

Box 12

1966 EXPLORATION PROGRAM
GNAT CREEK AREA, B.C.

BY
R. D. WESTERVELT, P.Eng.

February 28, 1966

104-I - 1/3/4/5 + 6

**1966 EXPLORATION PROGRAM,
OMAT CREEK AREA, BRITISH COLUMBIA**

by

R. D. WESTERVELT, P.Eng.

**Vancouver, B.C.
February 28, 1966**

**United States Smelting
Refining and Mining Company**

I N D E X

	<u>Page</u>
PART A. GENERAL	
1. INTRODUCTION	1
2. SUMMARY	1
PART B. THE AREA	
1. LOCATION	2
2. ACCESS	2
3. PHYSIOGRAPHY	2
4. CLIMATE	2
5. GEOLOGY	3
6. MINERALIZATION	3
7. MINERALIZED FLOAT	4
8. PREVIOUS WORK	4
9. DISCUSSION	5
10. PRIOR STAKING	6
PART C. THE PROGRAM	
1. PURPOSE	7
2. METHODS	7
3. PERSONNEL	9
4. SCHEDULE	9
5. COST	10

APPENDIX

1. Lytton Minerals (Patino) Announcements
2. B.C. Annual Reports - review notes
3. G.S.C. References - review notes
4. Review of G.S.C. field traverse notes
5. Summary notes from discussions with Dr. H. Gabrielse
(G.S.C., Ottawa, December 1965)

1966 EXPLORATION PROGRAM

GNAT CREEK AREA, B.C.

A. GENERAL

INTRODUCTION: A syndicate exploration venture has been proposed by United States Smelting in the Gnat Creek area of northern British Columbia.

The following report is presented for consideration by the participating companies and includes:

- a) a summary of available information,
- b) an outline of the proposed 1966 program.

SUMMARY: A favourable geological environment and encouraging copper mineralization have recently been established in the Gnat Creek area. The region remains relatively untested and presents an usually attractive area for intensive exploration.

A preliminary regional investigation for copper and molybdenum mineralization is recommended in 1966. Photo-geological, geophysical, and geochemical studies are proposed at an estimated cost of \$150,000.

B. THE AREA

LOCATION: The program area, covering 1250 square miles, is located in northern British Columbia, approximately 80 miles due south of Cassiar.

As defined, the area is bounded by the circumference of a circle with 20-mile radius and centered at north $58^{\circ}7'30''$, west $129^{\circ}37'30''$.

ACCESS: The area is traversed by a good gravel road - the Cassiar - Stewart Highway. Road distance to Cassiar is 100 miles, and to Watson Lake on the Alaska Highway approximately 200 miles.

Local transportation is hindered by rugged topography and lack of navigable waterways and lakes. No secondary roads and only a few pack trails are known to exist.

The Department of Transport maintains a 3,000 foot gravel airstrip, weather station, and radio facilities at Dease Lake, a few miles northwest of the program area.

PHYSIOGRAPHY: Broad flat upland valleys and sharp mountainous areas are characteristic of the region. Topography is moderately rugged with local relief in excess of 2,500 feet. Elevations vary from 2,500 to 7,500 feet above sea level.

Glacial till, sand, and gravel deposits blanket much of the area. Bedrock exposure is limited and mainly confined to the mountain ridges and steep slopes.

Tree line throughout the region occurs at an elevation of 5,000 feet.

CLIMATE: Temperature ranges are similar to those encountered elsewhere in northern B.C. and the southern Yukon. Snow conditions prevail from late September to mid-May.

Unlike the Coast Range areas to the west, the Gnat Creek region is semi-arid with total annual precipitation averaging 15 inches.

GEOLOGY: The regional geology is shown on G.S.C. Maps 9-1957 (Stikine River Area) and 29-1962 (Cry Lake, B.C.) on a scale of 1 inch = 4 miles.

The program area - located within the Tagish Cordilleran belt, is underlain by Upper Triassic volcanics and complex granitic intrusives of Jurassic-Cretaceous age.

