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BACON & CROWHURST
CONSULTING ENGINEERS

April 22nd, 1968.

International Minerals and Chemical Corporation,
Old Orchard Road,
Skokie, Illinois, U.S.A.

Attention: Mr. Peter O. Sandvik
Manager of Exploration

Gentlemen:

We are pleased to present herewith our report entitled "Mercury in Western Canada".

This report has been prepared on the basis of a letter dated March 8, 1968, from Mr. Peter O. Sandvik. We believe the report fulfills the requirements of the letter in that it will indeed serve "as a basic reference for identification of potential target areas, or properties, for specific exploration projects".

The report contains up-to-date information and opinions of the writer on specific points in addition to material derived from the sources listed. It is not embellished with published maps that are available, nor did the time allotted permit their reproduction and inclusion.

Respectfully submitted,

BACON and CROWHURST

W.R. Bacon, PhD., P.Eng.

WRB/ic

A

REPORT

ON

MERCURY IN WESTERN CANADA

FOR

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

SKOKIE, ILLINOIS

April 22, 1968

W.R. Bacon, PhD, P.Eng.

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INTRODUCTION

Mercury in Western Canada means mercury in the Cordillera of B.C. Its presence has been recorded in about forty locations, occurring mainly in three principal areas of the province; Kamloops, Bridge River, and Pinchi fault zone.

Only two occurrences have been successfully developed into producing mines but this is at least partly attributable to the fact that recent interest in mercury has been largely confined to a short period during World War II and 1964-. Even today, with one mercury mine re-opening and a relatively high price for the metal, prospecting in B.C. is directed toward copper, silver and base metals rather than mercury. Some natural reasons for this will become apparent later in the piece.

The principal mercury occurrences are described in some detail in the next section, and the land or ground or claim situation in their vicinity is set forth in the appendix. The land situation is difficult to ascertain at the present time for the B.C. Department of Mines has insufficient staff to cope with the number of stakings in the province during the past few years. Consequently, more than a week had to be devoted to this aspect of the investigation and the results leave something to be desired.

Subsequent to a description of the occurrences, the writer discusses briefly the factors he considers significant in the search for new deposits and, using these, he rates the B.C. areas. Lastly, he gives a few prospecting hints gleaned from his own practical experience.

The material for this report is obtained partly from published reports (see Bibliography), partly from personal communications, and partly from personal knowledge.

KAMLOOPS

The Kamloops cinnabar occurrences were prospected in the 1890's and constitute, therefore, the first showings of mercury found in British Columbia. They lie in a rather circumscirbed area extending 11 miles north and 12 miles south of Kamloops Lake. The mercury occurs in shear zones and veins of dolomite in greenstones which, in the vicinity of the deposits, have generally been intensely ankeritized.

There has been approximately 143 flasks of mercury produced from the Copper Creek deposits. A rather fulsome account of the Kamloops occurrences can be found in Geological Survey of Canada Memoir 249, pp. 82-104. A dozen locations are described, of which 6 were considered worth noting for the purposes of this report.

COPPER CREEK (1) *

The workings are situated on an open hillside on the north shore of Kamloops Lake, about 5 miles east of the west end of the lake. They are accessible by road from Kamloops and also by Canadian National Railway which passes between the showings and the lake.

Work has been concentrated in three discrete areas; the southerly and central workings are only 400 feet apart and are at an elevation of 1600 feet, 475 feet above the lake; the northerly workings

* See Index Map

are about one half mile beyond and at the same elevation. The workings are underground and mainly of the era 1894-5. Very little, if any, work was done in 1896-1925. In 1925-27 there was rehabilitation of certain workings and 5 flasks of mercury obtained. Some work, mainly stripping, was done in 1940-41.

Apparently the best ore shoot was in the southerly workings.

The environment of the deposits is a group of igneous rocks, extrusive and intrusive. The extrusives include both green and purple volcanic breccias and interbedded tuffs. The intrusives include diabase and picrite sills and, in addition, brown-weathering porphyritic dykes of basaltic composition.

Veins of white, massive to crystalline dolomite containing sporadic disseminations of cinnabar, characterize the deposit. The veins are up to 3 feet wide and probably average 18 inches. The veins are best developed in the brown porphyry dykes. Old reports indicate that the "best" cinnabar occurred as blebs or nodules of massive mineral.

Faulting is widespread in the workings but apparently there is no general or dominant trend.

HARDIE MOUNTAIN (2)

The Hardie Mountain occurrences are on the east bank of Copper Creek Valley, 4 miles above (north) the railway (see above). They are above the road that follows the valley down to Kamloops Lake.

Some of the showings were discovered as early as 1895; underground work commenced the following year. Apparently most of the

underground work was done in 1902 when five adits were driven aggregating 1066 feet in length. Another adit was driven in 1909. Some prospecting was carried out in 1940-41.

There are no records of production.

The geology consists of a series of volcanic rocks that strike northerly and dip 30 degrees westward; they include dark, fine grained basalts, coarse feldspar porphyry, andesite, tuff and volcanic breccia. Many of the rocks have been partly ankeritized so that their outcrops are rusty-brown. Scattered dolomite stringers cut the rocks and presumably, as at Copper Creek, carried sparse cinnabar.

Evidently there is some local silicification of the volcanics and veining by chalcedonic quartz. In this environment cinnabar is found as small grains "over considerable areas". This statement is found on the top line of P.102, G.S.C. Memoir 249, and the report goes on to mention assays obtained by several men not, apparently, including the author of that report.

SABISTON FLATS (3)

This showing of cinnabar occurs near the mouth of Sabiston Creek which flows southerly into Kamloops Lake, two miles westerly from Copper Creek.

About 100 feet above the railway, a 28 foot adit has been driven northerly into the hillside. The rock formation is brown-weathering feldspar porphyry intrusive into greenstone.

The adit follows a 3 inch stringer of dolomite-calcite which contains streaks and films of cinnabar.

DAVIS (4)

The showings are north of Kamloops Lake, near Savona station on the Canadian National Railway. They are on the steep rocky hillside of Mount Uren between elevations of 1800 feet and 2400 feet.

The mineral occurrences consist of small amounts of cinnabar in white dolomite veins or stringers. The stringers occur in tight shear zones within volcanic breccia and tuff. The rock within and adjacent to the shear zones is now largely ankerite.

Some shallow surface stripping has been carried out but apparently the results were not sufficiently encouraging to justify underground exploration by anyone.

CRISS CREEK (5)

The property is about 3 miles up Criss Creek from its junction with the Deadman River. Deadman River flows southerly into the Thompson Valley at the west end of Kamloops Lake. The junction referred to can be reached by about 14 miles of road up the Deadman Valley from Savona on the Trans Canada Highway.

The showings or workings are at elevations of 2250 feet to 2850 feet on the steep, open hillside sloping southeastward into Criss Creek. The first claims in this area were staked in 1896 and some prospecting and surface work was done in 1897 and 1900. Between 1929 and 1938 some short adits were driven.

The deposits are typical of the area - veins and stringers of dolomite in zones of ankeritized greenstones. Cinnabar, stibnite, realgar, azurite and malachite occur sporadically in the dolomite.

There are no records of production from this property.

TUNKWA LAKE (6)

These showings are about a mile due east of Tunkwa Lake and 15.5 miles south of Savona on the Kamloops-Merritt road. The workings are on the east side of and adjacent to the road - in open, rolling, range land.

The geologic setting is volcanic rock, part of which is banded tuff, altered to ankerite and veined with dolomite. The carbonate may contain stibnite, tetrahedrite, malachite, azurite, and cinnabar which generally occurs as thin films and small masses.

Two shallow shafts, within 15 feet of each other, have been sunk in carbonate rock. Several narrow bands of cinnabar occur in an irregular stripping immediately east of the shafts. A little more than one flask of mercury was produced from this open cut.

The zone of ankeritization here appears to be somewhat more extensive than in the locations described above.

BRIDGE RIVER

The Bridge River mercury occurrences are in the Tyaughton Creek and Yalakom River valleys, two southeasterly flowing tributaries of the Bridge River.

The Bridge River gold camp is farther upstream and south of the mercury occurrences, but there can be no doubt that the search for gold in the late 20's - early 30's begat the lode mercury discoveries.

The early discoveries were found in sheared, fractured and partly carbonatized volcanic rocks, but significant amounts of cinnabar were later found in conglomerate as well.

To the writer, one of the most pertinent regional features of the Bridge River is the Shulaps Range, bounded on the west by Tyaughton Creek and on the east by the Yalakom River. The Shulaps Range, trending northwesterly, is 30 miles long and 10 miles wide. It consists largely of ultrabasic rocks and their carbonatized, serpentinized equivalents.

