

PRELIMINARY METALLURGICAL REPORT

(Report No. 1)

Concentration tests on antimony ore from the Property of Yukon Antimony Corporation Ltd. (NPL), near Robinson, Yukon Territory.

THE ORE SAMPLE

A bulk sample of antimony ore contained in six bags and having a gross weight of 500 pounds was delivered to Britton Research Laboratories for testwork. An additional bag with specimen rocks of about 100 pounds is to be kept for later mineralogical investigations.

A 50 pound ore head sample crushed to minus 10 mesh was prepared by Mr. Britton. Following chemical analysis was determined:

As	0.008 oz./ton
Ag	0.15 oz./ton
Sb	11.78 %
As	0.06 %
Pb	0.02 %
Cu	0.017 %
Fe	2.45 %
S	5.27 %
Zn	0.43 %

ORE GRINDING AND ROUGHER FLOTATION

The influence of ore fineness on the flotability of the antimony mineral (Stibnite) in roughing was determined.

The ore sample of minus 10 mesh size was ground to 44%, 56% and 70% minus 200 mesh.

The coarse grind to 44% -200 mesh was accomplished in 25 minutes and requires 8 KWH per ton of ore.

The rougher flotation was carried out in four stages using lead nitrate as activating agent, sodium isopropyl Xanthate as collector, Carnea 21 and Dawfroth 250. Sodium carbonate and sodium cyanide were added to the grinding mill.

In the following Table #1 are summarized the antimony recoveries and grades of the total rougher concentrates as well as the first rougher concentrates (first stage of roughing).

TABLE 1

Test	Ore grinding, % minus 200 mesh	1st Rougher Concentrate		Total rougher Concentrate	
		Sb %	Rec. %	Sb %	Rec. %
1	44	55.68	87.5	41.27	97.2
2	56	54.85	67.1	39.87	95.7
3	70	53.30	50.7	33.48	94.9

The first rougher concentrates show that fine one-stage grinding appreciably decreases the flotability of Stibnite. More selective grinding and rougher concentrate regrinding will be an important phase ahead of concentration procedures.

The detailed rougher flotation Test #1 with coarse ore grinding to 44% minus 200 mesh, summarizing the four rougher stages is given in Table #2.

TABLE 2

Product	Weight		Sb
	%	Sb %	Rec. %
a First Rougher Concentrate	17.98	55.68	87.5
b Second Rougher Concentrate	2.40	23.48	4.9
c Third Rougher Concentrate	2.00	12.35	2.2
d Fourth Rougher Concentrate	4.56	6.51	2.6
e Total Rougher Concentrate	26.94	41.27	97.2
f Total Tailing	73.06	0.44	2.8
g Calc. head	100.00	11.44	100.0
a+b Combined	20.38	51.89	92.4
a+b+c Combined	22.38	48.35	94.6

COMPLETE PRELIMINARY FLOTATION TEST

Based on above preliminary testwork, a complete flotation test was carried out with ore ground to 44% -200 mesh. Three cleaning stages follow the rougher flotation. Two final concentrates were taken off in the third cleaning stage.

The screen analysis of the head sample and the final concentrate are shown in Table #3, the flotation results in Table #4. Table #5 indicates the total reagent consumption in roughing and cleaning.

TABLE 3  
(Screen Analyses)

Mesh Size	Weight Percent	
	Head Sample	First Concentrate (final, preliminary)
+48	4.2	Nil
65	11.2	1.5
100	17.6	8.2
150	13.1	10.5
200	10.3	10.3
+325	11.9	13.9
-325	31.7	55.6
-200	43.6	69.5



TABLE 4  
(Test P4)

Product	Weight %	Assay %					Sb Rec. %
		Sb	As	Pb	Fe	SiO <sub>2</sub>	
a First Concentrate	18.78	57.19	0.14	0.45	0.88	13.40	92.2
b Second Concentrate	0.73	15.11					1.0
c Third Cl. Tailing	0.57	6.03					0.3
d Second Cl. Tailing	1.12	4.90					0.4
e First Cl. Tailing	5.69	3.96					2.0
f Rougher Tailing	73.11	0.66					4.1
g Calc. Head	100.00	11.65					100.0
<b>Calculated Results</b>							
a+b	"	"	19.51	55.62			93.2
a to c	"	"	20.08	54.21			93.9
a to d	"	"	21.20	51.60			93.9
a to e	"	"	26.89	41.52			95.9
b+c	"	"	1.30	11.13			1.2

	Flot. Time Minutes	Pulp Temp. °C	pH
Roughing	25	18	7.7
1st Cleaning	10	16	9.4 - 8.1
2nd Cleaning	8	15	9.5 - 7.8
3rd Cleaning	5	14	9.6

The total reagent consumption of the first complete test is summarized in Table #5.

