PHONE: OFFICE 667-2819
RES. 668-2822
AREA CODE 403

R. G. HILKER
LIMITED
CONSULTING GEOLOGIST . . . PROFESSIONAL ENGINEER
P.O. Box 566
WHITEHORSE, YUKON TERRITORY
"LAND OF THE MIDNIGHT SUN"

TUNGSTEN PROSPECT

DUBLIN GULCH AND HAGGART CREEK

YUKON TERRITORY

MR. CONRAD PROVENCHER

PROPERTY EVALUATION

By

R. G. HILKER LTD. P. ENG.

WHITEHORSE, YUKON TERRITORY

JULY 29TH, 1969

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of

$ 1,700

D B Craig

~~Resident Geologist~~ or
~~Resident Mining Engineer~~

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act.

Commissioner of Yukon Territory

TABLE OF CONTENTS

INTRODUCTION

A property examination and evaluation was conducted on the Haggart Creek tungsten showings on June 29th, 1969, by R. G. Hilker who was accompanied by Conrad Provencher. Access to the property during the examination was by helicopter that landed on the PAN #1 claim. The eluvial granite-granodiorite that contains sheelite was investigated and sampled.

Haggart Creek and Dublin Gulch has been famous since the Klondike Gold Rush Days of 1898, as a producer of placer gold and a latter years placer scheelite for the tungsten content. The eluvial deposite that contain scheelite is in a decomposed granite and these showings were visited. Several trenches have been excavated by crawler tractor and were visited during the examination.

After examining the decomposed granite in the pits the writer and Mr. Provencher walked down Dublin Gulch to the Mr. Fred Taylor placer operation, and the boulder material was noted in the creek bed as the traverse was walked.

The Dublin Gulch has been investigated by a great number of geologists and notably the excellent work that has been done by the Geological Survey of Canada. Special reference at this time should be made to H. W. Little in his "Tungsten Deposits of Canada" published in 1959; the descriptions by R. W. Boyle in his Bulletin No. 111 on "The Geology, Geochemistry and Origin of the Lead-Zinc Silver Deposits of the Keno Galena Hill Area in the Yukon Territory", and D. D. Cairns has done considerable work also.