EAGLE (7)

This property is in the Yalakom River valley, just above the mouth of Shulaps Creek and 8 miles from the Bridge River road. There are showings on the west side (Red Eagle) of the river and on the east side (Golden Eagle).

Claims were located on the Red Eagle in 1937 and explored until 1942. About half a dozen flasks of mercury were produced in 1941-42. The workings consist of two adits and some eighteen open cuts and strippings. They are at the top of a series of bluff outcrops and steep slopes that rise 400 feet above the river.

The country rocks are green andesitic lavas interbedded with purple and green volcanic breccias and cut by small quantities of apparently related dioritic rock. They lie in the Yalakom fault zone and are considerably fractured.

At the workings, it appears that volcanic breccia overlies lava. The long axis of a zone of ankeritization, about 20 feet thick,

coincides approximately with the contact and can be traced along the hillside for 700 feet. The principal workings are at the southeast end of the altered zone.

The ankeritized zone contains masses of unaltered rock and is laced by stringers containing dolomitic carbonate and quartz. Cinnabar occurs in part of the ankeritized zone and also in adjacent crushed volcanic breccia. Some occurs in the dolomite stringers. In brief, its distribution can best be described as haphazard.

The Golden Eagle is almost directly across the Yalakom valley from the Red Eagle. It was first staked in 1938 and prospected until 1941. A small crude retort was built at the river's edge below the showings but there is no record of production.

The chief cinnabar occurrences are in a zone of purple volcanic breccia and its ankeritized equivalents. Cinnabar is present in at least four localities on the hillside with the main showings being 250 to 300 feet above the river. They were prospected with perhaps a dozen strippings and open cuts. Here, the area in which cinnabar is exposed extends 200 feet along the hillside, with both ends bounded by talus, and ranges from nil to 35 feet wide. Cinnabar and sparse pyrite are the only sulphides present. The cinnabar occurs as small veinlets, blebs, and disseminated grains, and as films on fracture planes. Most of it is close to carbonate veinlets, and cinnabar occurs on one or both walls of some veinlets.

In 1966, a small tonnage of ore was trucked from the Eagle to a Gould mill located at Mowson Pond in the Bridge River.

LILLOMER (8)

The Lillomer is in the upper basin of Pearson Creek, high on the west flank of Tyaughton Creek. The principal showings are at an elevation of about 6700 feet.

The history of the property goes back to the late 20's and, in 1929, material was hauled in for a small retort plant (that was never assembled).

The geological setting is a series of banded cherty and argillaceous rocks intercalated with greenstones. Occasional narrow bands and lenses of reddish and grey limestones, and small bodies of carbonatized serpentine are present. These rocks are broken at intervals by a series of faults.

The workings comprise one adit and a dozen or more open cuts ranging from 200 feet below to about 300 feet above the adit. They are mainly along shear zones and in part follow contacts of sedimentary and volcanic rocks. The adit, 100 feet long, investigates a shear zone, sediments for much of its length and, finally, a fault block of greenstone near the face. The volcanics are much shattered and carbonatized and contain numerous stringers and small veins of dolomite, calcite and quartz. With them are associated small streaks, veinlets, patches, and grains of cinnabar. Some of the well mineralized volcanic material was apparently mined.

The sediments are not mineralized. On all sides of the adit, for a radius of several hundred feet, the rocks, though poorly exposed, appear to be largely sedimentary. Above and beyond, there is

more greenstone exposed and open cuts have, in places, exposed showings of cinnabar that are not, however, as promising as those in the locale of the adit.

SILVERQUICK (9)

This property is about 5 miles due north of the Lillomer. The main area of interest is on the north slope of Eldorado Mountain at an elevation of more than 5000 feet.

A good road exists from the showings down Tyaughton Creek to the Bridge River road, a distance of 22 miles.

Some work was done on the showings in 1943 but nothing further appears to have been done until 1954. By 1963 a company, Silverquick Development Company (B.C.) Ltd., had been formed and, in that year, the company completed a camp, mined and stockpiled a small amount of ore, and trucked one load of the ore to a mill site on Mowson Pond where the erection of a Gould rotary furnace reduction plant was begun. (Mowson Pond is just north of the Bridge River road). In 1964 the reduction plant was completed and put into production at a rated capacity of 10 tons per day, the road to the mine was improved, and some mining was carried on. During the summer of 1965, 20 flasks of mercury were produced.

In 1965 Canex Aerial Exploration Ltd., an exploration arm of Placer Development, obtained an option on the property and had a crew of six men engaged in exploration for the period September - November. In 1966, after Canex had dropped their option, S.H. Glassmire and Associates of Santa Fe, New Mexico, reportedly did some 6,500 feet of bulldozer

trenching on the property. Still later in 1966, Pyramid Mining Co. Ltd. drilled 538 feet of BX wireline hole.

Bedrock in the area of interest consists of conglomerate and argillaceous rocks. The latter may be purple due to hematite along shear planes. Some shears carry graphite.

Bedding attitudes are east-west with dips from 47 degrees to vertical and averaging 75° south. The area is highly fractured with an estimated 80 per cent of the faults in the northeast quadrant.

Two types of dyke are present, a felsite and a hornblende feldspar porphyry.

The cinnabar is best developed as veins in the conglomerate. The "mineralized zone", denoted by geochemical results and limonite staining, is about 3500 feet by 600 feet and strikes northwest. A small open pit and two short adits lie at the northwest end of the zone and it was here that a small high grade lens was mined.

In general, individual cinnabar veins are flat to gently dipping, one to four inches in width, and of very limited strike length.

Mapping by Canex appeared to indicate a substantial flexure in the vicinity of the known showings. Channel sampling of trenches and underground workings gave assays up to 2% Hg. The best zone uncovered by trenching was 60 feet wide and assayed 1.03% Hg over that distance. It was calculated to contain a maximum of 5000 tons averaging 0.5% Hg. Canex did about 4200 feet of trenching, using a D-7 bulldozer; they also did extensive stream silt and soil sampling using a "mercury sniffer" in the field, later with the addition of a gold filter. All samples were checked by laboratory determination.

EMPIRE MERCURY (MANITOU) (10)

The Manitou is near the mouth of Mire (Mud) Creek which flows southwesterly into Tyaughton Creek at the big bend - where easterly flowing Tyaughton turns sharply southward towards the Bridge River.

Work on the property was first reported in 1931 when "one short tunnel has been started, but the best specimens are obtained from open cuts over a width of about 75 feet." Little more work was reported until June, 1936, when the property changed ownership with a consequent renewal of activity. In 1938 a reduction plant housing a crusher and a Gould rotary kiln was erected at the portal of the main or No. 2 adit. The furnace had a rated capacity of 10 tons per day. By the summer of 1940, 20 flasks of mercury had been produced.

The area of principal interest is on the west side of Mire Creek - on the south end of the ridge between Mire and Relay Creeks. This is underlain by a variety of rocks including: tuffaceous, chloritic sandstones with minor shales and pebble conglomerate; serpentinized ultrabasic intrusives; minor felsitic and porphyritic intrusions of comparatively recent age. Associated volcanic rocks consist principally of both green and purplish lavas with minor flow breccias and tuffs. The layered rocks and the associated serpentinized rocks have been steeply compressed and partly overturned with much shearing and faulting along directions roughly parallel with the bedding. The principal shear zones, as identified mainly in the underground workings, strike in part westerly and in part northwesterly to northerly.

It is along the shear zones and almost entirely within the volcanic rocks that the cinnabar occurs.

The principal workings are between 3800 and 4300 feet in elevation on the steep but largely drift-covered western slope of Mire Creek. They include numerous pits, open cuts and a series of deep, ground-sluiced trenches, some of which are more than 1000 feet in length. There are also some ten adits, most of them 50 to 150 feet long. No. 2 adit is 700 feet long, has stood well and was accessible in 1966. The principal discoveries were made in this adit, the No. 5 adit, and the No. 3A adit.

In these three adits irregularly mineralized shears have been followed which vary in width up to 10 feet and probably average 5-6 feet. The shears strike westerly to northwesterly and dip steeply to the south; the hanging wall rocks are crushed, mineralized greenstones and the footwall rocks are mainly ribbon cherts. Assays across these shears varied from less than 0.1% Hg to more than 1% Hg.

In addition to these workings, some surface investigation has been undertaken on the steep lower slopes across the valley of Mire Creek, as well as up the ridge above the main area of interest. Cinnabar was encountered in sheared volcanics but no appreciable body of mineral was discovered.

The above describes the state of affairs up to and including the period of World War II. In 1966 work was done on four of the claims, mostly in the vicinity of the main workings. The work included

building drill access roads, trenching, retimbering of some mine workings and drilling 128 holes (23,206 feet) with an overburden percussion machine.