Central to the area, the Hotailuh batholith is exposed as a prominent roughly circular pluton 20 miles in diameter. Previously thought to be related to the younger Cassiar intrusives, the batholith has recently been dated as probable Quichon age (Lower Jurassic) by the G.S.C. The intrusive composition varies from diorite to quartz-monzonite.

The batholith and smaller granitic stocks intrude the Upper Triassic sequence. As noted on Map 29-1962, the volcanic series includes andesite, basalt, tuff, breccia, and minor sediments (grey-wacke, argillite, and shale).

Structural information in the immediate area is lacking. However, two anomalous regional trends are noted:

- a) the general northwesterly Cordilleran structure swings sharply westward,
- b) the general structure is cross-cut by a series of northeast striking faults.

MINERALIZATION: A few minor occurrences of chalcopyrite within the intrusives and adjacent volcanics have previously been reported.

Significant mineralization has recently been encountered on a 37 claim group near Gnat Creek. The property, located on the northwest flank of the Hotailuh batholith, is currently being drilled by Patino (Lytton Minerals) and Mitsui Mining and Smelting. As announced (see Appendix), a large tonnage low-grade copper deposit may be indicated.

As determined in prior examination, the mineralization consists of fine (up to $\frac{1}{2}$ ") magnetite - chalcopyrite fracture filling veinlets in the volcanics close to the intrusive contact. Although present over considerable areas (up to 1,500' x 1,500'), the veinlets are quite irregular and surface grades obtained are low (0.2 - 0.4% Cu) - the best section assaying 1.1% copper over 15 feet. Character samples of the veinlet material assayed 2 - 3% copper - a single sample assayed for molybdenum graded 0.26% MoS₂.

The mineralization is confined to a half mile wide shear zone in the volcanics. The shear structure, striking northerly through the Gnat Lakes, occupies a broad, low, drift-covered valley. Volcanics within the structure are intensely shattered and carbonatized with local weak silicification. In comparison, volcanics observed on the flanking ridges are dense, massive, only weakly altered, and are apparently unmineralized.

MINERALIZED FLOAT: In 1964, one magnetic anomaly on the Patino property was found to be caused by massive magnetite-chalcopyrite-specular hematite float. Several large angular blocks were encountered in one trench. Representative samples assayed 1.90 - 2.48% copper with trace amounts of gold and silver.

No similar massive mineralization was encountered in place or indicated elsewhere on the property. The local topographical and glacial features indicate the float most probably has originated from a source to the southeast of the present Patino claims.

PREVIOUS WORK: 1956 - the program area was included in the Wenner-Gren aeromagnetic coverage of northern B.C. Flight lines in this region were at approximately $\frac{1}{2}$ mile intervals. Due to the mountainous terrain and use of fixed wing aircraft, considerable topographic distortion of the aeromagnetics was encountered.

1957 - Keneco, limited prospecting examination of Hotailuh batholith for porphyry copper mineralization.

1960 - Cassiar Asbestos, full season prospecting the batholith. Several small disseminated copper occurrences reported. Copper showings near Gnat Creek were staked but allowed to lapse after detailed prospecting and limited hand trenching. Much of the mineralization proved to be low grade float.

1964 - Highland Bell, 2 months geochem. program during summer. Type and extent of coverage unknown - probably limited to volcanic "Tongue" near Gnat Lakes.

1964 - Newconex, one month examination of 30 Krysko claims near Gnat Creek in September. Following geological and geophysical surveys, bulldozing exposed low-grade magnetite - chalcopyrite mineralization. Option not exercised due to high cash payments.

1965 - Patino optioned Krysko claims. Carried out complete I.P. and geochem. survey on property. Drilling commenced in September with present encouraging results being obtained on main magnetic anomaly.

During August and September, a 2 men Patino geochem. crew operated on outside exploration. Extent of coverage unknown. Bloem test (total heavy metals) was used with anomalous field samples being sent to lab for quantitative copper determinations.

DISCUSSION: The recent mineral discovery and Guichon dating on the Metalluh batholith are of immediate geological interest:

- 1) Mineralization is related to the intrusive.
- 2) The magnetite - chalcopyrite association was previously unknown.
- 3) The structural control and alteration were previously unsuspected.

