of the veins were poorly exposed because of the great thicknesses of slide material that occur on this slope. The ~~five~~ veins are each separated by 250 feet of quartzite on the average and appear to diverge slightly as they approach Bighorn Gulch. It is possible that the main vein is the same vein that was drifted in the Middlecoff workings.

Mineralization in all showings is fairly similar. The main ore mineral is galena and the main gangue mineral is manganiferous siderite. The exposed float is largely manganese oxides mixed with limonite, some quartz, brocica fragments of country rock, lead oxides and the occasional bit of unoxidized galena.

The silver to lead ratio in the various showings ranges from slightly more than 1 to 1, to as high as 8 to 1.

CONCLUSIONS & RECOMMENDATIONS

Although the vein system explored by the Middlecoff workings, Johnson adit and trenching occurs in the Central Quartzite formation it exhibits a number of features that are different from veins found on Keno and Galena Hills. It dips west rather than east and has a right-hand displacement rather than left-hand, thus it resembles Galena Hill cross-faulting rather than vein faulting. Nevertheless the various structures in the system show ample evidence of mineralization over at least 4,000 feet of strike length and definitely warrant further development. The possibility of finding enough silver-lead ore in the various vein structures for a small high-grade mining operation is excellent.

Although some of the mineralization in the Middlecoff workings had a low silver to lead ratio the fact that better silver to lead ratio material has been found in the same workings and further north on surface indicates that the overall silver to lead ratio of the system might average 2 to 1, or 3 to 1. Because of difficult surface conditions, particularly on the north side of Bighorn Gulch, further surface development should be kept to the minimum necessary to define underground targets.

Further development of the area falls naturally into two parts; one, underground exploration in the Middlecoff workings plus limited surface exploration along the vein

to the south; and two, surface exploration on the vein system north of Bighorn Gulch to define targets for underground developments.

The following program is recommended -

Stage I

1. Repair the secondary road and add bunkhouse and office facilities to the present camp to accommodate a total of 13 labourers, a camp manager and a geologist.....\$30,000.
2. Rehabilitate the lower and middle adit portals by bulldozing away the sloughed area and slash the sides and back of the middle portal to a size that will allow access for modern haulage equipment.....\$12,000.
3. Prospect the vein zone south of the Middlecoff workings by soil sampling on a 100 foot grid pattern...\$ 3,000.
4. Use an Atlas Copco overburden drill to explore the Main Zone and Johnson Vein along strike. Holes should be drilled to intersect the veins between 50 and 100 feet below surface.

Further use the overburden drill to explore, in a reconnaissance fashion, for mineralized sections in other veins in the system.....\$30,000.

Total cost of Stage I.....\$75,000.

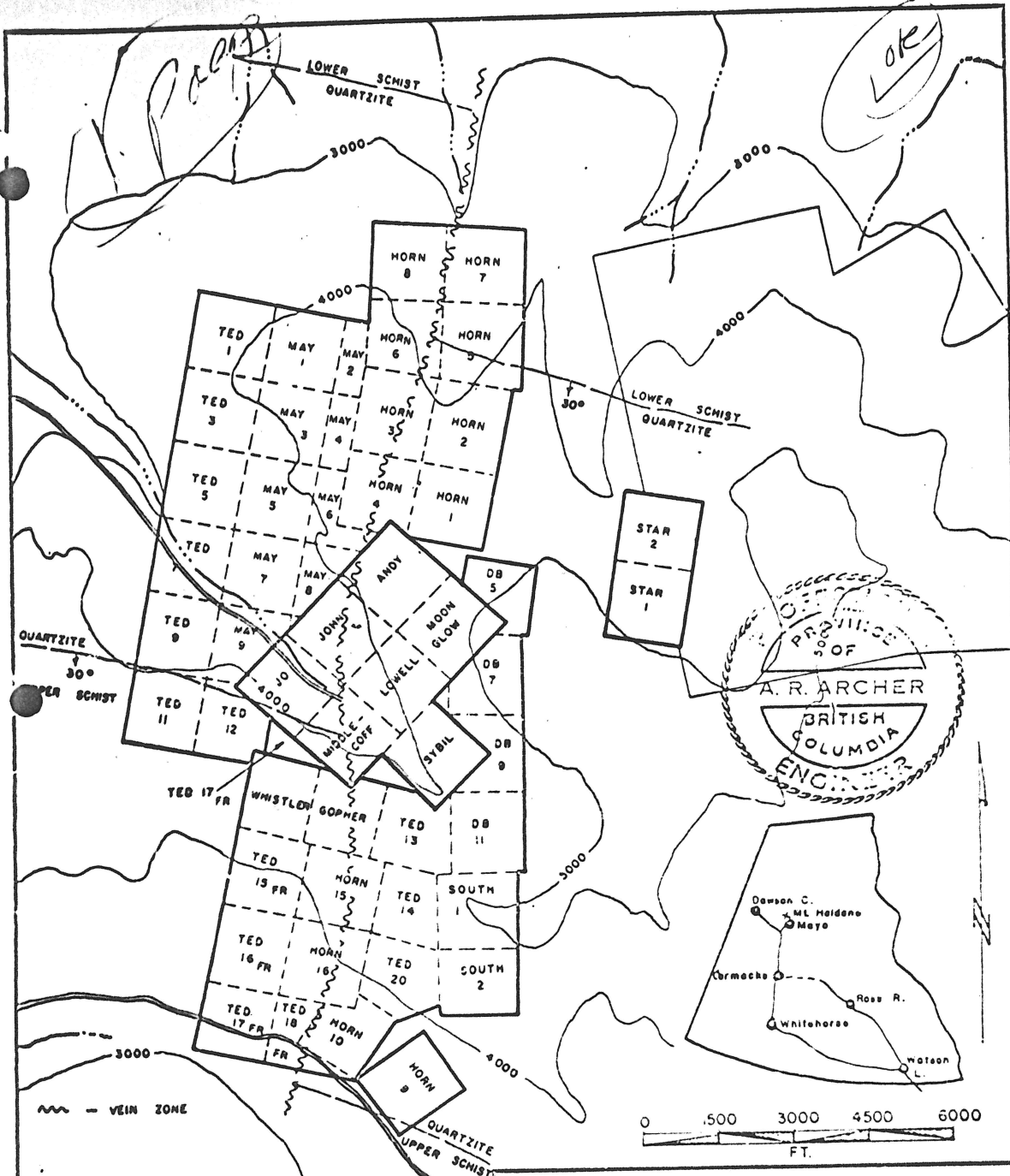
Stage 2

1. Explore for mineralized sub-parallel vein shears in the ribs of both adit levels by short cross-cuts and/or long-hole percussion drilling. Drift the middle adit a further 200 feet holding to the footwall side of the swing fault.....\$35,000.

2. Drive short adits into the two best areas located by overburden drilling north of Bighorn Gulch and drift each vein 400 feet, for a total footage of approximately 1,200 feet.....\$120,000.

3. Overburden drill and/or bulldoze anomalous areas found by soil sampling south of the Middle-coff workings.....\$20,000.

Total cost of Stage 2.....\$175,000.



This map is drawn from information believed to be reliable but individual ownership and exact location are not certified.

<b>HALDANE PROPERTY</b>		
<b>ARCHER &amp; CATHRO</b> Consulting Geological Engineers		
DATE	24 June 1966	DWG. No.
DRAWN	M.A. Adams	
SCALE	As Shown	



