3984

Reports of Geological, Geochemical, Magnetometer

Induced Polarization and Resistivity Surveys

In # 53 Group Mineral Claims

In #153 " " "

In #198 " " "

C # 1 " " "

C #17 " " "

C #30 " " "

Located 5 to 10 miles North of Mess Lake, Stikine Area,

57°30' North - 131°00' West

Liard Mining Division, B.C.

by

Erik Ostensoe

and

P. I. Conley, P.Eng.

Part 1 of 2

for

Hecla Operating Company

Work done in September and October, 1971
and June to August, 1972

Date of Report: October 26, 1972

Report of

Geological Mapping and Induced Polarization Surveys

IN #53 Claim Group, North of Mess Lake,

Liard Mining Division, B. C.

57°30'N - 131°00'W

Map Sheet 104G-NE

by

Erik Ostensoe, B.Sc.

for Hecla Operating Company

Supervised by P.I. Conley, P.Eng.

September and October, 1971

July and August, 1972

Date of Report: October 10, 1972

P.I. Conley

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I SUMMARY

Crews employed by Hecla Operating Company examined claims of the In #53 Claim Group during September and October, 1971, and July 1972. During July and August, 1972, 2.75 line miles of induced polarization and resistivity survey was completed on part of the claim group by McPhar Geophysics Limited. This survey is discussed in a geophysical report which forms part of this report, but which is filed under separate cover as Appendix B.

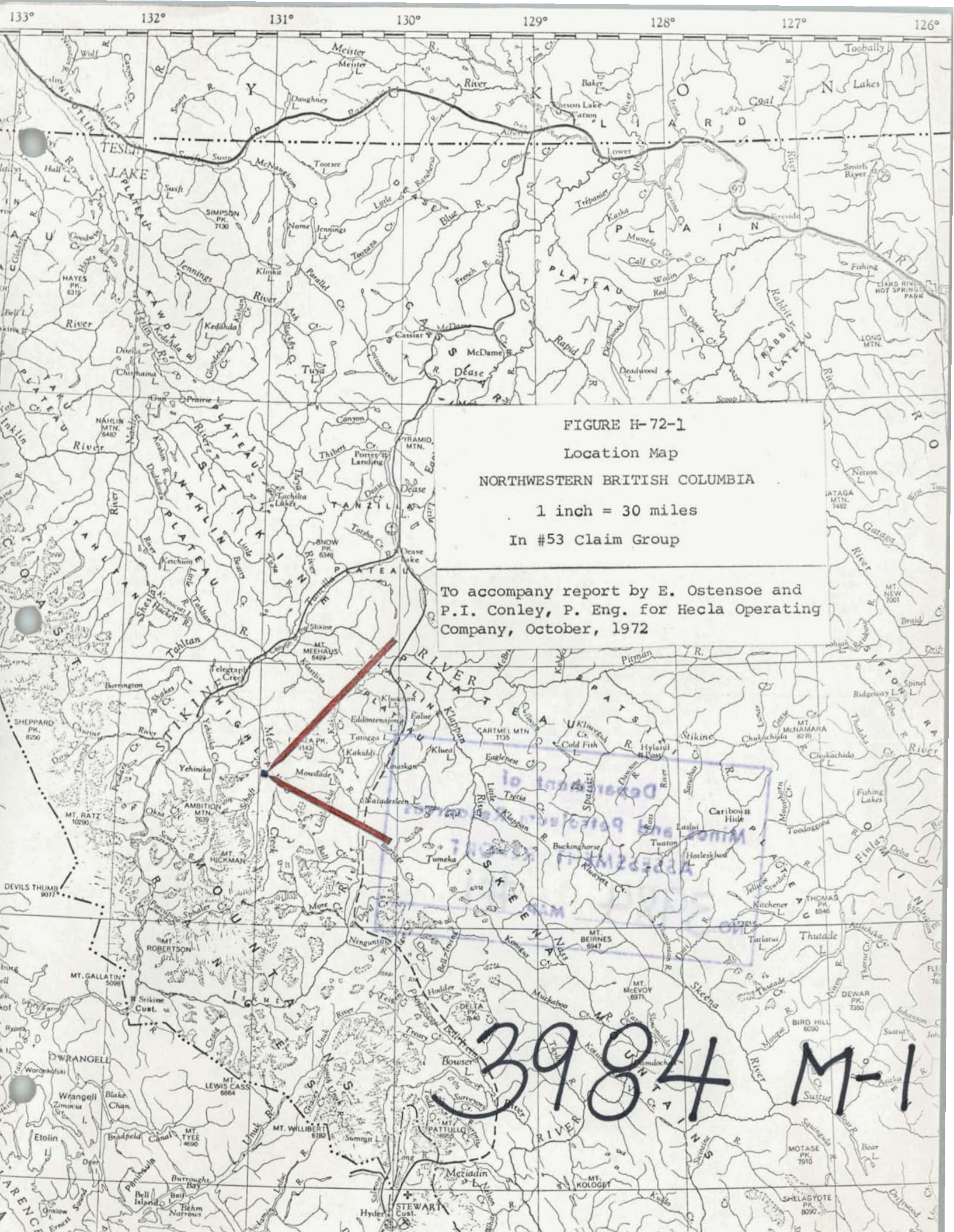
The In #53 Group claims are underlain by a complex of diorite and andesite intruded by granitic and quartz monzonitic rocks. Limestone and rhyolite outcrop in the southeastern part of the claim area.