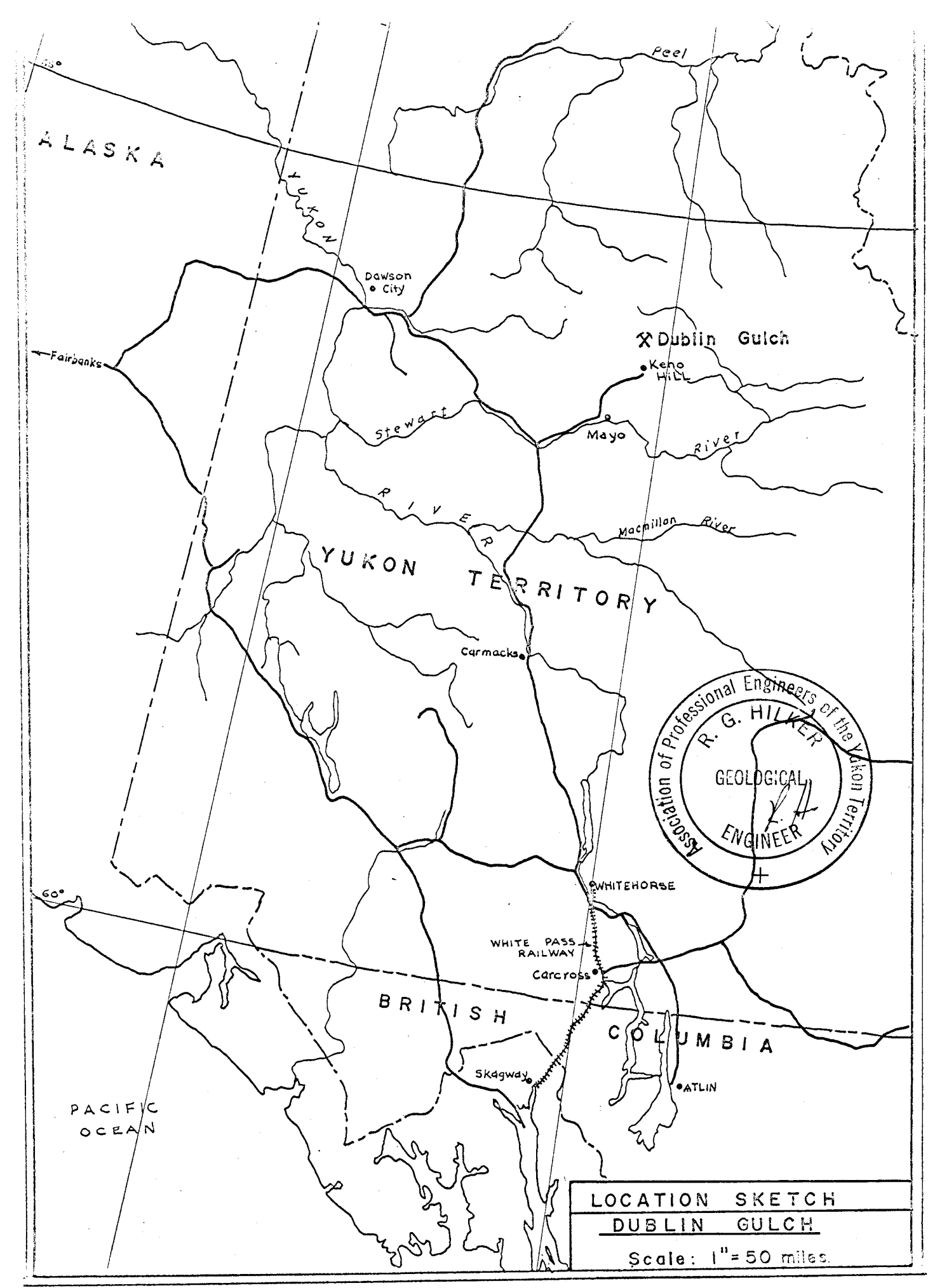
...2

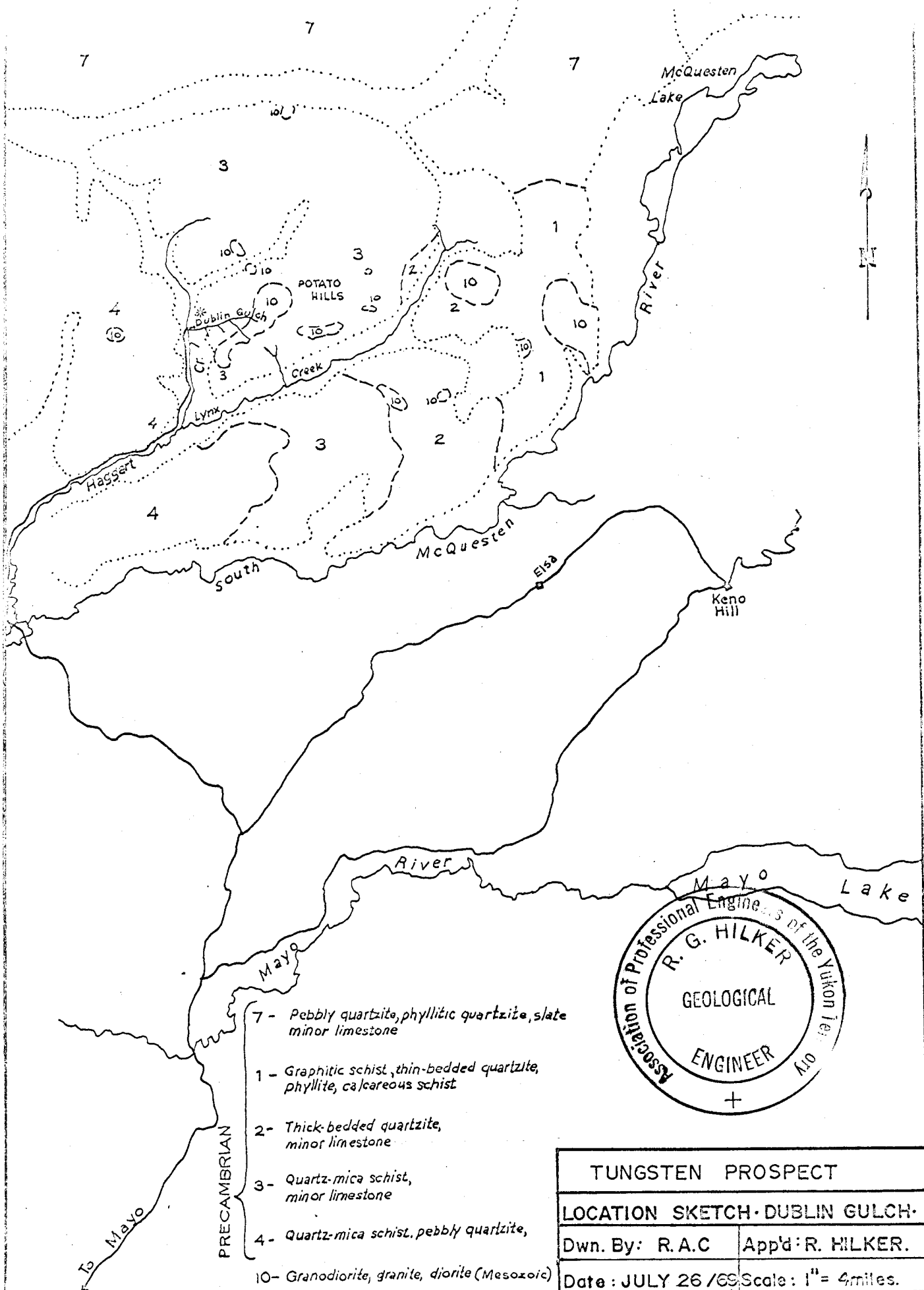
LOCATION

The claim group is located on Sheet No. 106-D-4 and consists of the PAN and ARPA claims. Access to the claim group is by Haggart Creek and Dublin Gulch on a truck-road. The South McQuesten road starts approximately 12 miles west of the United Keno Hill Camp at Elsa, and turns north from the main Elsa-Mayo road. The road follows around the south flank of Mount Haldane and goes approximately westerly and intersects Haggart Creek, follows up Haggart Creek to Dublin Gulch and terminates at the Fred Taylor placer operation. The distance from the Elsa-Mayo road into Mr. Taylor's is approximately 20 miles. This road is passable with an ordinary pickup truck, but bad spots can be encountered in places on Haggart Creek. Haggart Creek is located on the Topography Sheet No. 105-M of the Mayo District, and joins to the north on the Sheet No. 106-D. Haggart Creek, Dublin Gulch and the Potato Hills are located on the two previously-mentioned sheets (note the Location Sketch). Dublin Gulch is located at approximately latitude 64° and 3 minutes and longitude 135° and 45 minutes.

Road access to the Mayo area from the capital city of Whitehorse, is on the Whitehorse-Mayo road that is a total distance of approximately 245 miles in a northerly direction. This is an all-weather road and is used by the Clinton Creek asbestos property in the Dawson City area to haul asbestos fibre south by truck convoys to Whitehorse and the railhead. This same road is to be used in the fall of 1969 by the Anvil Mining Corporation, from Carmacks south to Whitehorse, for the haulage of concentrate from the Ross River area.

.../3


Peel
ALASKA
YUKON
Dawson City
Dublin Gulch
Keno Hill
Fairbanks
Stewart
Mayo
River
RIVER
Macmillan River
YUKON TERRITORY
Carmacks
Association of Professional Engineers of the Yukon Territory
R. G. HILKER
GEOLOGICAL
ENGINEER
WHITEHORSE
WHITE PASS RAILWAY
Carcross
BRITISH COLUMBIA
Skagway
ATLIN
PACIFIC OCEAN
LOCATION SKETCH
DUBLIN GULCH
Scale: 1" = 50 miles.



TUNGSTEN PROSPECT	
LOCATION SKETCH · DUBLIN GULCH ·	
Dwn. By: R.A.C	App'd: R. HILKER.
Date: JULY 26/65	Scale: 1" = 4 miles.