The association of mineral deposits with Guichon age intrusives has been well established elsewhere in B.C. Of particular interest, the geology of the Gnat Creek and Merritt regions may be favourably compared - in both areas Upper Triassic volcanic sequences are intruded by complex granitic batholiths of Guichon age. Similar mineralization may also be present - the massive float encountered on the Patino property is comparable to the Cragmont ore.

In view of these developments, the Gnat Creek area remains relatively untested:

- a) intensive work has been confined to the 37 claim Fatino group,
- b) prior prospecting has been limited mainly to the intrusive and has probably been ineffective due to the overburden,
- c) geochemical coverage has been incomplete and may have been unreliable due to the local strong carbonate alteration

PRIOR STAKING: For protective purposes, 231 claims were staked in the program area by United States Smelting in November 1965. The claims, in four groups, were staked to cover:

- a) the probable source area of the massive float,
- b) several interpreted shear structures in the volcanics close to the intrusive contact.

C. THE PROGRAM

PURPOSE: A regional exploration program for copper and molybdenum is proposed in the Gnat Creek area. The program during 1966 will involve a preliminary evaluation of the area and the four claim groups presently held. Intensive exploration on anomalies will be limited and mainly deferred until the following season.

On the basis of recent information, the area is considered to be favourable for:

- a) massive replacement mineralization in the volcanics close to the intrusive (e.g. Craigmont),
- b) fracture-filling mineralization in shear structures in the volcanics (e.g. Patino Gnat Creek property),
- c) disseminated mineralization in shear structures within the intrusive (e.g. Bethlehem - Highland Valley).

- METHODS:**
1. **PHOTO-INTERPRETATION:** A photo-mosaic and interpretation is being prepared by Lockwood Surveys (Hunting) over a central 900 square mile area. Known mineralization is associated with a major shear structure. It is anticipated the interpretive study will be useful in defining additional linear structures and fracture patterns within and around the Hotailuh batholith.
 2. **GEOCHEMISTRY:** A regional soil sampling program over the intrusive and flanking volcanics will be directed by Falconbridge. Hot extraction determinations for copper and molybdenum will be made in the Falconbridge laboratory in Vancouver. Assaying and evaluation of data are to be provided at cost with results available shortly for immediate field follow-up. An estimated 8,000 - 9,000 samples will be taken during the season.

3. **AEROMAGNETICS:** Ground magnetics on the Patino property were quite successful in outlining the magnetite - chalcopyrite mineralisation - even low-grade material over considerable areas gave distinctive 1,500 gamma anomalies.

Low level aeromagnetic profiling with a Hiller 12E helicopter will be carried out on selected structures in the volcanics. No comprehensive aeromagnetic survey or data reduction is currently planned - field interpretation will be made directly on the profile charts.

The aeromagnetic system supplied by Canadian Aero Services includes:

- a) a towed mag bird on 84 feet of cable,
- b) a Gulf Mark III total intensity fluxgate magnetometer,
- c) an APN-1 radio altimeter,
- d) a 35 mm positioning camera,
- e) fiducial and chart recording systems.

With reasonable weather, the aeromagnetic work will probably be completed in one month. As time permits, some limited higher level flying may be carried out to provide additional regional information.

4. **GROUND WORK:** General geological reconnaissance is planned to:

- a) locate the volcanic - intrusive contact,
- b) determine compositional variations within the intrusive,
- c) check for possible limestone beds within the volcanic sequence.

Testing of aeromagnetic and geochemical anomalies will be limited to intensive prospecting, magnetic and self-potential surveys, and additional detailed geochemical sampling.

Staking will be carried out as warranted.

PERSONNEL: A. FULL FIELD SEASON (late May to late September)

Field manager - geological reconnaissance direction of field program	1
Senior prospector - intensive prospecting of anomalous areas	1
Junior personnel - geochem. sampling, geophysical surveys, staking	7
Helicopter pilot and engineer	2
Cook	<u>1</u>
Total	<u>12</u>

B. PARTIAL SEASON

Project manager - administration,
general field assistance (2 one month periods)
Aeromag operator - (1 - 2 months)
Falconbridge geochemist - to recommend
sampling program (first week in June)
Temporary help - linecutting, etc. (as required).