II INTRODUCTION

The In #53 Group claims are listed in Appendix A. They were recorded on August 5 and 6, 1971 and were geologically mapped during September and October, 1971. During July 1972 additional field work was applied to these claims. Two grid lines, Line 1500S and Line 7000S, were extended from the adjoining "Windy Lake" grid across the In #53 claim group and were subjected to induced polarization survey in the period July 25 to August 6, 1972.

The In #53 Group claims (See figure H72-1 and H72-2) lie immediately southeast of a small lake, locally referred to "Johnnie Lake", situated 5 miles northwest of Mess Lake and 2 miles west of the confluence of Raspberry and Mess Creeks. The terrain is mostly flat or gently rolling, with a cover of jack pine and alder trees. In part the ground is marshy. Elevations are from 2800 to 3000 feet above sea level.

Access to the claim group was by helicopter from the Hecla Operating Company camp at Schaft Creek, which is 12 miles to the south. During the 1972 field work, a fly camp was established


133°
132°
131°
130°
129°
128°
127°
126°
FIGURE H-72-1
Location Map
NORTHWESTERN BRITISH COLUMBIA
1 inch = 30 miles
In #53 Claim Group
To accompany report by E. Ostensoe and P.I. Conley, P. Eng. for Hecla Operating Company, October, 1972
3984 M-1