HISTORY

The Haggart Creek and Dublin Gulch have contributed to placer gold-mining operations in the Mayo area since 1898, at which time a great number of prospectors came into the area for the yellow metal, gold. The discovery of gold on Haggart Creek was described by Cairns (1915) as follows:

> "Gold is reported to have been first found on Haggart Creek in 1895 and in 1896. The creek is known to have been prospected by Thomas Nelson who found gold in the canyong 4 to 4½ miles from the mouth; after him the stream was named Nelson Creek. The same year, Thomas Haggart built two cabins on the creek, and one on Dublin Gulch, from which to prospect and mine. In 1898, Thomas Haggart, Thomas Nelson, Peter Haggart and Warren Hiatt started from Dawson for Nelson Creek, but en route separated into two parties, and Peter Haggart and Warren Hiatt, reaching their destination first, staked Discovery, and re-named the stream after Peter Haggart. Since then, there has each year been more or less mining and prospecting along the creek."

Placer mining is still being carried on by Mr. Fred Taylor of Mayo, and Mr. George Smashnuk of Mayo, on Haggart Creek and Dublin Gulch. The portion of Dublin Gulch that dumps into Haggart Creek was first staked by John Suttles, who worked his ground from 1898 to 1915, and then disposed of the placer operation to the Cantin brothers who worked the ground from 1915 to the 1920's.

During the First World War tungsten was a valued element for the war effort and it was about 1916 that scheelite was recovered in the placer operations. The scheelite was concentrated in the sluice-boxes, sorted and shipped as concentrates as a by-product of the gold placer-mining operation. In 1936 Mr. Fred Taylor staked the first mile of Dublin Gulch, and is the only placer operator presently operating.

.../4

The Potato Hills, Dublin Gulch and Haggart Creek has had four stages of placer and lode mining and prospecting:

(1) From 1898 to the First World War, placer gold.

(2) From approximately 1898 to 1918, prospecting for the placer gold source, and discoveries of quartz veins carrying arsenopyrite and gold were made.

(3) 1916 to the present -- placer, scheelite and prospecting for scheelite-bearing veins.

(4) There have been a number of companies who have prospected the area for silver and gold veins, notably United Keno Hill Mines Ltd. in 1960, Mayo Silver Mines Ltd., 1962 through 1965, Rio Plata Mines, 1965-1966? and finally, Peso Silver Mines Ltd.

Perhaps the present time could be described as a fifth stage, as tungsten has become in short supply and a valuable element. The area should again become prospected and explored for both placer and vein-type of tungsten occurrences.

There has been considerable work done by the Geological Survey of Canada during the past 70-odd years on the tungsten and placer gold in the Haggart Creek and Dublin Gulch areas. Reference is made to the bibliography contained in the Appendix of this report.

CLAIMS

The following claims were searched at the Mayo Mining Recorder's Office, and are located on Sheet No. 106-D-4 of the Mayo Mining Division of the Yukon Territory:

Claim Name	Grant No.	Anniversary Date
Pan 1	Y27203	June 25, 1971
2-20	Y27204-27222 (incl)	June 25, 1970
21-36	Y27233-27248 (incl)	June 27, 1970
37-68	Y31528-31559 (incl)	October 25, 1969

.../5

Registered Owners - Instrument #4979 dated June 25th, 1968 and registered January 6th, 1969.

Conrad Provencher - 60% interest, and
John H. Boyce - 40% interest

The following Yukon Quartz mineral claims are part of the property:

Arpa 1-8	Y31687-Y31694 (incl)	February 28, 1970
Registered Owner - W. Jones		
Arpa 9-16	Y31695-Y31702 (incl)	February 28, 1970
Registered Owner - Ray Conant		
Arpa 17-24	Y31703-Y31710 (incl)	February 28, 1970
Registered Owner - E. Hager		
Arpa 25-32	Y31711-Y31718 (incl)	February 28, 1970
Registered Owner - L. Johnny		
Arpa 33-40	Y31719-Y31726 (incl)	February 28, 1970
Registered Owner - A. Hanny		
Arpa 57-64	Y31727-Y31734 (incl)	February 28, 1970
Registered Owner - L. Havanek		
Arpa 65-72	Y31735-Y31742 (incl)	February 28, 1970
Registered Owner - F. Henney		
Arpa 73-80	Y31743-Y31750 (incl)	February 28, 1970
Registered Owner - R. Lancaster		
Arpa 81-88	Y31751-Y31758 (incl)	February 28, 1970
Registered Owner - P. J. Hanson		

(Signed transfers to Conrad Provencher are being held for the Arpa 1 - 40 and 57 - 88).

The tungsten property consists of a total of 146 claims in the Haggart Creek-Dublin Gulch-Potato Hill area at (June 30, 1969).

The claims cover the Ray Gulch and two adjoining unnamed pups to the west that drain into Lynx Creek and contain known placer scheelite, also the Bawn Boy Gulch, all of the Olive Pup, Stewart Pup,

Eagle Pup, Suttle Pup and a portion of the Platinum Pup. The claim group covers all of Dublin Gulch and the north end of Haggart Creek up to where Secret Creek flows into Haggart Creek.

CLAIMS NOT OWNED (in TAM claim group)

There is one Crown Grant Claim, the Olive, which is Lot #11, Group 105A, and is located on the east side of Olive Pup. The registered owners are L. A. Trembley and Agnes J. Tinsley. On Platinum Pup there are located the Way #1-3 fractions, Grant Nos. 82558-82560 and the Way #4 fraction, Grant No. 82561, and the registered owner is Peso Silver Mines Ltd. (N.P.L.) and the anniversary date is August 22nd, 1969, on this claim. At the headwaters of Haggart Creek there is the Goldore #1, Grant No. Y31256; the registered owner is W. Makicky, and the anniversary date of this claim is September 9, 1969.

A number of placer leases are staked along the north portion of Haggart Creek and on Dublin Gulch (note the placer claim sketch in the pocket). The owners of the placer leases have all given written permission to overlap the placer leases with the Yukon Quartz Mineral claims. This written permission is to be registered in the near future at the Mayo Recorder's Office.

REGIONAL GEOLOGY

A Geology sketch after the Geology of Dublin Gulch, by Boyle (Bulletin #111, 1965) is contained in the pocket of this Report.