The holes (about 2" diameter) were drilled wet at -45 degrees in a NE direction, presumably to crosscut any shears. Sludge samples were collected for each 10 foot run and the holes were supposedly blown clean after each run. It is hard to believe (and is unconfirmed) but the writer has been told that the sludges were dried on a metal plate over an open wood fire.

With regard to assays, values of 0.2-0.6 pounds Hg per ton were reported for virtually every sample. (The highest obtained was 4.2 pounds per ton.) This is hardly consistent with the type of mineralization which is completely confined to shear zones and, thus, the assay results must be considered suspect until a plausible explanation is available.

The reason for using an overburden percussion drill is not known. Possibly this is an explanation of the 0.2-0.6 pounds Hg per ton reported for virtually every sample, i.e. the hole would be difficult to clean thoroughly after each run, hence the values would tend to become distributed in the samples. Undoubtedly some of the values would be washed into shears and fractures intersected by the drill holes.

Cinnabar is almost the only metallic mineral in the Empire Mercury deposits and much, perhaps most, of it occurs without associated gangue. Small globules of native mercury occur in the richer parts of the ore shoots. Finely crystalline pyrite or marcasite also occurs sparingly and metacinnabarite has been reported.

PINCHI FAULT ZONE

The Pinchi fault and its northwesterly continuation, the Omineca fault, has been mapped as a geological feature from Pinchi Lake northwestward for 180 miles. It has produced a lineament which extends as a rather sinuous line of depressions and valleys. The controlling structure is a southwesterly dipping overthrust fault which has moved Permian rocks upward on the west side with respect to Mesozoic formations on the east. Its extension has been mapped for about 180 miles southeastward to the vicinity of Horsefly River in the Cariboo. Its known length of 350 miles makes this fault one of the major structural features of B.C.

There has undoubtedly been more than one period of movement along the Pinchi fault zone. In the early stages of faulting the rocks involved were sheared and brecciated. The shears and breccias provided channelways for carbonate-bearing solutions that replaced the rocks with ankeritic carbonate. Greenstones and serpentines were altered to buff-coloured aggregates of ankeritic carbonate, quartz, chlorite, and mariposite; argillites and cherts to quartz-carbonate-mica schists; and grey limestones to buff dolomites. These carbonatized rocks formed relatively rigid bands along which later fault movements developed open fractures and breccia zones rather than closed shear zones. Mineralizing solutions traversing these fractures and breccia zones further carbonatized and silicified the rocks and deposited cinnabar in places. Post-mineral movements have disrupted some of the orebodies.

The cinnabar deposits generally occur in altered Permian limestones or, to a much lesser extent, in carbonatized serpentine. The cinnabar occurs mainly as veinlets, blebs, and individual grains filling pre-existing openings such as fissures, solution cavities, and interstices between grains and breccia fragments.

The majority of the mercury occurrences in the Pinchi fault zone are accessible by fair road. It is approximately 170 miles by road from Fort St. James via Manson Creek to the Bralorne Takla mine. From there a road extends northerly to Old Hogem, passing the Snell and Merc prospects. There is also a road southerly from the mine to the Hogan prospects. The Pinchi Lake operation is serviced by road and the Centennial prospect is right on the Fort St. James - Manson Creek road, just 6 miles out of the Fort.

MERC (11)

Claims in this area were first staked by Bralorne Mines Limited in 1940. They straddled the fault in which occurs a carbonatized serpentine sill, about 75 feet wide. Many subsidiary faults of varying attitude intersect the Permian limestone and along them the rock has been brecciated and dolomitized. Traces of cinnabar are found in both limestone and altered serpentine. Apparently "extensive surface work" in World War II failed to uncover anything of economic significance.

In 1965 this locality was restaked as the Merc group by a syndicate composed of Bralorne Pioneer Mines Limited, Canadian Exploration Limited and Noranda Exploration Company. The syndicate did some geochemical work and diamond drilling which disclosed nothing encouraging.

SNELL (12)

This property is south of the Merc and 10 miles north of the Bralorne Takla mine. Staked in 1941, it was optioned first to Bralorne in 1941, then to Cominco. The latter company "undertook extensive surface development and diamond drilling."

The property is heavily drift covered but exposures along two creeks apparently tie down the Pinchi fault zone or at least a strand of it. The principal showing is apparently in limestone, is 40 feet long by 6 feet wide, carrying 4-6 pounds Hg per ton. Early reports also mention that one good width of "low grade" ore was intersected in a drill hole. Here the cinnabar is in cherty limestone and carbonate-quartz-mariposite rock at the contact of limestone with altered serpentine.

Boulders of "rich cinnabar ore" were found in rusty Tertiary gravels in a stripping along Silver Creek.

In the middle '60's, the syndicate that worked on the Merc carried out similar exploration procedures, including diamond drilling, on the Snell. They were not successful.

BRALORNE TAKLA MINE (13)

This former producer is on the divide between Silver and Kwanika Creeks at an elevation of 3600 feet. Cinnabar was discovered in 1942 and a program of development including 6000 feet of diamond drilling was undertaken. Considerable ore was blocked out, a shaft was sunk, and by November, 1943, a small mill was in operation.

Production continued until September 1944 when the mercury market disappeared. During the 9 months of operation, 132,088 pounds of mercury were recovered from 11,249 tons of ore.

A mantle of drift, up to 100 feet or more thick, blankets much of the property and there are few outcrops. There are two groups of showings and both are in brecciated limestone. They are approximately 1000 feet apart with the intervening area mostly drift covered.

Interbedded with the limestone is chert, argillite, slate and schist. Greenstone sills are also present. Faulting and consequent brecciation are common.

Only one of the two groups of showings was developed underground and all the mercury recovered was from them, occurring in a body about 20 feet wide, 300 feet long, and 250 feet deep.

Cinnabar and minor pyrite are the only sulphides present. The best ore is found in breccia. Much of the cinnabar occurs as veinlets, blebs, and individual grains filling minute fissures, and in places the cinnabar forms the breccia cement. Cinnabar also occurs in solution cavities and as coatings on the cleavage planes and faces of the calcite crystals. There has been some replacement of limestone, especially where it is finely fractured. The resultant orebodies are quite irregular in outline. The cinnabar is of the massive red variety.

The two largest oreshoots mined contained 6,811 tons of 7-pound ore and 2,091 tons of 23.6 pound ore. Both lay near strong faults.

Prospecting in the vicinity of the Bralorne Takla mine was intense but did not result in any other significant discoveries of mercury. On the hillside immediately west of the mine, however, a silver prospect was found on Bralorne claims.

HOGAN (14)

A large group of claims staked by Hogan Mines Ltd. covers copper-molybdenum showings in granitic rocks of the Hogem batholith as well as mercury showings of more ancient vintage.

The original "mercury" locations probably resulted from the fact that cinnabar (as well as arquerite and gold) can be panned from the gravel of Kwanika Creek. Furthermore, the discovery of an 8 foot boulder of limestone and carbonatized serpentine containing much cinnabar undoubtedly created considerable interest.

In recent years Canadian Exploration Limited tackled both the mercury and copper-molybdenum prospects. With regard to the mercury possibilities, considerable soil sampling was done and some bulldozing which was, however, greatly hampered by the swampy nature of the ground.

INDATA (15)

Meagre old showings are at the southeastern tip of Indata Lake. They are covered now by Ajax Mercury Mines Ltd., a company that also holds a lot of claims in the Fort St. James area.

The "main" showing is practically on the lakeshore. Blue-grey Permian limestone is intersected by a north-south fault that can be traced from the shore for 1000 feet north where it passes beneath boulder clay. For the northernmost 175 feet the fault follows a 15 foot wide

serpentine dyke. The dyke exhibits the typical buff ankeritic alteration as does the limestone for widths up to 30 feet adjacent to the fault. Cinnabar occurs as scattered grains in cherty fragments in the dyke and in similar fragments in fault breccia.

TCHENTLO (16)

On the west side of the north arm of Tchentlo Lake, several large boulders and many smaller pieces of carbonatized serpentine contain cinnabar. Stripping by Cominco in 1941 failed to locate the source of the cinnabar float.

A few specks of cinnabar have been found in silicified limestone about one half mile east of the north arm of Tchentlo Lake.

PINCHI LAKE MINE (17)

This occurrence was discovered by J.G. Gray of the Geological Survey of Canada in 1937. The claims were staked by others and sold to Cominco. In June, 1940, construction of a 50 ton reduction plant was completed and smelting operations commenced. As the need for mercury was urgent, expansion was almost continuous and, by 1943, there was sufficient plant to handle 1,200 tons of ore per day. The emergency terminated and the operation shut down in July, 1944. During its 4 years of production, the mine produced more than 4,000,000 pounds of mercury. The grade of the ore treated is reported to have been between 0.5 and 0.75 per cent mercury.