**TABLE 5**  
(Reagent Consumption)

Reagents	Roughing lb./ton	Cleaning lb./ton
Lead nitrate	3.5	0.8
Sodium isopropyl Xanthate	0.18	0.03
Dowfroth 250	0.09	0.01
Carnax 21	0.2	-
Sodium Cyanide	0.2	0.1
Sodium Carbonate	2.0	1.0

CONCLUSIONS

The preliminary flotation tests with various fineness of the ground ore indicate that the flotability of the antimony mineral decrease when the ore is finer ground than 44% minus 200 mesh. The Stibnite slimes a great deal. With finer grinding, the ore size distribution becomes unfavourable for the separation procedure. This is shown in Table 1 on the flotation characteristics with decreasing recoveries for finer grinding.

The use of Lead nitrate as activating agent gives satisfactory results in the primary testwork.

A complete flotation test (Table 2) with the coarse ore grinding (44% -200 mesh) indicates that good grade and recovery will be possible by avoiding overgrinding and using more selective grinding. Stagewise coarse grinding as well as careful rougher concentrate regrinding for middling (Stibnite - silica) -liberation are important. Regrinding probably to 90% -325 mesh of a part of these middlings seems to be necessary.

This preliminary testwork shows that a final concentrate of 62% Sb at about 88% recovery is possible. Tests continue to realize above conditions and by suitable reagent adjustment and distribution to reduce the relatively high Pb content in the concentrate.

WRIGHT ENGINEERS LIMITED



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January 18, 1965

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CARBON HILL ANTIMONY DEPOSITS, WHEATON DISTRICT  
of  
YUKON ANTIMONY CORPORATION LIMITED (N.P.L.)

by  
Allan P. Fawley

Property Examined and Report Written September 1964

092071

WHEATON

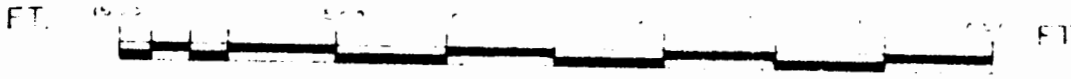
# WHEATON RIVER

CANADA

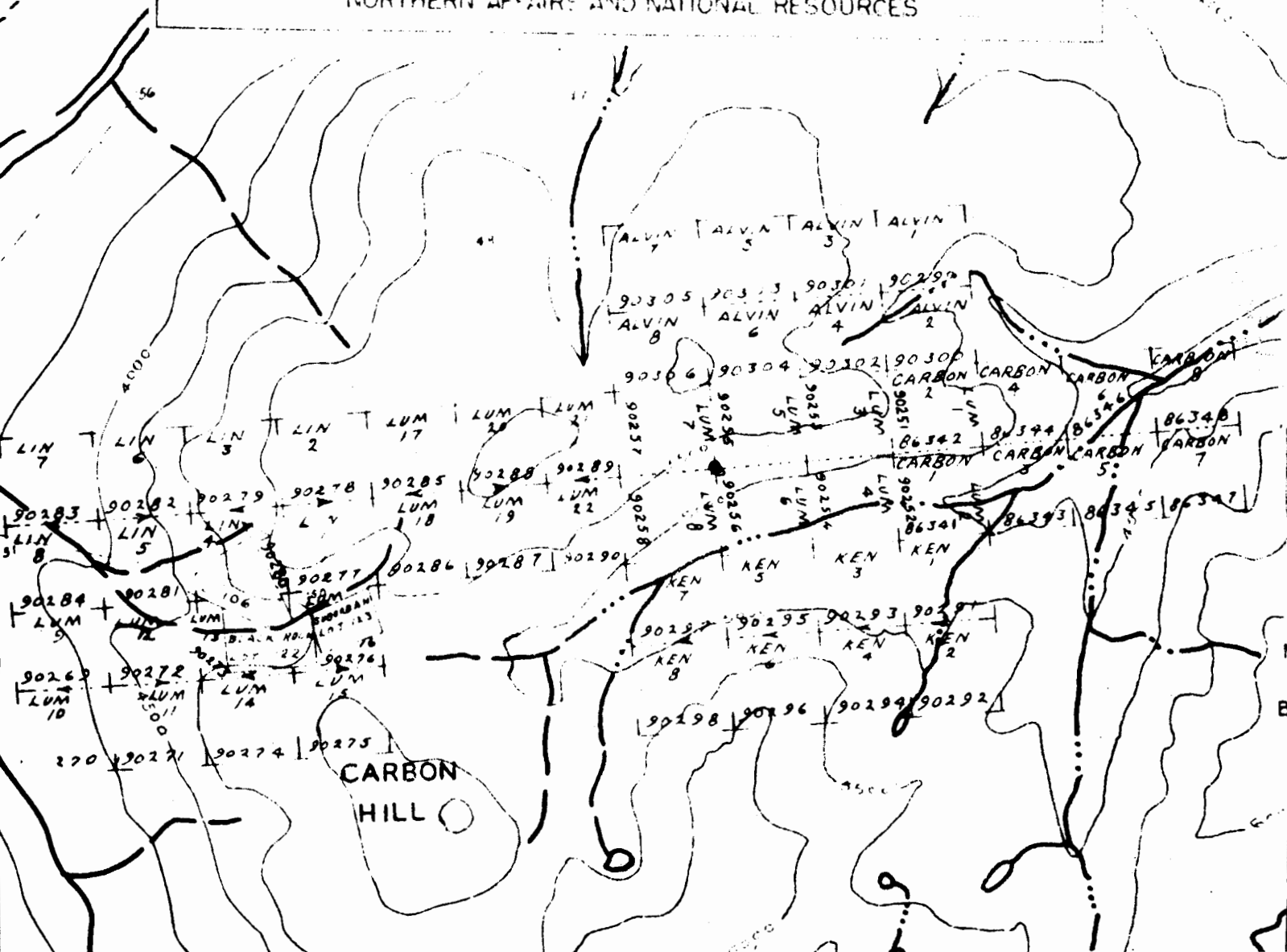
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES