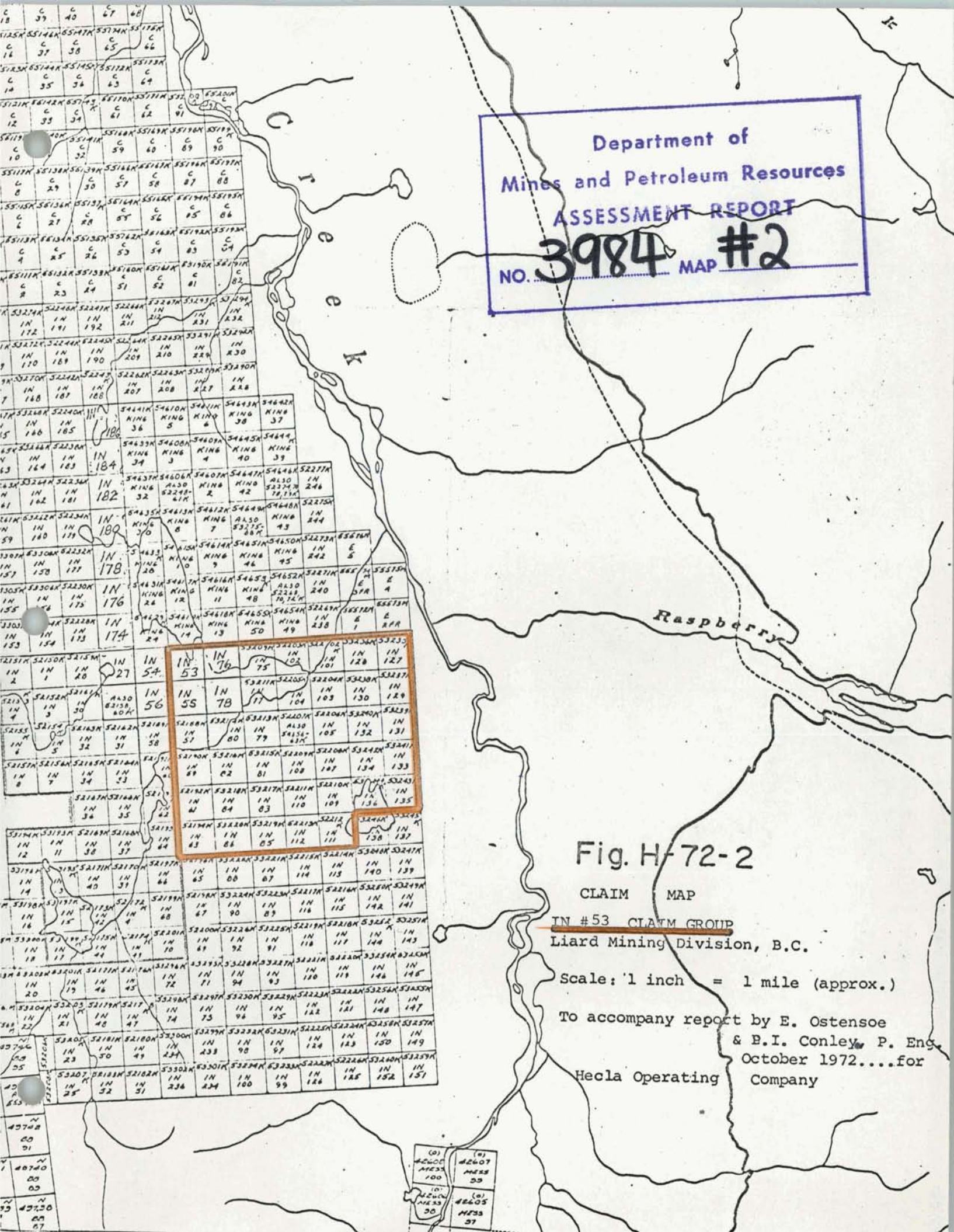


Fig. H-72-2

CLAIM MAP

IN #53 CLAIM GROUP

Liard Mining Division, B.C.

Scale: 1 inch = 1 mile (approx.)

To accompany report by E. Ostensoe & P.I. Conley, P. Eng. October 1972....for Hecla Operating Company

close to the claim block to accommodate the survey crews.

III FIELD WORK

The 1971 field work by Hecla Operating Company on the In #53 Group claims consisted of a number of geological mapping traverses by Harold Linder, Ph.D. P.Eng., James Mackie, P.Eng., and Erik Ostensoe, geologists. An enlarged photomosaic on scale 1" = 1,000 feet, prepared by McElhanney Engineering Ltd., was used for control. Due to a general lack of outcroppings elsewhere, particular attention was directed to stream channels and rock bluffs. Field observations were plotted on scale 1" = 1,000 feet (See figure H72-3).

The 1972 work was under the field direction of Gordon House and Ed Kruchkowski, geologists. Grid lines 1500S and 7000S were cut by Don Bartell and Chuck Beaulieu, linecutters. The induced polarization survey was conducted by a McPhar Geophysics Ltd. crew under the field direction of Alex Walcer and Scott Dunbar. In the In claims area the survey was carried out in routine fashion using a McPhar frequency-type system over 6.29 line miles of which 2.75 line miles was directly on claims of the In #53 group. The purpose was to supplement geological field data as an aid to evaluating the In #53 group claims. Apparent resistivities were also determined by McPhar and these results are reported together with the induced polarization survey results.