...7

The general rock types in the Potato Hills and Haggart Creek areas are a Cretaceous granite-granodiorite stock with minor portions of the intrusive protruding through the surrounding metamorphic and sedimentary rocks. A series of the Yukon Group of rocks located to the north-west and south of the granite intrusive contains quartzite, phyllite, graphitic schist, and quartz-mica schist. To the east of the Dublin Gulch and the granite intrusive there is a series of quartzite, phyllite, graphitic schist, limestone, quartz-mica schist and skarn. Further east of this group of rocks there is a quartzite, phyllite and quartz-mica schist. These have been mapped by the G.S.C. as being Precambrian and/or Palaeozoic. The upper part of Dublin Gulch, Bawn Boy Gulch and a part of Olive Pup extends into the granite-granodiorite intrusive. The headwaters of Ray Gulch are located near a small granite-granodiorite intrusive that is located to the west of the gulch. The Cretaceous granite-granodiorite strikes approximately north-east (N45°E) and with a strike length of approximately 3¼ miles and thickens on the north-easterly end to approximately one mile, and tapers off to the southwest end to an approximate width of one-half mile. Numerous small granite intrusives are located to the north of Dublin Gulch in the quartzite phyllite series of the Yukon Group.

The headwaters of Ray Gulch are located at about the 4,600-foot level and the headwaters of Bawn Boy Gulch and Dublin Gulch are located approximately elevation 4,200 feet. The terrain slopes off to the north, the south and to the west. Haggart Creek and the mouth of Dublin Gulch is at approximately elevation 2,700 feet, and the

.../8

extreme part of Potato Hill is at an elevation approximately 5,000 feet.

The granite-granodiorite at the head of Dublin Gulch and Bawn Boy Gulch is highly decomposed and contains tungsten in the form of scheelite. The decomposed or residual granite-granodiorite near the surface is stained an iron-brown or light-brown color, and there are numerous quartz veins and/or joint or fracture fillings that are quartz filled. It was noted that the veins are of a clear quartz and are deposited perpendicular to the strike of the vein. During the traverse down Dublin Gulch, at approximately the mouth of Bawn Boy Gulch, large angular rocks which can be described as felsenmeer in size are deposited along the gulch. The rock is a gray-colored granite and was noted to contain numerous quartz veins. The quartz was a milky-white variety and different from the clear quartz veins contained further up the Dublin Gulch in the decomposed granite.

The decomposed granite-granodiorite contains biotite, in parts quartz and feldspar. Texture of the feldspar varies from fine to porphyritic. Orthoclase-microcline and some plagioclase feldspar is present. Quartz veins up to ¼-inch thick pinch and swell in the granite-granodiorite. Surface alteration and weathering has reduced the first ten feet of the intrusive into a residual form. In parts the original granite-granodiorite has not broken down, and solid pieces of rock occur in the residual material. In parts of the solid rock cut by quartz veins weathering minerals are present in the form of a pale-green fibrous talc (possible saussurite). The quartz

.../9

veins in the intrusive carry the scheelite mineralization. The quartz veins in the intrusive rock is possibly fracture and joint filling and stockwork in structure.

During the past 53 years tungsten in the form of scheelite and wolframite has been recovered in the placer operations, notably in the Fred Taylor operation, who supplied the writer with some near-perfect wolframite crystals. The Dublin Gulch and surrounding drainage has a variety of tungsten occurrences in the placer, the eluvial or residual deposits, in the veins and pegmatites of the granite-granodiorite, and in skarn zones contacting with a sedimentary limestone in the metamorphic series rocks located in this area. The main sources of tungsten to date has been in the placer operations on Dublin Gulch and Haggart Creek.

.../10

ECONOMIC GEOLOGY

The following stages of mineralization are worthy of additional exploration work to prove up economic deposits:

1. Tungsten Deposits.

   (a) Quartz veins in granite with scheelite mineralization.

   (b) Eluvial or residual granite with quartz veins bearing scheelite.

   (c) Pegmatitic granites bearing scheelite.

   (d) Skarns with scheelite present near contacts of the granite.

2. Placer gold and scheelite in the gulches and pups adjoining Dublin Gulch and Haggart Creek.

3. Quartz-arsenopyrite-gold vein material in situ.

Tungsten is marketed in short ton units of WO_3 which is tungstic oxide. A short ton unit is 1% of a short ton, or 20 pounds of WO_3. Reduced supplies of tungsten from Communist countries, mainly China, have increased the demand for tungsten and contributed to a price increase in the metal. The two principal minerals of tungsten are wolframite ($FeMn\ WO_4$) and scheelite ($Ca\ WO_4$). Wolframite is commonly formed in granite and pegmatite veins under pneumatolytic conditions (derived from, or modified by, substances in a gaseous condition). Scheelite is formed under hydro-thermal conditions in pegmatite veins or in veins associated with granites or gneiss. Scheelite forms in tetragonal-pyramidal crystal form. Wolframite crystal system is monoclinic.

The scheelite and wolframite in the Dublin Gulch area occurs as primary and residual deposits and placer. No wolframite was ob-

.../11

served in place, but it is found in abundance in the Fred Taylor placer operation approximately one mile below the mouth of Bawn Boy Gulch. The granite-granodiorite igneous intrusive stock with the quartz veins may possibly be a stockworks. The primary scheelite deposits would include any quartz vein stockworks, quartz pegmatites and replacement type of skarn bodies. The secondary concentrations of scheelite occur as eluvial or residual deposits that are contained in the highly-decomposed granite-granodiorites which overlay a more competent igneous intrusive rock within the stock. Primary wolframite may possibly occur in quartz veins and the granite-granodiorite pegmatites but this type of occurrence was not observed. The presently located residual deposits are between Bawn Boy Gulch and Cascallan Gulch and this is at the headwaters of Dublin Gulch. There have been a number of crawler-tractor trenches dug in this area and all have encountered the decomposed granite. This area is located mainly on the following Yukon Quartz Mineral Claims: Pan #1, Pan #2, Pan #9, partially on Pan #10, and Pan #18. It is estimated that this covers roughly four claims, or approximately 200 acres. The decomposed granite appears to be occurring near the north-west edge of the granite-granodiorite igneous intrusive and in contact with the quartzites, phyllites and schists of the Yukon Group. As previously noted in the REGIONAL GEOLOGY a fresh angular gray-colored granite occurs along the beds of the upper parts of Dublin Gulch, approximately between Stewart Pup and Bawn Boy Gulch. The large angular felsenmeer granite could possibly be transported from close to the source. If this is so, then