NORTHERN ADMINISTRATION AND LANDS BRANCH  
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OF  
NORTHERN AFFAIRS AND NATIONAL RESOURCES



CARBON HILL ANTIMONY DEPOSITS, WHEATON DISTRICT  
YUKON ANTIMONY CORPORATION LIMITED (N.P.L.)

INTRODUCTION

Antimony deposits with associated silver have long been known to exist in the Wheaton District of the Southern Yukon and due to the present high prices of both metals the deposits offer definite possibilities of developing into producing mines. One of the deposits is now undergoing a careful examination to determine its size and grade and results obtained so far are very encouraging. Plans are underway to build access roads to some of the other deposits to enable an examination of them. The property was examined on September 17th and 18th, 1964.

PROPERTY

Yukon Antimony Corporation control 46 mineral claims in a single group, on Carbon Hill and 2 claims on Chieftain Hill in the Southern Yukon (see enclosed claim map).

LOCATION AND ACCESS

The mineral claims are 40 miles S.S.W. of Whitehorse, Yukon. The base camp on the claims is reached by 15 miles of good gravel road towards Carcross, then 28 miles of fair road past Annie Lake to the Wheaton River crossing (a ford), and then by 12 miles of trail that is only passable for 4-wheel drive vehicles, - total distance 55 miles.

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An additional mile of road has been constructed from the base camp (at 4,070 ft. elev.) to the Becker-Cochran antimony deposit (elevation 5,060 ft.).

### CLIMATE, TOPOGRAPHY AND TIMBER

The topography is mountainous, but the mountains though very steep have a rounded appearance and few cliffs. Most of the known antimony deposits are above the tree line where the mountains are covered with low bush, shrubs, moss and talus, with rock outcropping in some places. Timber suitable for mining purposes, bridges, etc. exists in the nearby valley of Wheaton River.

Typically there are about 5 months of summer weather (with about 20 hours of daylight during June and July). The rivers are generally open from early in May until freeze-up in late October.

### HISTORY

The antimony-silver deposits on Carbon and Chieftain Hill were discovered in 1893, then were lost but re-discovered in 1906. They were actively explored from 1906 until about 1915, and have lain dormant except for sporadic work ever since until this year.

During 1964, a "Jeep" trail has been built to the Becker-Cochran antimony deposit on the east side of Carbon Hill, the deposit has been exposed by deep trenching with a bulldozer, and about 15 tons of antimony-bearing rock has been mined and shipped to British Columbia for mill testing.



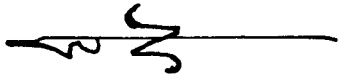
## GEOLOGY

The antimony-silver veins and shear zones occur both within granitic rocks and within Tertiary and older volcanic and metamorphic sedimentary rocks. The volcanic and sedimentary rocks have been intruded by granitic bodies of Cretaceous age. According to D. D. Cairnes (G.S.C., 1915) "The geology is complicated and intricate, due in part to the great diversity in age and character of the various formations that occur, but more particularly to the fact that the area has been subjected to a number of intense volcanic invasions. As a result of each invasion the older rocks have been cut, pierced, and in some cases, buried by the invading volcanics, and so each successive period of volcanic activity added to the geological complexity of the region".