Cominco undertook an appraisal of the property in 1964-66, drilling deeply on the main orebody and also on the West orebody. The

results of this work plus apparently favourable market studies influenced the decision to rehabilitate the property. A truck haulage incline has been driven 1350 feet from just above lake level to the main orebody. A concentrator and reduction plant capable of handling 800 tons per day is being built and production is scheduled for early 1969.

Discovery Hill stands out like a sore thumb 700 feet above Pinchi Lake. The rocks comprising the hill strike northwesterly and dip northeasterly; they are sediments of the Cache Creek group (Permian). The sequence of rocks from lakeshore up Discovery Hill and over the top are as follows:

1. 300 feet of unaltered, unmineralized crystalline limestone.
2. 1500 feet of quartz-mica schist and intercalated cherty quartzite, glaucophane schist and minor limestone.
3. 400 feet of highly altered, mineralized limestone forming the top of Discovery Hill.
4. Andesitic greenstone forms a small hill immediately behind (NE) Discovery Hill.

Pinchi Mountain, northwest of the mine property, is composed of serpentinized ultrabasics and its southwesterly scarp face obviously marks a profound fault, presumably the main strand of the Pinchi fault zone.

The top of Discovery Hill is now the site of two glory holes, the larger being about 600 feet long. The host rock for the main orebody may be described as a buff-coloured ferrodolomite; it has suffered intense ankeritization and silicification. The mineralized zone dips northeasterly at 50°-60° but it is cut by at least two southwesterly dipping reverse faults which have the effect of stacking up

faulted segments of the orebody, one on top of the other in vertical fashion.

Twelve hundred feet northwest of the main orebody glory hole is the West orebody. The mineralization here is in a hard, dense, white rock; it could be chert or a silicified limestone. Layers of graphitic schist were encountered in drill holes in this locality.

Half a mile southeast of the main orebody, cinnabar is found in carbonatized, brecciated serpentine.

At Pinchi Lake, most of the cinnabar occurs as veinlets and blebs filling pre-existing openings such as fissures, solution cavities, and interstices between grains and breccia fragments. It is apparent that the grade of ore increases in direct ratio to the porosity. A little stibnite and scattered grains of pyrite have been found in the mine.

CENTENNIAL (18)

The discovery showing is right on the north side of the road. Considerable cinnabar occurs in a well-shattered outcrop of buff-coloured ferrodolomite.

In the middle 50's 13 diamond drill holes were put down by Canex Aerial Exploration Ltd. and its former subsidiary, Centennial Mines Ltd. Several holes penetrated beneath the discovery showing and encountered nothing. In fact, only one of the 13 holes cut anything of interest. This hole, drilled south of the road, intersected 40 feet of mineralization that ran 0.44% Hg. The legend for these drill holes lists volcanics and ultrabasics, quartz-mica schists, graphitic and talcose fault material, mariposite rock and silicified rock.

CANADA

1965

No. 32

Mercury

J. G. GEORGE*

With the exception of small quantities produced in 1955, 1964 and 1965 in the Bridge River district in southern British Columbia, there has been no mine production of mercury in Canada since 1944 when the Pinchi Lake and Takla mines, both in British Columbia, were closed. The Pinchi Lake and Takla properties, operated as underground mines during World War II by The Consolidated Mining and Smelting Company of Canada Limited and Bralorne Pioneer Mines Limited, respectively, are the two most important known mercury deposits in Canada. The Pinchi Lake mine was, by far, the more important source and during the years it operated, from 1940 to 1944 inclusive, it produced more than 4 million pounds of mercury. The Takla mine, in operation from November 1943 to September 1944, produced about 124,000 pounds. Cinnabar (HgS) is the chief ore mineral at the two properties that lie about 90 miles apart along the Pinchi fault zone that trends north-northwest through central British Columbia in the Omineca Mining Division. Other small quantities of mercury were produced sporadically in Canada prior to 1940 at mines to the east and north of Bralorne and in the vicinity of Kamloops Lake, in the southern part of the province.

Canadian imports of mercury in 1965 were more than triple those of the previous year. Reported consumption in Canada in 1965 was double that in 1964.

WORLD REVIEW

In 1965, Spain and Italy together furnished more than half of the estimated world mine output of 275,000 flasks of mercury (a flask contains 76 pounds). The seven largest producing countries in declining order of output were Spain, Italy, U.S.S.R., Mainland China, U.S.A., Mexico, and Yugoslavia; their combined output accounted for almost 95 per cent of world mine production of mercury.

* Mineral Resources Division, Department of Mines and Technical Surveys, Ottawa.

TABLE 1
Canadian Mercury Production, Trade and Consumption, 1964-65

	1964		1965[P]	
	Pounds	$	Pounds	$
Production				
British Columbia	5,548	22,848	1,520	13,249
Imports				
Britain	29,000	107,748	474,400	2,077,366
Spain	141,800	407,781	400,400	1,798,505
United States	26,400	99,652	121,200	1,174,229
Yugoslavia	34,200	132,871	41,000	258,358
Other countries	62,500	243,318	34,900	271,129
Total	293,900	991,370	1,071,900	5,579,587
Consumption, metal				
Heavy chemicals	190,846		390,750	
Pharmaceuticals and fine chemicals	3,109[r]		109	
Electrical apparatus	2,875		22,405	
Gold recovery	2,653		2,381	
Miscellaneous	8,821		351	
Total	208,304		415,996	

Source: Dominion Bureau of Statistics.
[P]Preliminary; [r]Revised.

TABLE 2
Mercury — Production, Trade and Consumption, 1956-65

	Production, Metal (pounds)	Imports		Exports, Metal (pounds)	Consumption, Metal (pounds)
		Metal (pounds)	Salts $		
1956	-	450,006	1,819	5,953	212,800
1957	-	400,710	24,225	1,425	215,344
1958	-	197,073	10,918	2,830	151,021
1959	-	141,219	6,137	10,458	161,987
1960	-	243,091	6,915	1,918	139,627
1961	-	312,913	3,764	..	150,588
1962	-	245,059	3,838	..	135,291
1963	-	447,592	9,521	..	147,396
1964	5,548	293,900	..	..	208,304[r]
1965[P]	1,520	1,071,900	..	..	415,996

Source: Dominion Bureau of Statistics.
[P]Preliminary; - Nil; .. Not available; [r]Revised.

Mine output in the United States declined steadily from 33,223 flasks in 1960 to 14,142 flasks in 1964 but the trend was reversed when 1965 production rose to an estimated 19,582 flasks. The United States is the world's largest consumer but has always produced less than its requirements. United States consumption in 1965 was 76,454 flasks. Accurate statistics are not available on consumption in other foreign countries but Britain, France, Japan, U.S.S.R., West Germany, and others are consuming increasing quantities of mercury. Mainland China and Russia, which normally have been exporters of mercury, virtually ceased exporting early in 1963 and reportedly made substantial purchases of the metal in Europe in the latter part of 1964. Chinese mercury, however, seems to have been made available during 1965 in small and sporadic quantities. The recent increase in world consumption is largely due to world-wide expansion of the plastics industry, that has necessitated building more chlorine-caustic soda plants, and to the rapid growth of the electrical industry.

The year 1965 was a remarkable one for mercury with prices reaching new all-time highs. Demand increased and a shortage developed but production, while increased in many areas, did not match earlier estimates. The shortage and high prices undoubtedly promoted substitution in certain applications. In the latter part of the year, however, prices trended downward and it was expected that this trend would continue into 1966.

At the end of 1965, United States government stockpiles contained a total of 200,365 flasks of mercury; the stockpile objective is 200,000 flasks. These stocks are exclusive of excess mercury held by the U.S. Atomic Energy Commission (AEC). In January 1965, 55,500 flasks of surplus AEC stocks were made available for sale to domestic consumers and by the end of September 30,700 flasks had been sold. The remaining 24,800 flasks, together with an additional 38,000 flasks released by AEC on October 22, 1965, were included in the sales program beginning on that date. This long-range disposal program provided for the release of 1,500 flasks a month which should make it last until the early part of 1969.