- SCHEDULE:**
1. Photo-interpretation to be completed by April 15th.
 2. Field personnel to establish base camp at Dease Lake during last week of May.
 3. Helicopter to arrive June 1st. To spend first week on geological and geochemical reconnaissance.
 4. Aeromagnetic equipment to arrive June 8th. Priority on helicopter to be given to complete aeromagnetics in one month if possible. During this period field crews will commence ground surveys on existing claims and geochemical program.
 5. On completion of aeromagnetics, helicopter will be used in transporting and supplying ground crews.

6. Field program terminating mid to end of September.

7. Compilation of results, filing of assessment work, and final report to be completed by December 31st.

COST: As detailed in the preliminary budget prepared in January, \$150,000.00 will be required to complete the proposed 1966 program. Included in this total are prior staking costs incurred on the four claim groups presently held.

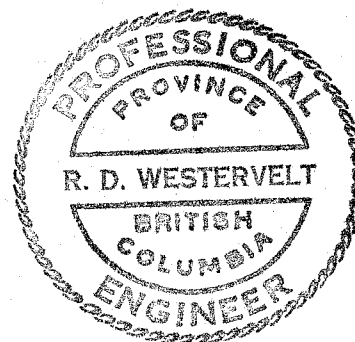
The preliminary budget is currently being revised. No increase in total cost above the original estimate is anticipated.

Respectfully submitted,

R. D. Westervelt

R. D. Westervelt

VANCOUVER, B.C.,
February 28, 1966.



A P P E N D I X

LYTTON MINERALS LIMITEDMITSUI MINING AND SMELTING CO. LTD.

JAPANESE FIRM TO PARTICIPATE IN EXPLORING DEASE LAKE CLAIMS - Announcement is made by E. Koblanski, president of Lytton Minerals Limited, that Mitsui Mining and Smelting Company Limited, has subject to the approval of the Japanese government, entered into an agreement with Lytton with respect to the exploration and development of its Dease Lake property located on the Cassiar-Stewart Highway, approximately 90 miles south of the Cassiar Asbestos Mine.

Terms of the agreement provide for Mitsui to participate with Lytton in the exploration and development of the property on the basis whereby Mitsui would acquire an equal interest in the property with Lytton in consideration of Mitsui bearing 55% of the expense of exploration and 50% of the acquisition costs of the property. Diamond drilling is continuing and results of the assays will be announced as soon as they are received, the announcement says. (For previous item see GCNL No. 195(1965).)

LYTTON MINERALS LIMITED

PROGRESS REPORT ON DEASE LAKE PROPERTY - E. Koblanski, president of Lytton Minerals Limited, has provided the following report on the company's 37 claim optioned property on flank of Cake Hill granitic batholith, 16 miles south of Dease Lake, where drilling is now underway. The property straddles the Cassiar-Stewart highway in northern B.C.

"Field work in the past season, including geological mapping, induced polarization and magnetometer surveys, geochemical soil sampling and bulldozer stripping has shown widespread copper mineralization. The mineralization occurs near the contact between basic volcanics and a number of quartz feldspar porphyry intrusives which are related to the nearby granite, and that the better copper bearing zones are defined by the magnetics.

"Seven holes have been drilled to date on the property, of which three are located along a 2,100 foot northwest striking magnetic anomaly, that lies in low ground on the edge of the largest known porphyry stock. Hole 2, collared in mineralization within the anomalous area, cut 27 feet averaging 0.86% copper from 29 to 56 feet. Assay returns for the section between bedrock at 15 feet and 27 feet have not yet been received, but will probably be of lower grade. Hole 3, located 250 feet to the northwest, intersected 95 feet grading 0.56% copper from 479 to 574 feet. Mineralization continues to the end of the hole at 605 feet, where drilling has been temporarily suspended because of badly fractured ground and poor core recovery. Hole 6, drilled 400 feet southeast of hole 2, intersected 11 feet at 1.05% copper from 226 to 237 feet and further low-grade mineralization from 263 to 364 feet, which have not yet been assayed. Hole 8 is now drilling, midway between holes 2 and 6.