.../12

Dublin Gulch contains considerable granite and this granite may have been frost-heaved vertically to the surface. This is a common type of frost action in the Yukon Territory. This is a geological problem that will require further investigation of the granites to determine whether there are two ages of granites in the Dublin Gulch area in the presently-mapped Cretaceous stock, or if there has been more than one stage of granitization within the stock. This would point to a possible area for further exploration to determine where and how the decomposed granite is occurring. It can be expected that geological exploration will prove a greater quantity of decomposed granite than presently outlined on the four previously-mentioned Pan claims that contain approximately 200 acres of the residual material. This residual material has been assayed and found to contain the following quantities of WO_3:

Sample No.	WO_3	Description of Sample
3701	Tr	Pieces of granite from the helo-pad trench in the decomposed granite.
3702	0.14	Decomposed granite at helo-pad.
3703	Tr	Decomposed granite from the seven hand-dug pits by Conrad Provencher.
3704	.02	From the six hand-dug pits; these are hard samples of the granite.
3705	.06	From the helo-pad trench; these are hard samples of granite that contain quartz veins.
3706	0.14	From the crawler-tractor trench next to the hand-dug trenches; these are from hard samples that contain quartz veins in the decomposed granite.

The placer tungsten in the form of scheelite and wolframite has been outlined by Boyle in his report (1965), and occurs in the following areas: On Ray Gulch and the two pups to the west that join

.../13

into Lynx Creek; Bawn Boy Gulch; Olive, Stewart, Eagle and Suttle Pups; Dublin Gulch, and Haggart Creek. The previously stated drainage system contains potential economic bearing gravels with scheelite and wolframite for placer type of mining. Dublin Gulch and Haggart Creek are held under placer leases by various owners; however, some of the pups and notably Ray Gulch are not held under placer leases and could be acquired for the Tungsten & Associated Minerals Co. Ltd. It is reported by Boyle that there is tungsten-bearing skarns at the headwaters of Ray Gulch and this would be a primary source of a hydrothermal replacement type of occurrence of scheelite within a metamorphic rock type of skarn.

The arsenopyrite and gold bearing veins occur in a northeasterly direction from Eagle Pup to Bawn Boy Gulch and are shown on the enclosed Geology Map that is after Boyle from his report (1965).

.../14

CONCENTRATING & MARKETING

The following estimates will outline the economics of producing a WO_3 scheelite concentrate from the residual material in the Dublin Gulch area:

Tonnage & Yardage - Residual Granite on Pan 1-2-16-19 Claims.

$$200 \text{ acres} \times \frac{43{,}560 \text{ ft}^2}{\text{acres}} \times 10 \text{ ft.} \times \frac{1}{14 \text{ ft}^3/\text{ton}} = 6{,}223{,}000 \text{ tons}$$

$$\text{or} \quad \frac{87{,}120{,}000 \text{ ft}^3}{27 \text{ ft}^3/\text{yd}^3} = 3{,}226{,}000 \text{ yd}^3$$

Possible Grade

estimated 0.14% WO_3/ton of residual granite (10 feet deep from surface)

0.14 x 2,000 lbs. = 2.8 lbs of WO_3 per ton of residual granite at surface.

Possible Ore

$$6{,}223{,}000 \text{ tons} \times \frac{2.8 \text{ lbs}}{\text{ton}} = 17{,}424{,}000 \text{ lbs } WO_3 \text{ (scheelite)}$$

estimate 80% recovery = 80% x 17,424,000 = 13,940,000 lbs recoverable WO_3

S.T.U. (short ton units 1% of short ton, or 20 lbs.) of WO_3 (tungstic oxide) scheelite.

$$\frac{13{,}940{,}000 \text{ lbs}}{20 \text{ lbs}} = 697{,}000 \text{ S.T.U. } WO_3$$

Value

$43.00/S.T.U. of 697,000 S.T.U.	$29,970,000 (U.S.)
July 25/69 - Premium on U.S. dollar 7.5¢	2,247,800
Total Value (Canadian funds)	$32,207,800

Production Costs

The scope of this report will not cover capital outlay for equipment, milling, camp, testing or access. However, an estimate will be made for the approximate production costs of WO_3 (scheelite)

.../15

from the residual ores. Based on a 2,400 ton-per-day mill and open pit operation:

		$ Canadian
A/ 1.	Open Pit Mining	0.50
2.	Milling	1.50
3.	Exploration	0.15
4.	Staff	0.10
5.	Maintenance	0.15
6.	Electrical	0.07
7.	Water Supply	0.05
8.	Contingencies	0.10
		$2.62/ton of ore

Note: Milling should produce a concentrate between 65% and 75% WO_3 (jig-table and possibly flotation)

B/ 1. Transportation per ton of concentrate (100 S.T.U. of WO_3 scheelite) 270 miles - Dublin Gulch to Whitehorse, Y.T. 10 cents/ton mile $27.00/ton

2. Transportation per ton of concentrate Whitehorse, Y.T. to Seattle, Wash., U.S.A. $19.00/ton

Total cost of transportation ..... $46.00/ton of concentrate

C/ Mine Life at 2,400 tons/day with 6,223,000 tons ore

1. 2,400 tons/day for 292 operating mill days, total of 700,000 tons of ore/year.

2. Therefore - $\frac{6,223,000 \text{ tons}}{700,000 \text{ tons/year}}$ ..... 8.89 years

Cash Flow

1. Cost for mining and milling 6,223,000 tons of ore @ $2.62 per ton $16,304,000

2. Transportation of 697,000 S.T.U. or 6,970 tons of concentrate @ $46.00/ton 320,000

Total $16,624,000

3. Operating Costs/year based on 8.89 years mine life and $16,624,000 costs ..... $ 1,870,000

4. Possible capital outlay, depreciation, interest on loan, head office, engineering & consulting expenses ..... $ 7,000,000

.../16

CONCLUSIONS

The Dublin Gulch area contains a large quantity of residual granite that appears to contain economic grade of scheelite to warrant a mining operation. A good bulk sampling program must be done as the next stage of exploration on the decomposed granite, to determine the overall grade of tungstic oxide (WO_3) that is contained in the residual material. The sampling method for the property examination was only random samples, but it did indicate that the residual material carries economic quantities of the scheelite. It is the opinion of the author that 0.14 percent WO_3 content per ton of residual granite is an economic grade to mine at a profit.