TABLE 3

World Production of Mercury* 1961, 1964 and 1965

(flasks of 76 pounds)

	1961	1964	1965[p]
Spain	51,202	78,322	82,760
Italy	55,376	57,001	57,291
U.S.S.R.[e]	25,000	35,000	40,000
China (mainland)[e]	26,000	26,000	26,000
United States	31,662	14,142	19,582
Mexico	18,101	12,560	18,000[e]
Yugoslavia	15,954	17,318	16,419
Japan	5,437	4,812	4,820[e]
Peru	3,001	3,275	3,280[e]
Turkey	1,881	2,615	2,620[e]
Philippines	3,167	2,496	2,500[e]
Czechoslovakia[e]	725	725	725
Chile	1,509	275	370[e]
Rumania	350	194	200[e]
Tunisia	54	—	174
Bolivia	—	32	30
Canada	—	73	20
Colombia	191	3	3
World total[e]	240,000	255,000	275,000

Source: U.S. Bureau of Mines *Mineral Industry Surveys, Mercury in the First Quarter of 1966.*

*Data do not add to totals shown because of rounding where estimated figures are included in detail.

[p] Preliminary; [e] Estimate; — Nil.

USES

One of the oldest but now relatively unimportant uses of mercury is for recovering gold and silver from their ores by amalgamation. The chief uses in recent years, in declining order of consumption, have been for electrical apparatus, electrolytic production of chlorine and caustic soda, mildew-proofing paints, industrial and control instruments, pharmaceuticals, insecticides and fungicides, and dental preparations. Its military uses include fulminate for munitions and blasting caps, electric batteries and as a catalyst in the manufacture of chemicals for chemical warfare. Because of its capacity to absorb neutrons, mercury in recent years has been used as a shield against atomic radiation. One of the larger and growing uses of mercury is as a cathode in the electrolytic preparation of chlorine and caustic soda. Actual consumption of mercury in this manufacturing process is small although large quantities are required for the original installation.

TABLE 4

United States Mercury Consumption, by Uses

(flasks of 76 pounds)

Use	1961	1964	1965
Agriculture (includes fungicides and bactericides for industrial purposes)	2,557	3,144	3,116
Amalgamation	278	667	495
Catalysts	707	656	924
Dental preparations	2,154	2,612	1,619
Electrical apparatus	10,255	10,690	14,764
Electrolytic preparation of chlorine and caustic soda	6,056	9,572	8,753
General laboratory use	1,484	18,516*	2,827
Industrial and control instruments	5,627	4,972	4,628
Paint			
Antifouling	915	547	255
Mildew-proofing	5,146	4,898	7,534
Paper and pulp manufacture	3,094	2,148	619
Pharmaceuticals	2,515	5,047	3,261
Redistilled**	9,013	11,405	12,257
Other	5,962	7,734	15,402
Total	55,763	82,608	76,454

Sources: Statistics for 1961 and 1964 from preprint from US Bureau of Mines *Mineral Year Book 1964;* statistics for 1965 from US Bureau of Mines *Mineral Industry Surveys, Mercury in the First Quarter of 1966.*

*Figure represents combined total; source reference lists separate figures as follows: general laboratory use - commercial, 1,516; government, 17,000.

**Redistilled mercury is also consumed for many of the same uses as virgin mercury.

PRICES AND TARIFFS

Except for a slight decline in February and March 1965, the price of mercury per flask (76 pounds) f. o. b. New York, as quoted in *E & M J Metal and Mineral Markets*, rose continuously from $475 to $490 at the beginning of January to an all-time high of $725 to $775 at the end of June. Since then the New York price trended downward and closed the year at $535 to $540. Average for the year was $570.75 a flask, or more than 80 per cent higher than in 1964. The London exwarehouse price, as quoted in *Metal Bulletin* (London), rose from £150 per flask (76 pounds) at the beginning of January 1965 to a record high of £265 in mid-June. The £265 price obtained until early September; from then onward the price declined and closed the year at £200.

TABLE 5

Mercury Prices at New York and London

($ per flask of 76 pounds)

	New York*	London**
1956	259.92	238.68
1957	246.98	232.36
1958	229.06	214.98
1959	227.48	208.61
1960	210.76	197.86
1961	197.61	181.87
1962	191.21	172.79
1963	189.45	171.42
1964	314.79	280.90
1965	570.75	217.50

* *Engineering and Mining Journal*; ** *Mining Journal* (London), U.S. equivalent.

Imports of mercury into Canada are duty-free. A duty of 25 cents a pound ($19 a flask) of mercury continued in effect in the United States.

July 1966.

This is one of 60 preliminary mineral reviews that will be published as a permanent record in the *Canadian Minerals Yearbook 1965*. A set of the reviews or the yearbook may be purchased from the Queen's Printer for $5 each. Separate reviews may be purchased only from the Distribution Office, Mines Branch and Mineral Resources Division, Dept. Energy, Mines and Resources, Ottawa, for 25¢ each.

Extensive bulldozer work has met with indifferent success as the property is largely covered by fairly deep overburden. Soil sampling is a logical approach to its exploration and this Cominco did during the course of a recent option (which was dropped). This company followed up the sampling by 2 drill holes into the best "soil anomaly". One hole failed to get through the overburden and the other drew a blank.

Federal-Provincial aeromagnetic maps 1581-G and 1582-G indicate that the showings are on the northern edge of a discrete, ultrabasic mass.

GEOLOGIC POTENTIAL

The writer considers the following factors of particular importance in estimating the geologic potential of the areas and occurrences discussed above.

1. Environment

Whatever the genetic reason, it is an empirical fact that no known mercury occurrences of any importance are found in volcanic rocks. On the contrary, they are generally found in sedimentary rocks such as quartzite, sandstone, limestone and dolomite - competent, brittle rocks that have yielded to stress by fracturing and brecciation rather than by flowing.

The writer is also impressed by the fact that in the Cordillera of California, a geologically similar area to that under appraisal, one finds that over 50 per cent of the larger mercury deposits, including those of New Almaden and New Idria, occur in

altered serpentine (silica-carbonate rock) and an additional 30 per cent occur in adjoining sedimentary rocks.

2. Structure

This factor is generally important in evaluating the potential of all hydrothermal situations.

Accepting the above as valid criteria, one can say that the Kamloops area is a write-off on both counts - the environment is wrong and there is a complete absence of any strong structure.

On the same basis, in the Bridge River, the Silverquick property would appear to have the most potential. The mineralization is in conglomerate and the property is in an area that abounds in serpentinized ultrabasics. In contrast, the Empire Mercury mineralization is almost entirely in volcanics. No major structure is recognized in the Tyaughton Creek sector of the Bridge River.

The Pinchi fault zone checks out as favourable on both counts - environment and structure. Thus, the writer rates the British Columbia occurrences as follows:

1. Pinchi fault zone with special attention to the Bralorne Takla property and immediate vicinity.
2. Bridge River with special attention to the Silverquick property and areas underlain by conglomerate. The Empire Mercury warrants a look.

PROSPECTING FOR MERCURY

The search for mercury is by no means easy. One of the most important things to remember, at least in B.C., is the size of the target. It will be relatively small, measuring in length a few hundred feet. Therefore, the search, by whatever method, cannot be undertaken on too coarse a scale.

The B.C. mercury deposits have all been found by keen eyes or panning or by both. In recent years soil sampling has been given a try because this method has been successful in searching for such minerals as copper and molybdenum. With mercury, however, the situation is probably more complicated and is certainly less well understood. Anomalous mercury readings from soil samples could result from cinnabar, native mercury or mercury vapour.

For two years, Cominco did soil sampling in the Pinchi Lake-Fort St. James area and, on the results of the analyses, staked a large number of claims. In the case of the Centennial, the company probed an anomalous area with two drill holes. Subsequently, much of this ground was allowed to run open and, as mentioned above, the Centennial holes were not encouraging. It is noteworthy, in passing, that this work was undertaken by Dr. Louis Azzaria, a geochemical specialist who studied under Dr. H. Hawkes in California.

Several years ago, a paper was presented in Europe by the Yugoslav geophysicist, Sumi. The gist of the paper was that, based on work in a Yugoslav mercury mine, Sumi recommended Induced Polarization as a tool in prospecting for mercury. As a result of reading Sumi's paper, this writer ran an IP line over the West orebody at Pinchi Lake mine. An anomalous response was obtained over the orebody (which is intact and exposed) but one other anomaly was obtained which was difficult

to reconcile with any known mineralization. In view of the conductivity of cinnabar and the amounts likely to be present in even the most promising prospects, it seems improbable that this method actually has merit in prospecting for mercury.

It is almost axiomatic that economic deposits remain to be found in the Pinchi fault zone and the problem is how to find them. A disconcerting fact is that bedrock is commonly covered by glacial deposits that may be as much or more than one hundred feet in thickness. On the positive side, mercury has been found in at least eight localities; of these eight, one is going to be a successful producer and another, the Bralorne Takla, has the potential that warrants a careful scrutiny. Moreover, the zone has not received the blanket attention that would have been accorded it had the prospects therein been copper or molybdenum.