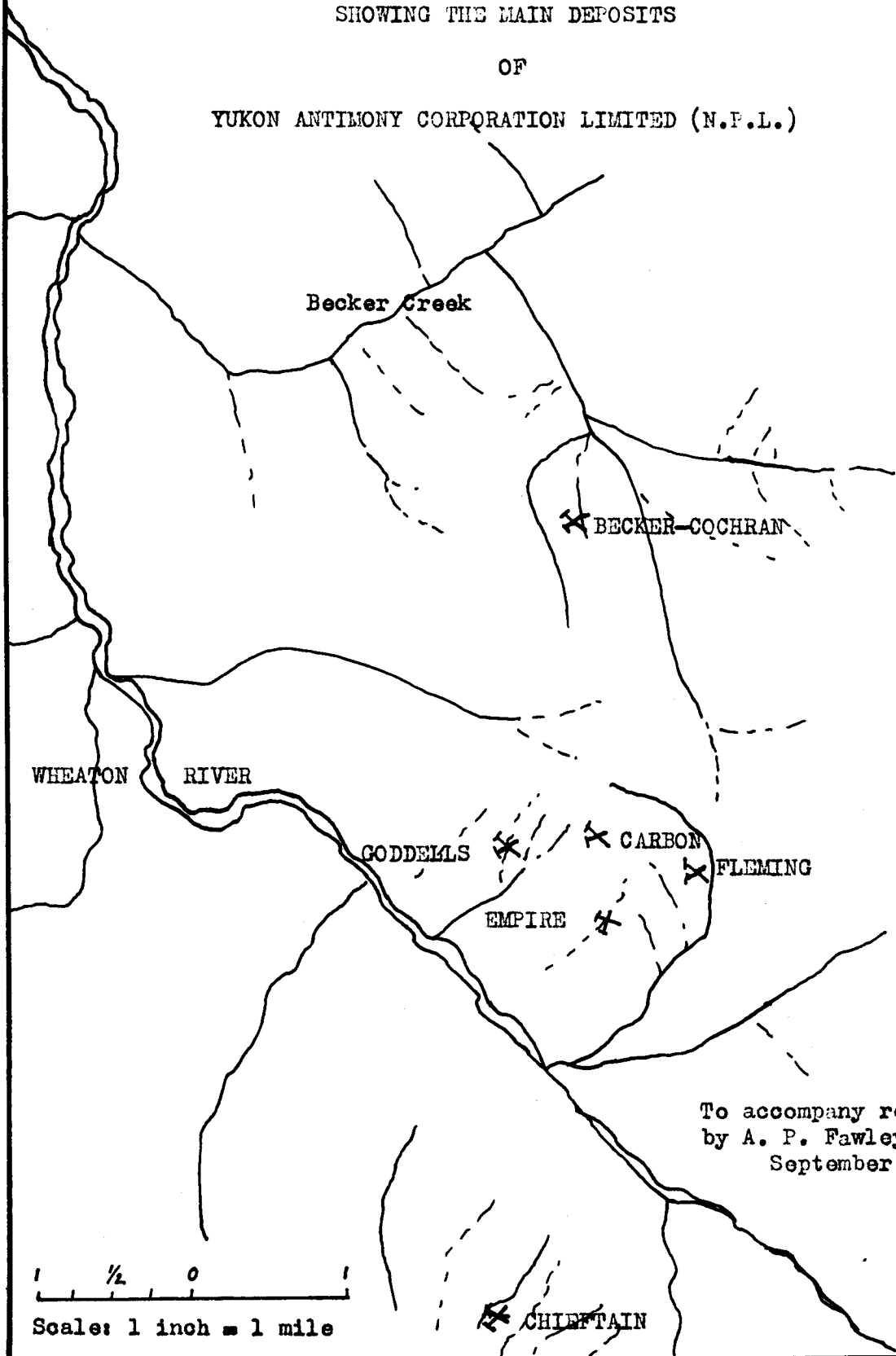
## MINERAL DEPOSITS

More than a dozen antimony or antimony-silver veins or shear zones have been discovered on Carbon and Chieftain Hills. Of these deposits only the Becker-Cochran (using its old name) has been re-exposed so that it could be carefully examined and sampled. Of the remaining deposits, some have veins or parts of veins exposed but in general the old workings have caved and old trenches and pits have become filled with talus. The following reports are based on my own observations and sampling at the Becker-Cochran deposit, and on published reports plus oral information from Mr. Keith Lumsden (prospector) for the remaining deposits.

The approximate location of the various deposits, or groups of deposits, is shown on an enclosed map.



LOCATION MAP  
SHOWING THE MAIN DEPOSITS  
OF  
YUKON ANTIMONY CORPORATION LIMITED (N.P.L.)



A summary of the antimony-silver deposits by Cairns (Mem. 31, G.S.C., 1912) is as follows:

"These antimony-silver ores occur distributed throughout a westerly-trending belt about 5 miles long by 1-1/2 miles wide, which includes all the southern portion of Carbon hill and extends to the west across Wheaton river and embraces the central portion of the eastern face of Chieftain hill. The greater number of the veins, however, have been discovered on the western face of Carbon hill, on an area about one mile in diameter. These ores occur in the Jurassic Coast Range granitic rocks, and in the Chieftain Hill andesites and volcanic breccias. The veins have, with one exception, a general westerly trend and are either perpendicular in attitude or dip to the northeast.

Two of the veins are traceable for over 2,000 feet on the surface, but other outcrops are generally covered with superficial materials, so that 200 feet is the farthest that any of them have been followed, but a number probably extend much greater distances.

The veins vary in thickness from 2 or 3 inches to 6 feet, but 1 to 3 feet is generally about the average of the more valuable. The fissures, in all the cases so far discovered, appear to be simple in form and without any foot or hanging-wall stringers or branching fissures.

The ores consist chiefly of quartz, calcite, barite, stibnite, sphalerite, jamesonite, galena, and grey copper. Stibnite constitutes the greater part of the vein-fillings in parts of some of the veins, and in

such cases is generally associated with minor amounts of sphalerite and jamesonite. Wherever any gangue is present, it is generally chiefly quartz, barite and calcite occurring only in subordinate amounts. The veins that are richest in the silver consist of a quartz gangue impregnated with more or less galena and grey copper, and very few antimony minerals. In fact, the ores high in silver are generally low in antimony, and vice versa. But there are places where both antimony and silver occur together in considerable amounts.