The extremely large area of decomposed granite, which has been estimated at approximately 200 acres covering four claims, and at a depth of 10 feet in thickness, would be easily open-pit mineable. The residual material could be scooped off surface by a large-capacity (5½-yard) front-end loader, loaded into trucks and hauled to the mill, or it could be loaded onto a conveyor belt and moved to a milling operation. The overburden covering the decomposed granite was noted to be one foot.

Dublin Gulch has very little water during the summer months, and the available water is being used downstream by the Fred Taylor placer operation. It is suggested at this time that a water study should be considered during the stages of exploration, for continuous pumping of water to the top of Dublin Gulch. A good supply of water would be necessary if a mining operation commenced. Water pumping could be done with a large-diameter water line, approximately 10-12

.../17

inches in diameter, and moving about 1,000 gallons per minute.

The greatest economic potential of the Dublin Gulch area is the residual material where scheelite mineralization occurs. The stages of exploration to follow would be to prove tonnage and grade of the residual material, and make a feasibility study for a mining and milling operation. The gold and placer scheelite and the arsenopyrite gold-bearing vein material could be explored in detail, after exploration is completed on the residual material. For the present the residual material will be the most lucrative and most profitable on which to concentrate exploration efforts and exploration dollars. This area does not have too severe weather conditions or snowfall to prevent year-round work; it could be expected that a year-round open pit mining and milling operation is quite possible and would not be hampered by winter weather conditions in the Yukon Territory.

.../18

SCOPE OF WORK

It will be necessary to acquire bulk samples from the residual material exposed on the Pan claims at the headwaters of Dublin Gulch. Several methods of bulk sampling can be utilized:

1. By using a backhoe digger on a crawler-type tractor (about the size of a D-4 caterpillar).
2. By augering large-diameter holes.
3. By bull-dozing trenches.

It would be more representative to dig a series of small holes rather than one large cut-type of trench that now exists on the property; therefore, it is recommended that a backhoe digger be employed to dig a close-spaced series of test pits throughout the 200 acres of exposed residual scheelite-bearing material. These bulk samples would then be used for assaying to determine average grade and if economic WO_3 grade is proven the samples can be used for various mill tests. The testing would consist of jigs, table and possible flotation; the recovery and concentrate of WO_3 is to be determined. This test work could be done in Vancouver, B.C., or it may be possible to purchase the necessary equipment to do the testing at the site on Dublin Gulch.

A good petrographic study of the granites in the area should be made to determine the type of granitization and possibly the reason for the decomposition of the granite. The microscope work would also determine the scheelite in the quartz vein and any other interesting commercial mineralization that might be present. This

.../19

type of work should be done on both the competent pieces of granite that still exist in the decomposed residual material, and also in the granite float that occurs in Dublin Gulch. The milky-white quartz veins should be checked for possible occurrences of gold and tungsten minerals.

A study should be started on a dependable water supply, consisting of the distance the water would have to be moved, as well as the vertical height it would have to be pumped. It would be necessary then to call on a good Civil Engineering consulting firm such as Golder, Brawner & Associates Ltd., Vancouver, B.C., to design a pumping system and a pipe-line.

The next section of this report will deal with the actual recommendations and the amount of money to be spent. The recommendation for a line grid, and various surveys, will assist in delineating the granite in the sediments, as well as in extending the source of the decomposed granite.

A good transit type of survey control will be required to lay out all the necessary survey stations in the area to assist in accurate and good control on all exploration work. The survey grid will delineate the boundaries of the decomposed granite so correct tonnage calculations can be made at a latter date.

.../20

RECOMMENDATIONS

The following exploration program is recommended for the "Tam" tungsten property:

Geological Work to be Performed	Dollars
Linecutting Grid - 75 miles @ $85/mile	$ 6,375
Geological Mapping - 75 miles @ $100/mile	7,500
Scintilometer Survey - 75 miles @ $40/mile	3,000
Geochemical Survey - 75 miles @ $100/mile	7,500
Soil Sample Determinations - 2600 samples @ $2.00	5,200
Engineering & Surveying - 3 mos @ $3,000/month	9,000
Staff - 3 months @ $3,000/month	9,000
Geological Consultant	10,000
Petrographic Study	2,000
	$59,575
Physical	
Bulk Sampling - backhoe and/or auger drill, 30 days @ $400/day	$12,000
Assaying split samples - 1000 @ $7.00	7,000
	$19,000
Mill Testing	
Specific gravity checks, jig-table & flotation tests for recovery of scheelite and % of concentrate possible	$10,000
General	
Transportation	$10,000
Access road repairs & extension	10,000
Camp - sleeping, kitchen, shower facilities	5,000
Catering services	10,000
15% Expediting Services	6,000
Office & Administration	5,000
Water Supply Study	5,000
	$51,000
Total	$129,575
10% Contingencies	13,000
	$142,575

CERTIFICATION

I, ROBERT G. HILKER of #6 Chalet Crescant Hillcrest, in the City of Whitehorse, in the Yukon Territory, DO HEREBY CERTIFY:

1. THAT I am a Consulting Geologist, with an office located at #8 Northern Metalic Building and postal address P.O. Box 566, in the City of Whitehorse, in the Yukon Territory.

2. THAT I am a graduate of the Michigan Technilogical University located at Houghton, Michigan, U.S.A., where I obtained a Bachelor of Science Degree in Geological Engineering (Exploration Option) in 1962.

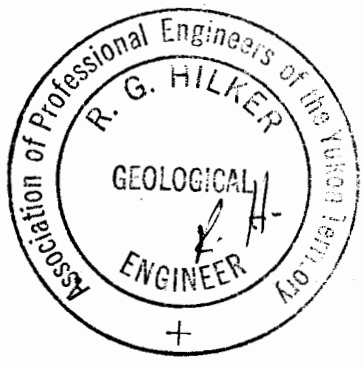
3. THAT I am a registered member in good standing of the Association of Professional Engineers of the Yukon Territory and registered with a non-residence license in the Association of Professional Engineers of the Province of British Columbia.