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APPENDIX

The following pages give the claim situation, as it is known, in the vicinity of the occurrences cited in the text. Under separate cover are the pertinent claim maps (and Index Maps) issued by the provincial Department of Mines and Petroleum Resources.

Each item noted on the following pages represents a separate title search. Title for a group, in most instances, is established by researching one or two of the claims. Where claim record numbers are consecutive, this method gives complete information.

The system has certain deficiencies. Firstly, the claim maps are not within several months of being up to date, due to lack of adequate Departmental staff to work on them. Secondly, claims are placed on these maps in the locations indicated by the staker and there is no obligation for anyone to verify this information. Thirdly, the location of the actual showing or showings may be anywhere in a large claim group; there is no requirement to divulge the location.

The data included herein, therefore, give a general idea of the land situation. If it is important to verify anything further, it can only be done in the field.

Numerous claims on the maps submitted are marked with a small "c". This signifies that the claim is cancelled.

KAMLOOPS MINING DIVISION - MAPS 92 I/10E, 10W, 15E, 15W (M)

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
L.J. Leier 10608 Maple Glen Cres. Calgary, Alta.	57202G Merc #1	June 23, 1966	June 23, 1967	June 23, 1968	Merc Group Merc 1-17	
	57221G Merc #20	June 23, 1966	June 23, 1967	June 23, 1968	Merc Group Merc 19-28	
	60435M Merc #29	Sept.16, 1966	Nov. 22, 1967	Sept.16, 1968	Merc Group #3 Merc 29-59	
	47853P Mount 10	Nov. 16, 1964	Sept.29, 1966	Nov. 16, 1969	Hardie Group Mount 8-12, 14, 28, 30	Staked by Hans Haversen - caveat filed by L.J. Leier June 14, 1967
	67078P L.J. #1	Nov. 22, 1967				
Alex W. Hardie 348 Linden Ave. North Kamloops	56458G Jackal #1	June 2, 1966	June 2, 1967	June 2, 1968	Jackal Group Jackal 1-8	
Bradford Root 2498 Brierwood Kamloops	62741B Tick #1	Feb. 24, 1967				Apr. 10, 1967 - Half interest to V. Anderson
Frank R. Christy Box 496, Lillooet	67324R Bard #1	Dec. 1, 1967				
A.E. Greenway Lillooet, B.C.	67195R Red #1	Dec. 4, 1967				
G.I. Burr & E. Mullin Box 370, Penticton	Mineral Lease M-34	Leased Apr. 7, 1967		Apr. 7, 1968	Lots 922-929; Bellview, Briar, Red Robe, Polar Bear, Excelsior, Big Horn, Eureka, Mountain	
Roy Davidson Box 192 Hamilton Montana, 59840	67348R Canmont #3	Dec. 13, 1967				
H.O. Ferguson	53315A Cotan #1	Jan. 21, 1966	Nov. 18, 1966	Jan. 21, 1968	Cotan 1, 2	
K.R. Rosseau, R.R.1, Port Alberni	L 882 Tenderfoot					
J. Boicay 1393 Robson St. Vanc.	64045E J.J. #1	May 9, 1967				
Max Keith	37104H Hilltop #4	July 14, 1961	Sept. 6, 1966	July 14, 1969	Hilltop Group O.K. 1-5, 9-12, Sage 1-3, Hilltop 1-4, Kamloops 1, 2	
M.B. Baker 334 Seymour St. Kamloops	50254E Billiburt	May 27, 1965	May 25, 1967	May 27, 1968	Billiburt Group - Billiburt, Billiburt 1, 3-6	Trail work done

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
John Fennell, Barriere, B.C.	B.I.C. 10	May 17, 1966	May 17, 1967	May 17, 1968		Cash in lieu of work. In July 1966 option to Maurice Murtach. Returned to Fennell Feb. 20, 1967.
T.J. McQuillan 4 - 425 Howe St. Vancouver	56746-57G BO 1-12	June 10, 1966	June 8, 1967	June 10, 1968	BO Group 1-12	Survey
Bernice Castonguay, 1420 - 2 NW, Calgary, Alta.	67009-14P Criss 1-6	Nov. 13, 1967				
Roy Swainson, 2416 - 14th St. SW, Calgary, Alta.	66499, 500N RAY 18, 19	Oct. 13, 1967				
	66356-59K ROY 1-40	Oct. 3, 1967				
John Kruszewski	64634G, 66218M LESS 1-14	June 26, 1967				Staked by L.E. Chester, 1256 W. 10th, Vancouver
	57024G Chess 3,5-7,15	June 15, 1966	June 13, 1967	June 15, 1968		
Silver Summit Mining Co. Box 25, 156 Victoria St., Kamloops, B.C.	60095M Colin 1-6	Sept. 1, 1966	Aug. 30, 1967	Sept. 1, 1968	Colin Group 1-6	
	50017K Art 2, 11-25	Aug. 29, 1966	Mar. 13, 1967	Aug. 29, 1968	Pat Group-Pat 1,2 Art 1, 2, 11, 12, 14	

LILLOOET MINING DIVISION

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
			EMPIRE MERCURY - SILVERQUICK AREA (10 & 9) - MAPS 27CM, 25T269			
Empire Mercury	22266G Mercury #4	June 24, 1960	April 4, 1967	June 24, 1970	Iris Group Iris 1-8, Link 22, 23, Mercury 2-8, Unna, Grizzly 1-4, Link 20 FR, Marie	
	26898K Link 20 FR	Aug. 15, 1966	April 4, 1967	Aug. 15, 1970	Iris Group	
	26076E Link 15	May 9, 1966	April 4, 1967	May 9, 1971	Ross Group Ross 1-6, Leif 1-8, Link 5-16, 17 FR, 18, 19, 21 FR	
	25561K Ross #5	Aug. 9, 1965	April 4, 1967	Aug. 9, 1970	Ross Group	
	25563K Leif #1	Aug. 9, 1965	April 4, 1967	Aug. 9, 1970	Ross Group	
	25748N Relay #2	Oct. 15, 1965	April 4, 1967	Oct. 15, 1970	Florence Group 20 claims Florence 1-13, Link 1-4, Relay 1, 2, Relay FR	
	21727P Florence #1					
	25552K Florence #9	Aug. 9, 1965	April 4, 1967	Aug. 9, 1970	Florence Group	
	26072E Link #11					
Silverquick Development Co.	25836N Kim #5	Oct. 1, 1965	Aug. 4, 1966	Oct. 1, 1969	Wood Group 40 claims Dot 11-14, Kim 5-8, Woods 10, 15, 16, Silverquick 3,4,6,7, Bob 4 FR, Quicksilver 1,2, Mills 1-10, Bob 7-10 FR, Cal 3-10	
	23754E Dot 13	May 15, 1963	May 12, 1967	May 15, 1969	Wood Group	
	22914H Silverquick #1	July 17, 1961	May 12, 1967	July 17, 1972	Dot Group 40 claims Dot 1-10, 15-20, Woods 9, 19, 20, Silverquick, Silverquick 1, 2, 5, Kim 1-4, Bob 1-3 FRCS, 5-6 FRCS, Cal 1, 2, 11-14, VON 1, 2	
	23742H Dot #1					
	23744H Dot #3					
	23747E Dot #6					
	24047M Dot #17					
	25832N Kim #1					
	25480H Wood 19	July 16, 1965	May 12, 1967	July 16, 1972	Dot Group	

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
EMPIRE MERCURY - SILVERQUICK AREA (cont'd)						
Silverquick Dev. Co.	27716N Grace #1	Oct. 28/66	Oct. 24, 1967	Oct. 28, 1968	Group Grace 1-4	
Seward Calvin, 21332 - 21st Rd. Haney, B.C.	26941K Harry #1		Aug. 18, 1967	Aug. 22, 1968	Harry Group 1-6	
Bralorne Pioneer	25126A B.K.0.4	Jan. 29, 1965	Jan. 20, 1967	Jan. 29, 1970	B.K.O. Group BKO 1-4, 6, 8, 10-20	
	25141A B.K.0.19			Jan. 29, 1969		
Silver Standard Mines	27387M Jeannie 4	Sept.19, 1966	Sept. 7, 1967	Sept.19, 1969	Jeannie Group 3-6	
C.C. Richardson Goldbridge	26371G Renee #1	June 16, 1966	June 16, 1967	June 16, 1968	Renee Group 1-4	
Edwin Phillips	24571H Limestone	July 24, 1964	June 30, 1967	July 24, 1968	Tyax Tungsten Group 39 claims Cinnabar 1-4, Queen FR, Tyax FR 12, 13, Marion, Tyax B 1-18, Mercury 1A, Limestone, Limestone FR, Sandy 2-4, 5, 6, Jack 1, Jane, Jean, Joan	
	27580N Tyax B 2	Oct. 18, 1966	Oct. 17, 1967	Oct. 18, 1968		
	14758H Cinnabar #1		July 19, 1967	July 26, 1969		
Cora R. Phillips	20267M KAS #4	Aug. 31, 1954	Sept. 8, 1967	Sept.13, 1968	KAS Group 24 claims KAS 4-19, Gordie 1-8	Transferred from Canex Aug. 20, 1960
Edwin Phillips	27634N EE #1	Oct. 13, 1966	Oct. 10, 1967	Oct. 13, 1968	Group EE 1-28	
Magnet Exploration	23508H Mugwump #3	July 3, 1962	June 27, 1967	July 3, 1970	Relay Group 29 claims Mugwump, Mugwump 2-4, 5-14, 1-4 FR 5-6 FR, Honda 1-6, Windfall 1-3 FR	
	25877A Mugwump #5	Jan. 24, 1966	June 27, 1967	Jan. 24, 1971	Relay Group	
	25885A Mugwump #13					
	23506H Mugwump					
	27553N Honda 1	Oct. 7, 1966	June 27, 1967	Oct. 7, 1970	Relay Group	
	37558N Honda 6	Oct. 7, 1966	June 27, 1967	Oct. 7, 1970	Relay Group	