Assays running over 500 ounces of silver to the ton have been obtained, but they are very exceptional. Samples of the better class of ores containing galena and grey copper often carry from 100 to 200 ounces. The better grades of the stibnite ores contain 50 per cent to 65 per cent of antimony. The ores rarely contain more than a few cents per ton in gold. It is not known what the ores will average over any considerable portion of their outcrops, nor what they will assay more than 10 feet below the surface.

The zone of vein-oxidation is prevailingly shallow, and unaltered sulphides generally occur within a few inches or 4 or 5 feet of the surface. Only a slight amount of leaching appears to have taken place in these ores."

#### Becker-Cochran Property

The property is at an elevation of approximately 5,000 ft. and is well above the treeline. It was being stripped with a bulldozer when examined on September 17 and 18, 1964. During previous years two

adits were driven on the occurrence, the older of which was about 50 ft. long and has now been entirely removed due to recent trenching; the other adit (about 50 ft. higher) is caved near the portal.

Stripping has revealed a shear zone striking about  $65^{\circ}$  N.W. and dipping steeply to the S.W. and ranging in width from 7 to 23 ft. for an exposed length of 170 ft. The upper adit followed the shear for an additional 95 ft. to the north-west, so that the minimum length of the shear zone is 265 ft., and as the shear appears to be a strong one, it probably continues much further and to depth. The shear zone contains both massive and disseminated stibnite (antimony sulphide).

The shear is really a fault-gouge zone, and is composed of about 70 percent of soft clay-like gouge ranging from jet black to brown, to red and yellow. The remaining 30 percent of the shear is hard silicious antimony-bearing rocks that occur as veins up to several ft. wide within the shear zone. The gouge material also contains antimony.

The wall rocks intruded by the shear are light cream to brown rhyolites and tuffs which appear to strike easterly and dip to the south.

The hard and soft rocks of the shear zone were sampled separately because the hard ones contain far more antimony than the soft ones and because, if desired, the hard rocks could readily be separated from the soft ones. The assay results follow:

	Antimony	Arsenic
1. Representative sample of the soft rock, mostly gouge, from the shear zone for a length of 70 ft., average thickness 18 ft.	2.50%	0.85%
2. Representative chip sample of the hard rock throughout the entire exposed section of the shear zone	11.23%	0.43%
3. Chip sample of hard rocks from the shear zone that have been pushed onto the dump (rejects after hand-sorting). Most appears to be low grade	7.75%	0.25%
4. Chip sample of high-grade ore (hand-sorted) from the shear zone	27.50%	0.53%
5. Sample of soft, bright red to orange to yellow material that makes up about 1 to 2% of the shear zone	11.23%	0.29%

Further sampling is necessary before stating the average grade, but on the basis of the above assays and assuming the proportion of 70% of soft rock to 30% of hard rock will remain constant, then the indicated grade of the shear zone where trenched is 5.13% antimony and 0.72% arsenic.

Sampling records reported by others for the Becker-Cochran property are:

No.	Antimony %	Arsenic %	Gold oz/ton	Silver oz/ton	Lead %	Zinc %	Copper %	Bismuth %
1.	1.0	0.5	0.02	0.10	tr	tr	tr	
2.	13.3	0.4	tr	tr	tr	tr	tr	
3.	5.72							
4.	13.28							
5.	30.13	0.18	0.005	0.19	nil	0.10	0.06	nil
6.	0.18	0.26						
7.	0.36	0.38						
8.	39.68	0.14						
9.	21.20		tr	tr				
10.	40.62		tr	tr				

Sample no. 1 is a 6 ft. channel sample 45 ft. inside adit (Aho).  
 " " 2 " " 6 " " " 65 " " " "  
 " " 3 " " 4 " " " across face of adit (Bostock)  
 " " 4 " " hand-picked sample of vein matter inside adit (Bostock)  
 " " 5 " " hand-picked sample of the richer sulphide vein  
 matter on the dump outside the adit (Bostock)  
 " " 6 is a 1-1/2 ft. channel sample across soft clayey and  
 greyish blue material exposed in surface cut (Wheeler)  
 " " 7 same as no. 6 (Wheeler)  
 " " 8 is a sample of high-grade ore from the dump outside the  
 portal (Wheeler)  
 " " 9 is a sample of all the vein fragments in sight from  
 an old adit (Cairns)  
 " " 10 is a sample of the better mineralized pieces (Cairns)

### Fleming Property

This property is described by J. O. Wheeler (G.S.C., Mem. 312, 1961) who states, "Several claims designated at different times as the Porter or Fleming group occur on the west face of Carbon Hill. The workings may be reached by a steep trail from ruined cabins at timberline on Antimony Creek, accessible in turn by wagon road and trail along Wheaton River valley.

"The early exploration of the property revealed several veins in the granitic country rock. Their attitude and correlation was uncertain because the outcrops were small and the trenches exposing them were constantly being filled in again with talus on the steep hillside. The most promising looking vein was 14 inches to 3 feet thick for at least 200 feet on the surface. The vein was chiefly quartz and stibnite with subordinate sphalerite and jamesonite. Parts of the vein contained a thickness of 12 to 14 inches of almost pure stibnite. The other veins, containing disseminated galena and grey copper, were 2 to 12 inches thick but were not so well mineralized. The best showing at the time of Bostock's visit

was near the adit. It is an easterly trending vein dipping  $60^{\circ}$  N and is composed of 8 inches of stibnite, 12 inches of granodiorite, 4 inches of quartz and stibnite, 30 inches of granodiorite, and 12 inches of quartz and stibnite. A channel sample across this vein gave 9.61 per cent antimony. The 8-inch lens of stibnite pinched out in 2 feet.