4. THAT I have practiced my profession as an engineer and geologist for the past seven years.

5. THAT I have personally examined the claims held by Mr. Conrad Provencher in the Dublin Gulch and the Haggart Creek area of the Yukon Territory on June 29, 1969.

6. THAT I have no direct or indirect interests in any of the mineral claims, or in any of the securities held by Conrad Provencher nor do I expect to receive any.

DATED this 31st day of October, A.D. 1969.



R. G. HILKER, P. ENG.

A P P E N D I X

The following data is from the CANADIAN MINERALS YEAR BOOK 1966, the section entitled "Tungsten", by G.P. Wigle of the Mineral Resources Division:

WORLD PRODUCTION AND TRADE

World mine production of tungsten ores and concentrates in 1966 contained an estimated 62 million pounds of tungsten of which some 34 million pounds came from communist countries.

Production of tungsten in the United States was estimated at about 9 million pounds in 1966. The principal producers are the Mining and Metals Division of Union Carbide Corporation, and American Metal Climax, Inc.

During 1966, the United States General Services Administration released from stockpile approximately 514,000 short-ton units of WO_3 in concentrates.

TABLE 3

World Production of Tungsten in Concentrates, 1964-66
(short tons, 60% WO_3 basis)

	1964	1965	1966e
Canada	--	3,113[r]	3,487
China	22,500	18,700	..
USSR	12,100	12,700	..
United States	9,244	7,949	..
South Korea	5,988	4,935	5,500
North Korea	4,400	4,850	..
Bolivia	2,285	2,043	2,600
Australia	1,860	2,197	2,300
Other countries	6,023	4,358	..
	64,400	60,845[r]	65,000

Source: U.S. Bureau of Mines Mineral Trade Notes, October 1966 and U.S. Bureau of Mines Commodity Data Summaries, January 1967 and company reports.

-- Nil; .. Not available; e Estimate; [r]Revised.

.../2

Canada became the leading supplier of tungsten concentrates to the United States in 1965, the year that Canada Tungsten came into production. Canada supplied 24 per cent of US imports of 3.5 million pounds of tungsten in 1965 and 23 per cent of the 4.2 million pounds in 1966.

Australian mine production of tungsten has been stimulated by the sustained improvement in prices of tungsten concentrates on world markets and by the relative stability introduced by securing long-term contracts covering the bulk of domestic production. During the first 6 months of 1966 Australia's production of 65% WO_3 concentrates was at the rate of about 2,100 tons a year.

The United Nations Committee on Tungsten held its fifth session in New York in May to review the tungsten market. The meeting, May 16 to 19, was attended by representatives of 25 countries for discussions of the desirability of intergovernment arrangements regarding the tungsten market and of establishing an international tungsten institute. Producers throughout the non-communist countries are anxious to maintain an orderly market for tungsten and avoid the erratic price changes which have been characteristic for tungsten concentrates.

CONSUMPTION AND USES

United States is the largest consumer of tungsten, used by some 15 steel producers and 22 firms producing metal powder and tungsten carbides. The major-use categories, approximate amounts, and proportions consumed are listed in an accompanying table

Consumption of Tungsten in the United States, 1965-66

Uses	1965 (000 lb)	1966 (000 lb)	By Use %
Carbides	6,240	7,550	45
Steel Alloys	3,190	3,850	23
Tungsten Metal	2,774	3,350	20
Other	1,664	2,010	12
Total	13,868	16,750	100

In high-temperature nonferrous and super-alloy fields, where temperature resistance requirements are beyond the ability of highly alloyed steels, tungsten is used as a base-alloy with varying amounts of cobalt, chromium, molybdenum, nickel or other refractory metals to produce a series of hard, heat- and corrosion- resistant alloys. High-

.../3

temperature alloys are used in structural components in temperature environments of 1,700°F and higher. High-tungsten alloys are used in jet and rocket engine parts, missile nose cone inserts, nozzle inserts, guidance vanes, turbine blades and combustion chamber liners. Examples of such applications are: nose cone insert castings made of an alloy containing 85 per cent tungsten and 15 per cent molybdenum and rocket-engine nozzle inserts of 98 per cent tungsten and 2 per cent molybdenum. Stellite, a nonferrous alloy containing from 5 to 20 per cent tungsten with cobalt and chromium, is used in welding rods for hard-facing and in high-speed tools.

PRICES

According to E & MJ Metal and Minerals Markets of July 14, 1969, Tungsten (WO_3) prices in the United States were:

	$ U.S.
Tungsten Ore, per short-ton unit of WO_3 (20 lbs), basis 65%, c.i.f. U.S. ports (premium paid for higher specifications)	
Wolfram	43.00
Scheelite	43.00

WHITEHORSE ASSAY OFFICE

P.O. BOX 348. WHITEHORSE. YUKON

RECEIVED FROM Mr. R. Hilker

SAMPLE NO.	GOLD OZ. PER TON	SILVER OZ. PER TON	Tungsten	Molybdenum
3701	-	-	TR	TR
3702	-	-	.14	TR
3703	-	-	TR	TR
3704	-	-	.02	TR
3705	-	-	.06	TR
3706	TR	.10	.14	TR

ASSAYER Geo. Sparling

REFERENCES

Bostock, H.S.; Mining Industry of Yukon, 1939 and 1940, G.S.C. mem. 234 (1941).

Boyle, R.W.; Geology and Geochemistry of Silver-Lead-Zinc Deposits of Keno Hill and Sourdough Hill, Y.T., G.S.C. Paper 55-30 (1956).

Boyle, R.W.; Lead-Zinc-Silver Loades of the Keno Hill-Galena Hill area, Yukon; Structural Geology of Canadian Ore Deposits, vol. 2 (1957a).

Boyle, R.W.; Geology, Geochemistry and Origin of the Lead-Zinc-Silver Deposits of the Keno Hill-Galena Hill area, Y.T., G.S.C. Bulletin 111 (1965).

Cairns, D.D.; Mayo Area, G.S.C. Sum. Rpt. 1915, Investigations and Mapping in Yukon Territory (1916).

Cairns, D.D.; G.S.C. Sum. Rpt. 1916 (1917).

Cockfield, W.E.; Mayo Area, Yukon, G.S.C. Sum. Rpt. 1918, pt. B (1919).