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
		LILLOMER AREA (8) - MAP 25T269				
Edwin Phillips	23994K Charlotte #5	Aug. 21, 1963	Aug. 18, 1967	Aug. 21, 1969	Charlotte Group 1-12	
	28238M Cheryl #6	Sept. 8, 1967				
	~~21499N Gordie #2~~	~~Oct. 9, 1957~~	~~Sept. 8, 1967~~	~~Oct. 9, 1968~~	~~KAS Group 24 claims KAS 4-19, Gordie 1-8~~	~~Transferred from Canex Aug. 20, 1960~~
	28095H Cheryl #1	July 19, 1967				
Rico Copper (1966) Ltd. 850 W. Hastings St. Vancouver	L-6831 - L6838 (inc.)	Northern Light 1-8				
Bridge River United Mines Ltd.	Lucky Strike FR L6827) Lucky Strike L6828) Homestake #4 L6829) Bob 3-6 L8046-49)	Taxes in arrears for 1967, 1966				
	26728H Ricky #13	July 19, 1966	July 10, 1967	July 19, 1968		Road work
	26729H Ricky #14	" " "	" " "	" " "		" "
	26725H Ricky #10	" " "	" " "	" " "		" "
	26835H Lucky Strike #2	July 22, 1966	July 10, 1967	July 22, 1968		" "
	26834H Lucky Strike #4 FR	" " "	" " "	" " "		" "
	26818H Bob #1 FR	" " "	" " "	" " "		" "
	28259M Bob #3 FR	" " "	" " "	" " "		" "
	26820H Bob 7	" " "	" " "	" " "		" "
	26824H Bob 11	" " "	" " "	" " "		" "
	26825H Bob 12	" " "	" " "	" " "		" "
	26828H Bob 15	" " "	" " "	" " "		" "
Walter L. Butula 2561 E. 27th Ave. Vancouver, 12.	28129H Rose #2	July 27, 1967			Rose 1-15	Apparently staked over existing claims in part
Florence Westbrook,	25382G Ann #1	June 30, 1965	June 30, 1967	June 30, 1968	Ann 1-4	
David M. Robson 1870 S.W. Marine Dr. Vancouver	W.G.; Vista, K2, J.G. 2-7 Lots 7599-7607; Ann #1 L7579, Ann L7580 A-3 - A-8, Lots 7583-7588; B-1 - B-8 Lots 7591-7598 K-4 L7434; K-5 L7435; K-6 L7608; OX L7431; A-2 L7582 Higrade FR L7432, NEA FR L6773; TAX FR L7589; WG FR L7578					All Crown Grant lots in tax arrears for 1967 and 1966

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
		EAGLE AREA (7) - MAP 24AM				
Benn Exploration, 3304 Cambie St., Vancouver	27791P Benn #9	Nov. 14, 1966	Nov. 14, 1967	Nov. 14, 1968	Group Benn 5-14	
Walter L. Butula 2561 E. 27th Ave. Vancouver, 12	28125H BEE #1	July 27, 1967			BEE 1, 2	
Jacob Butula 1423 Columbia Ave. Trail, B.C.	28234M Ace 12	Sept. 6, 1967			Ace 9-14	
	28383N Pola #3	Oct. 27, 1967			Pola 1-4	
Lillooet Mercury Mines	27890A Joyce #1	Jan. 10, 1967			Joyce 1-4	
Emil Deering 605 - 796 Granville St. Vancouver	28015E Amil 6	May 10, 1967			Amil 1-10	Staked by T. Christy
Gert. Miller Christianson, 810 - 789 W. Pender, Vanc.	27999E Mill #1	May 10, 1967			Mill 1-11	ditto
W. Ellener 38 - 845 Hornby St. Vancouver	28507A W.E.#1	Jan. 29, 1968			W.E. 1-6	"
Bruce Ferguson Lillooet, B.C.	28029G BF #1	June 2, 1967			BF 1-6	"
Condor Mines 38 - 845 Hornby St. Vancouver	28429R Buck #1	Dec. 1, 1967			Buck 1-9	"
	28446R Hawk 4	Dec. 1, 1967			Hawk 1-4	"
Adam Baumann 38 - 845 Hornby St. Vancouver	28504A AB #1	Jan. 29, 1968			AB 1-3	"
T.G. Christy	24370D Yalakom #1	Apr. 30, 1964	Mar. 28, 1967	Apr. 30, 1968	Yalakom Eagle Group - 15 claims Eagle 1-10, Yalakom 1-3, 5, 6	
F.R. Christy	26044(0) Eagle 8	Mar. 25, 1966	Mar. 28, 1967	Mar. 25, 1968	Yalakom Eagle Group	Option to T. Pietrok & Fred Matthieu Nov. 9, 1966

REGISTERED OWNER	CLAIM INVESTIGATED		DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
EAGLE AREA (cont'd)							
T. Pietrok Box 747, Lillooet	27960(O)	Pamco 9A	Mar. 9, 1967				
Yalakom Mines	25100R	Yalakom 20	Dec. 16, 1964	Dec. 18, 1967	Dec. 16, 1968	Group Yalakom 1-28, Ridge 1-9 Fall 1, 2	
R.W. Carlson 1765 Kilkenny Rd. North Vancouver	28265M	Lake #6	Sept.20, 1967			Lake 1-8	
Frank Christy Lillooet	27944A 27936A	Peak #1 Red Star #1	Jan. 26, 1967 Jan. 26, 1967			Peak 1-6 Red Star 1-8	
Thomas Christy	27955A	Snow #6	Jan. 26, 1967			Snow 1-10	

PINCHI LAKE MINE (17) - MAP 28A-M

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
Cominco, 300 - 890 W. Pender St. Vancouver, 1, B.C.	44295K Toad #5	Aug. 27, 1966	July 21, 1967	Aug. 27, 1968	Toad Group 15 claims Toad 1-12, 13FR, 14, 15	
	27612P Ban #5	Nov. 16, 1964	Nov. 1, 1965	Nov. 16, 1980	Mercury #3 Group 14 claims Ban 1-8 Dugout #1 L5214, Mercury 3 L5213, Mercury 1 L5211, Pinchi 1 L5224, Island L7463, Roaster FR L7464	
	46866R Nab #17	Dec. 12, 1966				Feb. 10, 1967, all interest to Cominco.
	33961P Geo #5	Nov. 29, 1965	Sept.28, 1967	Nov. 29, 1968	Pinchi #2 Group See below	
	33957P Geo #1	"	"	"	Pinchi #2 Group Geo. 1-10 RAF 1-4, 17-29, 34, 35, 73, 74, 76, 78, 80, 97, 99, 100, 102, 104, 106	
	Lots 5212 Mercury #2; 5215-20 Dugout 2-7; 5222,23 - Chief 1, 2, 5227, 28, 29 - Pinchi 3, 5, 6; 5230-32 - Pinchi 7-9 5733 - Victory FR; 7462 - Lakefront					
D.W. Heddle, 300 - 890 W. Pender, Vancouver, 1, B.C.	46588P Nab #7	Nov. 28, 1966				No Bill of Sale to Cominco before 17 Nov. 1967
Highland Mercury Mines 300 - 999 W. Pender, Vancouver, 1, B.C.	27653, 27655, 27656-27665; 27667, 27669, 27670 27696-27698, 27705-27712 27740	Nov.10/64		Nov. 10, 1969	CIN Groups	
	34053, 27654, 27713-27716 27718, 27725, 27727 27729-27734; 27736, 27741	"		Nov. 10, 1968		
	27647-27652, 27666, 668 27674-27676, 680, 682, 684, 27686, 688, 690 27692-695; 27699-704	"		Nov. 10, 1968		