"The workings consist of an adit leading to further underground workings and numerous trenches which in 1948 and 1951 were entirely filled with talus. The underground workings on the Fleming property consist of an adit at elevation 5,250 feet which extends for 337 feet at  $N21^{\circ}E$  with short crosscuts on both sides. Near the end of the adit, winding tunnels have been driven 192 feet northwest and 379 feet southeast respectively. A vein 3 to 8 inches wide, which carries quartz, stibnite, and minor amounts of other sulphides, is intersected by the southeast tunnel about 25 feet from the adit. The vein, which appears on the northeast wall of the tunnel, strikes  $N55^{\circ}E$  and dips  $42^{\circ}NW$ . It appears to terminate against a shear zone in the back of the drift.

"The workings are in granodiorite locally cut by northwesterly trending andesite dykes. The granodiorite is traversed by numerous slips and shears mainly disposed in three sets: a northeast set dipping  $40$  to  $50^{\circ}SE$ , a northwest set dipping steeply northeast, and a north-northwest set dipping  $40$  to  $60^{\circ}SW$ . In the underground workings, the abundance of these slips and shears, one of which is known to have faulted the vein, suggests that great difficulty may be encountered in establishing the number and extent of the veins found on the surface.



"Silver values obtained during the early exploration ran as high as 500 ounces a ton, though generally they were less than 50 ounces a ton even in the richer pockets. Average silver values were traced to 5 ounces a ton. The most promising vein gave 50 to 60 per cent antimony, although Bostock reports picked samples from the underground vein which ran only 28.39 per cent antimony. Gold rarely exceeded 0.1 ounce a ton and generally was 0.05 ounce a ton. Highest lead values were 7 to 15 per cent but generally were less than 5 and often less than 1 per cent.

"A vein of quartz, stibnite, and barite, striking north and dipping 25°W, has been exposed at an elevation of 4,650 feet on the south side of Carbon Hill, overlooking the head of Antimony Creek. In one trench the vein is 6 feet 7 inches thick. On the hanging-wall side it shows 2 feet of vein material with no stibnite, then 3 feet of granodiorite in the centre, followed by 1 foot 7 inches of vein material containing a 5-inch seam of stibnite. A channel sample across the foot-wall part of the vein, 1 foot 7 inches thick, gave 16.68 per cent antimony. A hand-picked sample from the stibnite seam gave:

Bismuth . . . . .	nil
Arsenic . . . . .	nil
Antimony . . . . .	31.36 per cent
Lead . . . . .	0.76 per cent
Zinc . . . . .	3.40 per cent
Copper . . . . .	0.05 per cent
Gold . . . . .	trace
Silver . . . . .	1.52 ounces a ton"

Cairns (1915) states that as many as 15 to 20 veins may have been discovered on this property, though he may be including the Carbon and Empire properties that are listed below.

### Carbon Property

The following account is from a report held by the White Pass and Yukon Corporation Limited:

"On the northwest crest of Carbon Hill a barite-stibnite vein about two feet in width is exposed in a small open cut on the Carbon No.8 mineral claim, one of a group of eight claims staked by Walter Green in 1952 and now held by Yukon Exploration Co. of Whitehorse. The vein is banded and consists principally of barite, some quartz, radiating blades and massive fine-grained lenses of stibnite, and minor sphalerite and possibly jamesonite. The wall rocks are slightly metamorphosed andesite and rhyolite. The vein apparently continues north-westward and float from the vein was traced southeast for about 500 feet, indicating a strike of N 65W. The dip, although probably steep southwest, is uncertain because of slumpage. The vein was said by McAllister to assay \$6 to \$7 per ton in gold and other metals. A channel sample was taken by the writer across an exposed width of 2 ft 4 in., 10 inches, part of which may be repeated by slumping, and gave the following results:

Sb	8.1%
As	Tr (less than 0.05)
Ag	0.5 oz/ton
Pb	Tr
Zn	0.70%
Cu	Tr
Au	Tr "

### Empire Property

The following account is also from the White Pass and Yukon Corporation:

"Showings on the Empire Group of crown-granted claims, now held by Yukon Exploration Co., are located halfway down the northwest slope of Carbon Hill, on the nose of a red-weathering spur of granite porphyry and pyritized felsite. The vein matter seen in dumps of slumped open cuts shows widths and mineralogy similar to that of the Carbon No.8 showing. Several veins are apparently present, the attitudes of which are unknown, but which appear to strike in the same general direction (N 60°W) as the Carbon No.8 vein. Thicknesses range up to 2-1/2 feet and the grade is probably comparable to that of the Carbon No.8 sample. Red-weathering pyritized quartz porphyry or felsite, and grey-weathering granite, both cut by vesicular andesitic dikes, form most of the country rock. An assay of the most strongly altered and pyritized quartz porphyry yielded only a trace of gold."