"To-date less than half of the strike length of this anomaly has been tested and at least two other magnetic anomalies, with strike lengths of 2,000 feet and 9,000 feet, remain to be drilled.

"Four drill holes have been completed at other locations. Two of these were on I.P. anomalies without coincident magnetics and contained only minor pyrite and two intersected only scattered copper mineralization."

LYTTON MINERALS LIMITED

EXPLORATION ACTIVITY TO BE EXPANDED IN B.C. AND YUKON; PROPERTY OPTIONED IN NEW HAMPSHIRE - Lytton Minerals Limited, under the direction of The Patino Mining Corporation, will expand considerably its exploration activities this year.

Drilling will continue on its Dease Lake property in northern B.C. where the 1965 work, including 4,600 ft. of diamond drilling, located widespread copper mineralization. This program is being carried out in conjunction with The Mitsui Mining & Smelting Co.

GNAT CREEK AREA

B.C. Annual Reports - Review Notes

N.T.S. References 104 - G - 1, 2, 7 to 10, 15, 16
 104 - H - 3 to 6, 11 to 14
 104 - I - 3 to 6, 11 to 14
 104 - J - 1, 2, 7 to 10, 15, 16

B.C. Refences 57 - 129
 57 - 130
 58 - 129
 58 - 130

1964. Prospectors Assistance Program.

1) Near Gnat Creek, green copper stain and minor amounts of bornite where found near a contact zone of granite and volcanics. Close to the Three Sisters Range, narrow discontinuous stringers of bornite were observed.

2) Pitman River area received some attention; small pieces of chalcopyrite float were found in several places, but source not discovered.

Pg. 11 Dease Lake - 32 Joy claims held by Kennco. Copper mineralization occurs in sheared granitic rocks along contact with greywacke. IP used to explore large geochem anomaly on property (see assessment file 585 - geology, geophysics, geochemistry)

1963. Prospectors Assistance Program.

1) Southeast of Dease Lake, in the Kutcho Creek sector, a number of claims were staked on a narrow but high-grade vein containing considerable amounts of chalcocite.

Scattered showings of copper mineralization associated with geochemical anomaly investigated on Joy claims by Kennco.

1962. 1) Southeast of Dease Lake, heavily pyritized granodiorite and some shear zones were investigated. Between Tanzilla and McBride Rivers, magnetite float was picked up - search filed to find it in situ.

1961 to 1957 NIL

1956. 30 "Windy" claims held by Conwest 3 miles northwest of Cluea Lake. Showings consist of a large oxidized area with small amounts of azurite and malachite. Open cut and pack sack drilling.
- 1955 to 1936 NIL
1935. Pg. B-12 History and Transportation.
Pg. B-22 Description of Dalvenie property (originally known as "Big Chief") - pyrite - pyrrhotite - chalcopyrite - arsenopyrite replacement in gabbro and slate, widths 20' - 34' for 1200' strike length.
1934. NIL
1933. Pg. A-63. Description of placer gold on Wheaton Creek.
- 1932 to 1925 NIL
1924. See photo pg. B-72
- 1923 to 1918 NIL
- 1917 to 1915 Not reviewed
- 1914 to 1913 NIL
1912. Notes on trip to Dease Lake area. No pertinent information.

December 2, 1965

R. D. Westervelt

GNAT CREEK AREA

G.S.C. References - Review Notes

N.T.S. areas 104 - G, H, I, J.