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
			CENTENNIAL (18) - MAPS 28A-M, 93K/8E(M)			
R.D. Vinnedge, Ft. St. James, B.C.	30378G Frog #3	June 8, 1965			Calexco Group See 26280K	July 18, 1966 Option to Cominco Jan. 5, 1967 Returned to Vinnedge
Ralph Hall	26280K Calex #1	Aug. 20, 1964	Mar. 20, 1967	Aug. 20, 1969	Calexco Group 25 claims, Calex 1-4, Top 1-4, LAF 2-4, 9 Wren 1-4, Frog 1-4, Hawk 1-5	July 18, 1966 Option to Cominco Jan. 5, 1967 Returned to Hall
R.A. Goodwin, Ft. St. James, B.C.	31095H Hawk #5	July 12, 1965	Mar. 20, 1967	July 12, 1970	Calexco Group	July 18, 1966 Option to Cominco Jan. 5, 1967 Returned to Goodwin
Ajax Mercury Mines	28963(O) M#6	Mar. 19, 1965	Mar. 16, 1967	Mar. 19, 1968	Greenwest Group 23 claims M-14, 39-44, 16, 18, 20	
	37415D K-74	Apr. 12, 1966	Mar. 16, 1967	Apr. 12, 1968	K. Brown North Group 16 claims K65-80	
	41804H Ajax #1 FR	July 19, 1966	Nov. 9, 1966	July 1969	Ajax Proshine Group 27 claims Ajax #1 FR, 2, 3-6 FR's, 7-10; Hope 1, 2 FR, Sunshine 1-8, Pro 1-14, Geo 1-3	
	41812H Ajax 9	July 28, 1966	Nov. 9, 1966	July 28, 1969	Ajax Proshine Group	
	35046R Belle 21	Dec. 10, 1965	Dec. 7, 1966	Dec. 10, 1967	Belle Group 36 claims Belle 3-23; 25-39	
	27582P Sunshine #3	Nov. 13, 1964	Nov. 9, 1966	Nov. 13, 1968	Ajax Proshine Group.	
Eugene Larsson, Ft. St. James, B.C. Box 193	29091(O)	Mar. 17, 1965	Nov. 9, 1966	Mar. 17, 1969	Ajax Proshine Group	Option to Ajax Mercury Sept. 15, 1966
James Henry	30341E Pro #2	May 31, 1965	Nov. 9, 1966	May 31, 1969	Ajax Proshine Group	Option to Ajax Mercury Sept. 15, 1966
Ajax Mercury Mines	28973(O) M-16	Mar. 19,1965	Mar. 17, 1967	Mar. 19, 1968	Green West Group 23 claims M1-14, 39-44, 16, 18, 20	
	35165B K-1	Feb. 4, 1966	Feb. 3, 1967	Feb. 4, 1968	'K' Brown South Group 40 claims K-1 -40	
	38954D K-45	Apr. 12, 1966	Mar. 16, 1967	Apr. 12, 1968	Dickinson Group K41-64	
J. Bradcoe, Fraser Arms Hotel, Vancouver	35076A Stan #12	Jan. 6, 1966	Feb. 6, 1967	Jan. 6, 1968	Stan Group Stan 1-20, 25, 26-44	
C.S. Downey Penticton, B.C.	54695M John #1	Sept.30, 1967				

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
			HOGAN (14) - MAPS 28M, 57M			
Hogan Mines Ltd.	30388G MG #1	June 8, 1965	Oct. 17, 1967	June 8, 1969	MG Group HG1-8, MG 1-22 TGEE 1-6, TGEE 27-30	All interest to Hogan Mines Mar. 28, 1967
	31925H MG #7	July 12, 1965	June 7, 1967	July 12, 1968	MG Group	
	30406G TGEE #1	June 8, 1965			MG Group	
	31931H MG-13	July 12, 1965			MG Group	
	27828P TX-13	Nov. 25, 1964	Nov. 8, 1966	Nov. 25, 1967	TX Group TX 1-30, Boom 1-6	
	27816P TX-1	Nov. 25, 1964	"	"	Frankie 1-4	
	30926G HG #1	June 23, 1965	June 7, 1967	June 23, 1968	MG Group	
	30418G TGEE #13				JAM Group JAM 1-20, TGEE 7-26	
	30918G JAM #13	June 23, 1965	"	"	JAM Group	
	31911K KS #1	Aug. 3, 1965	Aug. 2, 1967	Aug. 3, 1968	KS Group KS 1-14, Bud 1-14	
	33207M Bud #1	Sept.10, 1965	Aug. 2, 1967	Sept.10, 1968	KS Group	
	30934G CHO #1		June 7, 1967	June 23, 1969	CHO Group CHO 1-20	
			SNELL (12) - MAP 57M			
North Star Exploration	33724M Bob #1	Sept.17, 1965	Sept.19, 1966	Sept.17, 1968	Group Bob 1-4	Copper prospect
	55038N Break #1	Oct. 2, 1967				Staked by R.M. Tait - copper prospect
R.M. Tait	55048N Ran #7	Oct. 2, 1967				Copper prospect
	51565H Wind #1	July 21, 1967				Copper prospect
Bralorne Pioneer	12050G Amy 5	June 24, 1958	Oct. 16, 1961	June 24, 1969	Amy Group	
	12279N Amy 9	Oct. 25, 1958	Jan. 9, 1960	Oct. 25, 1970	Amy Group 1-10	

REGISTERED OWNER	CLAIM INVESTIGATED	DATE RECORDED	CERTIFICATE OF WORK FILED	CERTIFICATE OF WORK EXPIRES	CLAIM GROUPING	REMARKS
			MERC (11) - MAP 57M			
Bralorne Pioneer	12774H Amy 11	July 28, 1959	Jan. 9, 1960	July 28, 1970	Silver Group 20 claims Amy 4 Amy 10-28	
	12604G Amy 27	June 8, 1959	Jan. 9, 1960	June 8, 1970	ditto	
	12608G Amy 19	"	"	"	"	
	12616G Amy 13	"	"	"	"	
J.D. Carnahan 675 W. Hastings St. Vancouver, B.C.	30270E Merc #1	May 31, 1965	May 13, 1966	May 31, 1971	Merc Group 1-22	
			INDATA (15) - MAP 28M			
Ajax Mercury Mines	46712P Omac #1	Nov. 21, 1966				Certificate of work to come on 46712-727
	48942D T-1	Apr. 28, 1967				Transferred to Ajax Aug. 21, 1967
Cominco	42756K B#1	Aug. 15, 1966	Aug. 15, 1967	Aug. 15, 1969	B-1 Group B1-20	
	45216M B#5	Sept.29, 1966	Aug. 15, 1967	Sept.29,1969	B-1 Group	
			BRALORNE TAKLA MINE (13) - MAP 57M			
Bralorne Mines Ltd. 320 Marine Bldg., Vancouver, 1, B.C.	L-6181 - L-6188	SB1-8 Crown Grants				
Takla Silver Mines	27742P AG #1	Nov. 17, 1964	Oct. 15, 1966	Nov. 17, 1970	Takla Silver Group 27 claims Lustdust 1-15, Keno 1-8, AG 1-4	
	13236M Lustdust #1	Sept. 3, 1960	Dec. 3, 1965	Sept. 3, 1969	Takla Silver Group Lustdust 1-15, Keno 1-8, AG 1-4	
	13281M Lustdust #11					
	28292B Keno #1	Feb. 11, 1965	Dec. 3, 1965	Feb. 11, 1971	Takla Silver Group	

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RESOURCES MAP NO.

BRITISH COLUMBIA

INDEX MAP of MERCURY OCCURRENCES

KAMLOOPS

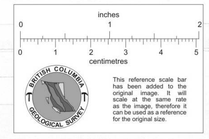
1. COPPER CREEK
2. HARDIE MOUNTAIN
3. SABISTON FLATS
4. DAVIS
5. CRISS CREEK
6. TUNKWA LAKE

BRIDGE RIVER

7. EAGLE
8. LILLOMER
9. SILVERQUICK
10. EMPIRE MERCURY (MANITOU)

PINCHI FAULT ZONE

11. MERC
12. SNELL
13. BRALORNE TAKLA MINE
14. HOGAN
15. INDATA
16. TCHENTLO
17. PINCHI LAKE MINE
18. CENTENNIAL



This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

Scale

40 30 20 10 0 40 80 120 160 MILES

N.W.T.

Y U K O N

ALASKA

U. S. A.