Mr. Keith Lumsden reports orally (1964) that the old cuts on what is believed to be the Empire Property are now sloughed in but that blocks of almost massive stibnite up to 40 lbs. in weight are beside some of the pits, and he states that there are many small dumps of stibnite.

#### Goddell's Property

"This showing lies between elevations of 4,100 and 4,850 feet on the northwest slope of Carbon Hill, about a mile north of the Fleming property.

"Bostock (1941, p.36) records vein material at several points on the steep slopes of Carbon Hill overlooking Wheaton River. At elevation 4,100 feet, a 13-inch vein in an easterly trending, vertical shear zone

in granodiorite carries quartz gangue, stibnite, jamesonite, and arsenopyrite. A channel sample across 13 inches gave 14.19 per cent antimony. This vein is 3 to 6 inches wide over most of its exposed distance of 80 feet.

"Vein material is exposed at elevation 4,450 feet where 2 to 3 inches of quartz and stibnite are exposed for a length of 3 feet. A picked sample of the vein matter assayed as follows:

Bismuth . . . . .	nil
Arsenic . . . . .	0.11 per cent
Antimony . . . . .	7.74 per cent
Lead . . . . .	nil
Zinc . . . . .	nil
Copper . . . . .	0.03 per cent
Gold . . . . .	0.09 ounce a ton
Silver . . . . .	0.28 ounce a ton

"At an elevation of 4,500 feet, about 4 feet of similar mineralization is exposed. At 4,850 feet, 9 inches of vein is exposed and a sample carried 5.49 per cent antimony.

"Virtually all the old workings have caved or sloughed in. Cairnes (1912, p.116) described two parallel veins not more than 30 feet apart, but Bostock thought there were three or perhaps four nearly parallel veins in the shear zone across a width of more than 50 feet." (Wheeler, 1961)

#### Chieftain Hill Property

"The former Morning and Evening claims lay along a vein on the southeast face of Chieftain Hill at an elevation of about 4,700 feet, directly across the Wheaton River valley from Goddell's claims. The vein lies parallel with a set of fractures cutting both granitic rocks and the

volcanic rocks of uncertain age. It strikes nearly due east and dips vertically. It occurs in a fracture zone about 40 feet wide that forms a gully now filled with debris. Limited exposures indicate that the vein consists of lumps of quartz containing stibnite and locally some sphalerite in a mass of fractured rock and gouge. A hand-picked sample of stibnite 2 by 3 by 8 inches, taken by Bostock, yielded 49.90 per cent antimony."

Cairns (1915) states "The vein occurs in a fissure in andesitic rocks, strikes about due west, and has a nearly perpendicular attitude. The deposit also consists chiefly of quartz which is in places well mineralized with stibnite, and carries also subordinate amounts of zinc blende. At one point the vein is 5 feet in thickness, 2 feet of which appears to be composed almost entirely of stibnite. The vein, however, narrows rapidly in each direction from this point.

"An important vein carrying antimony minerals is reported to have been recently discovered on Berney creek, a short distance to the southwest of Chieftain hill, but this was not seen by the writer."

#### CONCLUSIONS AND RECOMMENDATIONS

A large number of veins and shear zones that contain massive or disseminated stibnite (antimony sulphide) occur on Carbon and Chieftain Hills in the Wheaton District of the Southern Yukon. Silver is associated with the antimony in places.

Due to the rise in price of both antimony and silver all these veins and shear zones warrant a thorough examination to determine their size and grade. This work is already well underway, with very encouraging

results, on the most accessible deposit, called the Becker-Cochran, which is on the east side of Carbon Hill.

The Becker-Cochran deposit has proved to be much wider, where stripped, than old reports indicated and the grade is quite satisfactory. The antimony-bearing shear zone has been proved to extend for a minimum length of 265 ft. with a width of 7 to 23 ft., and as the shear is a strong one it probably continues much further and to depth. Based on preliminary sampling, the grade of the stripped section of the shear is 5.13% antimony and 0.72% arsenic. If desired, a much higher-grade material can readily be separated from the shear zone as most of the shear zone is comprised of a very soft clay-like gouge while about 30% is a very hard rock that contains about 8-12% antimony and 0.3-0.5% arsenic.

The Becker-Cochran shear appears to be very low in gold and silver, but old records show that sections of some of the other antimony veins and shears have a high silver content.

A suggested program for the antimony and antimony-silver deposits held by the Yukon Antimony Corporation on Carbon and Chieftain Hills is as follows:

1. A trail has already been opened to the Becker-Cochran property on the east side of Carbon Hill, a second trail to the west side of the hill to open up the Fleming, Empire, Carbon, and other properties is now necessary. A survey should be made for this new route and to determine the best site for a bridge to be built to cross the Wheaton River.
2. When the above bridge site has been selected, improve the road from that site to the Becker-Cochran property, and construct a trail

(passable by trucks) to the west side of Carbon Hill. Besides a bridge over the Wheaton River, several small bridges over creeks may be necessary.