- 1) GSC Sum. Rpt., Pt.A, 1925 p. 25-99.
Description of placer gold occurrences in area.
- 2) Maps 2097, 2104 - not pertinent
- 3) GSC Sum. Rpt., P + A 1926 p. 14 - 34
and Pt.A 1928, p. 11 - 26. Geological notes by Kerr
up Stikine River to Telegraph Creek. Not pertinent.
- 4) GSC Sum. Rpt., Pt.A, 1930 p. 41 - 55. Geological
notes by Kerr between Stikine and Taku Rivers.
Not pertinent.
- 5) Memoir 69. Coal Fields of B.C. Not pertinent.
- 6) Memoir 194. Eagle McDame Area, Cassiar District by
G. Hanson, 1936 (contains map 381 A). Mainly describes
area to north, but covers northern edge of intrusive
and gives good description of McLeod (volcanic) Series.
- 7) Paper 60 - 24. Tectonic Framework of Southern Yukon
and Northwestern British Columbia by Gabrielse and
Wheeler, 1961. General description of regional
structures. Applicable.

December 2, 1965

R. D. Westervelt

GNAT CREEK AREA

Review of GSC Field Traverse Notes,

Ottawa, December 1965

- 1) Pink, coarse grained syenite to medium grey monzonite, 15% mafics - mostly chloritized amphiboles, some biotite, epidote abundant.
- 2) Green grey aphanitic greenstone, strong jointing at 028°, dipping 67° east.
- 3) Granite with predominantly green amphibole mafics and epidote stringers.
- 4) Notes presence of greenstone dykes and feldspathic dykes.
- 5) Impure quartzite (?), fine grained, salt and pepper texture, may be marginal phase of granite
X = pure quartzite, slight gneissosity at 125°, contains siderite and small amounts of bornite and azurite.
- 6) Coarse greenstone with porphyritic basalt flows with rare red weathering granite dykes.
- 7) tuff, banded greywacke.
- 8) large red gossan zone, boulders in creek below were intensely pyritized granite rocks.

Notes from Roote's Traverses:

- 1) Traverse down Hluey Creek to Gnat Creek. Entirely greenstone from first main bend to below main tributary to mouth - dull weathering andesite and andesite breccia. After creek swings from eastward to northeast trend, rocks are much shattered, rusty weathering, pyritized, and apparently carbonatized. No structure visible, but probably major fault.
- 2) Dalvenie claim - notes "silicated limestone".
- 3) Gorge in north Hotailuh escarpment just north of westernmost Hluey Lake - entirely volcanic rocks, mostly basaltic, in large part heavily sheared and mineralized (mainly pyrite with some Cu and Mn stain). Shear zones, up to 20 feet wide striking 020° - 060° and dipping 70° - 90° NW, are very numerous.

January 5, 1966

R. D. Westervelt

GNAT CREEK AREA

Summary notes from discussions with
Gabielse in Ottawa,
December 13th - 14th, 1965

- 1) Ground Traverses in area of interest are quite limited, and intrusive contact may be subject to revision. Contact is fairly well established by traverses along north and east sides. Southern contact is interpreted mainly from photos with only few spot landings. Subsequent work has indicated tongue of volcanics into intrusive along west side (see copy of map for approximation).
- 2) Recent age dating by GSC indicates Hotailuh Batholith is oldest acid intrusive in area and is of probable Guischon age (lower Jurassic). Probably very short interval between the deposition of the Upper Triassic volcanics and the intrusion of the Batholith.
- 3) The main Cassiar intrusives to the northeast are younger than the Hotailuh but are older than the Coast Range intrusives (Coast Range dates indicate complex system of intrusives with some dates equivalent to Hotailuh and Cassiar, but predominantly younger).
- 4) Small intrusive plugs to south are most probably same age as Hotailuh.
- 5) Discontinuous exposures of intrusive to northeast in vicinity of Snowdrift and McBride Creeks are different and may be more closely related to Cassiar type.
- 6) Intrusive plug to west may also be more closely related to the younger Cassiar type.
- 7) Note sedimentary sequence determined along north contact by GSC traverses and not shown on published map (greywacke, slate, conglomerate). Apparently discontinues due to lobular intrusive contact (Contact generally sharp were observable).
- 8) Hotailuh covered by limited preliminary helicopter prospecting program in summer of 1957 by Kennco.

January 5, 1966

R. D. Westervelt