Green, L.H. and Roddick, J.A.; Dawson, Larsen & Nash Creek Map Areas, Y.T., G.S.C. Paper 62-7 (1962).

Green, L.H. and McTaggart, K.C.; Structural Studies in the Mayo District, Y.T.; Proc. Geol. Assoc. Can., Vol. 12 (1960).

Little, H.W.; Tungsten Deposits of Canada, G.S.C. Econ. Geol. Series 17 (1959).

* * * *

Haggart Creek

Claims Outline

N

Creek

Ann Pup

Cascellan Gulch

POTATO HILL

Gulch

Olive

Bewn Boy Gulch

Dublin

Eagle

Stewart

Pup

Suttle

Pup

Pup

Pup

Ray Gulch

Haggart

Platinum

Pup

Claims Outline

Creek

Lynx

LEGEND

MESOZOIC

CRETACEOUS

4 — Granodiorite, granite, and allied rocks

PRECAMBRIAN AND OR PALAEOZOIC

YUKON GROUP

3 — Quartzite, phyllite, graphitic schist, quartz-mica schist

2 — Quartzite, phyllite, graphitic schist, limestone, quartz-mica schist, skarn.

1 — Quartzite, phyllite, quartz-mica schist

Arsenopyrite-scorodite-gold veins

Cassiterite-tourmaline veins and lodes — Sn.

Placer (gold)

Placer (scheelite)

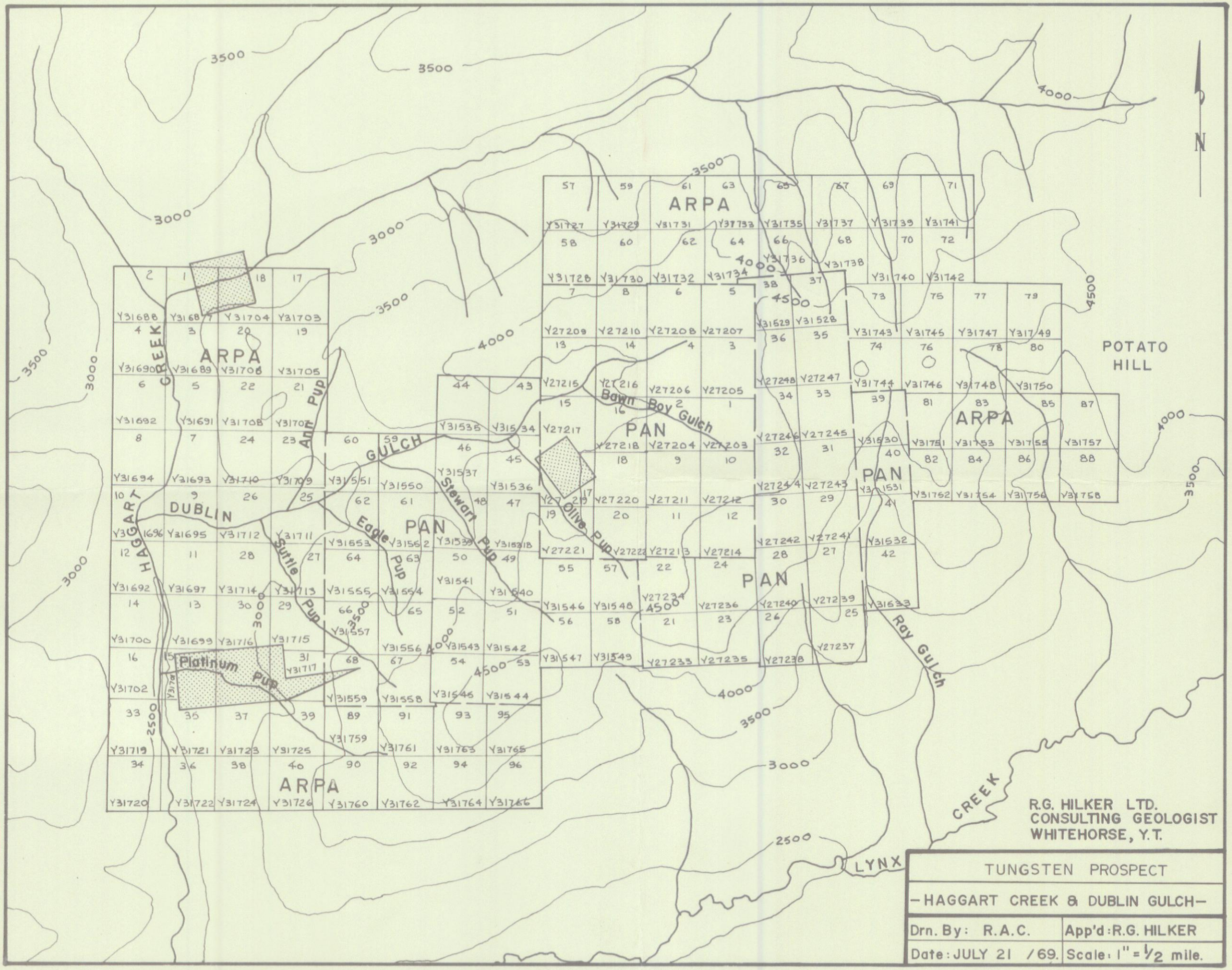
Bedding (inclined)

R.G. HILKER LTD.
CONSULTANT GEOLOGIST
WHITEHORSE, Y.T.

—TUNGSTEN PROSPECT—

-GEOLOGY OF DUBLIN GULCH AFTER R.W. BOYLE (1965) G.S.C.

Drn. By: R.A.C.	App'd: R.G. HILKER
Date: JULY 23 /69.	Scale: 1" = ½ mile.


3500
3000
4000
4500
N
ARPA
PAN
DUBLIN
POTATO HILL
HAGGART CREEK
Ann Pup
GULCH
Bawn Boy Gulch
Stewart Pup
Eagle Pup
Olive Pup
Surtle Pup
Platinum Pup
Ray Gulch
CREEK
LYNX
2500
R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.
TUNGSTEN PROSPECT
-HAGGART CREEK & DUBLIN GULCH-
Drn. By: R.A.C.
App'd: R.G. HILKER
Date: JULY 21 /69.
Scale: 1" = 1/2 mile.