3. Have mill and smelter tests conducted as soon as possible on the bulk sample of ore that has been mined and shipped from the Becker-Cochran deposit. Have several organizations test the ore, such as the Department of Mines and Technical Surveys, Ottawa; and also possible buyers such as Consolidated Mining and Smelting Company of Canada, and United States firms.
4. Continue opening up the shear zone on the Becker-Cochran property by stripping with a heavy bulldozer and trace the shear zone as far as possible along the hill slopes to the northwest and southeast. Also prospect the Becker-Cochran property for further antimony deposits.
5. Open up the various antimony and antimony-silver showing on the west side of Carbon Hill by trenching and stripping with a heavy bulldozer (a ripper, or drilling and blasting will probably be necessary in places).
6. Following completion of the stripping and trenching program, or in conjunction with its later stages, a diamond-drilling program should be undertaken to test the veins and shears at depth.

#### ESTIMATED EXPLORATION EXPENSES

A large sum of money was spent in 1964 on road building, stripping and trenching, and for the purchase of heavy machinery. Work completed so far includes re-opening 12 miles of road from the

Wheaton River crossing to the base camp on the east side of Carbon Hill at an elevation of about 4,000 ft.; constructing an additional mile of road to the Becker-Cochran antimony showing at about 5,000 ft.; and stripping, mining and shipping a trial sample of ore.

Machinery and equipment now on the property or stored at Whitehorse, includes: a Caterpillar D8 bulldozer, Gairdner-Denver compressor, Copco drill, jack-hammer, 3-ton truck, panel truck, Austin jeep, 4-wheel oil tank, ore cart, lighting plant, pressure pump, shop heater, tents, blankets, etc., etc.

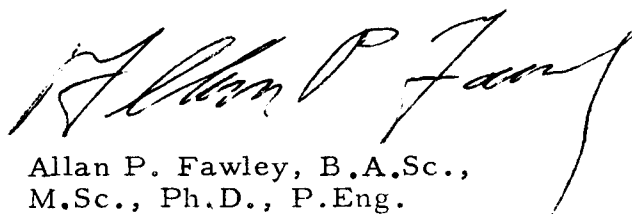
A rough estimate of the cost of further exploration and development work is as follows:

- |    |  |             |
|----|--|-------------|
| 1. | To build a bridge across the Wheaton River and improve the road from the bridge site to the Becker-Cochran base camp on the east side of Carbon Hill | \$25,000.00 |
| 2. | To construct a road from the bridge site to the antimony and antimony-silver showings on the west side of Carbon Hill                                | \$25,000.00 |
| 3. | For stripping and trenching on both the east and west sides of Carbon Hill   | \$25,000.00 |
| 4. | Engineering, supervision, assays, etc.   | \$10,000.00 |
| 5. | Construction of camp sites and of a repair service depot for heavy machinery   | \$35,000.00 |



The above program will cost about \$120,000.00 and a further \$25,000.00 should be available for diamond-drilling the more favorable deposits, hence a sum of \$145,000.00 should be available for the exploration program.

Respectfully submitted,



Allan P. Fawley, B.A.Sc.,  
M.Sc., Ph.D., P.Eng.

Consulting Mining Engineer  
and Geologist

Vancouver, B.C.

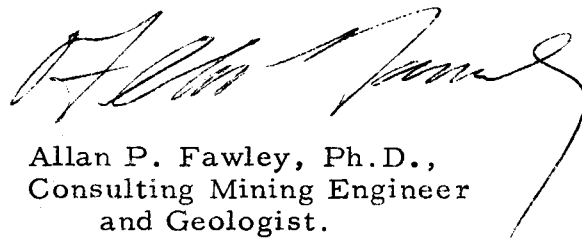
September 30, 1964

CERTIFICATE

I, ALLAN PRIEST FAWLEY, of the City of Vancouver in the Province of British Columbia, HEREBY CERTIFY:

- (1) THAT I am Consulting Mining Engineer and Geologist and my address is 1947 West King Edward Avenue, Vancouver 9, B.C.
- (2) THAT I am a graduate of the University of British Columbia with the degree of B.A.Sc. (1937) in Mining Engineering, of Queen's University with the degree of M.Sc. (1946) in Geology and of the University of California with the degree of Ph.D. (1948) in Geology.
- (3) THAT I am a registered Professional Engineer in the Geological Section in the Province of British Columbia and also a member of the Society of Economic Geologists, of the Canadian Institute of Mining and Metallurgy, and of the Geochemical Society.
- (4) THAT I have practised my profession as a geologist for more than twenty years.
- (5) THAT I have no direct interest or indirect interest, nor do I expect to have any interest in Yukon Antimony Corporation Limited or in any of their Mineral Claims.
- (6) THAT I have no direct or indirect interest in any company acquiring control or intending to acquire control of Yukon Antimony Corporation Limited or in any of their Mineral Claims.
- (7) THAT the report on the Yukon Antimony Corporation Limited Mineral Claims is based on my personal examination of the property during the period September 17-18, 1964.

DATED this 30th day of September, 1964.



Allan P. Fawley, Ph.D.,  
Consulting Mining Engineer  
and Geologist.