The McPhar Geophysics Ltd. report is submitted under separate cover in Appendix B. The report includes a detailed discussion of the theory, method of field operation and presentation of data.

IV GENERAL GEOLOGY

The area northwest of Mess Lake is underlain by volcanic and intrusive rocks thought to be of Mesozoic age. Structurally the area lies on and immediately east of the east side of the Coast Mountains. With reference to the general Mess Creek area, J. G. Souther (reference: Souther, 1971, Telegraph Creek Map Area, B.C., page 21)

states that -

> "The Triassic and lower to middle Jurassic terrain is broken into a mosaic of fault bounded blocks between which there is little structural continuity. The structural style of any given block is determined largely by the competency of the rocks within it."

Regional geological work by Hecla employees supports the concept that Mess Creek Valley and the "Start Lake - Skeeter Lake Valley" a few miles south of the subject area, are occupied by major faults. The area west of Mess Creek was apparently uplifted and eroded in post-Early Tertiary time but in general escaped burial by volcanic flows of the Spectrum Range and Mount Edziza Tertiary and Recent volcanic events.

V GEOLOGY OF THE IN #53 CLAIM GROUP

Reconnaissance mapping of the In #53 Group claims was limited by the small amount of bed rock exposed. With the exception of the southeasternmost corner of the claim block, the area is predominently quartz monzonite, andesite and diorite intimately mixed. In the southeast, in particular on the In #133 and In #135 claims, coarse grained recrystalized limestone and quartz porphyry rhyolite occur. Unconsolidated deposits of glacial and fluvial material are widespread throughout the area.

The structural geology of the In #53 claim group is poorly known. A few recorded attitudes indicate that a northeasterly component is dominant in the southeastern part of the area. Flat lying remnants of a limestone unit similar to that mapped on In #133 claim are known to outcrop north and northeast of Johnnie Lake, where it appears to overlie and thus be younger than the andesite member. A northwesterly striking shearing (N75°W, 90°) was noted in the creek canyon on In #78 claim. A strong shear zoned with attitude N10W/90° was noted near the In #101 - In #102 claim location line. Expressions of the Mess Creek fault (reference: Souther, 1971) or secondary structures related thereto were not recognized.

Coarse to medium grained quartz monzonite outcrops in the west central portion of the claim group. It is typically a massive red rock but white and pink phases were mapped elsewhere in the region. Variability of colour and grain size occur and may be functions of the amount of assimiliation of country rock that has occurred. A finer grained more foliated intrusive rock approximating diorite occurs with, or at least in close spacial relationship with, the quartz monzonite and it in turn exhibits gradation to andesite. It is not apparent whether the diorite is a marginal, or contact, phase of assimilation between the quartz monzonite of Hickman Batholith and the green andesite formation.

The andesite is widespread in the Schaft Creek - Mess Creek area. Its texture varies from very fine to medium grained. Flows, tuff and tuff breccia horizons have been recognized within the unit and, in adjoining areas, tuff is a prominent component. Chloritization with some epidotization is pervasive, reflecting a dominant greenschist facies of metamorphism. Magnetite content is uniformly about 2%.

The limestone unit is typically a white to ivory coloured coarse crystalline rock that weathers to a gray and gray-blue surface colour. The rock is apparently resistant both to weathering and physical attack as it forms bluffs and, elsewhere in the region, is frequently found as isolated patches on the tops of glaciated ridges.

Only one outcrop of rhyolite was noted in the In #53 claim group but the unit is abundantly represented nearby. Typically, it is buff coloured but occasionally is light green. Pyrite is usually present. Textures vary from cherty to porphyritic. The latter phase is particularly abundant and is characterized by angular equidimensional "glassy" quartz fragments.

Dark gray hornblende andesite occurs as a dike on In #132 claims.

Sulfide mineralization, mostly in the form of pyrite, is present in the quartz monzonite, diorite, andesite, and rhyolite units. Chalcopyrite is uncommon and generally occurs as very fine specks.

A few narrow veinlets of chalcopyrite were reported by prospectors. Minor specularite and magnetite mineralization is present in the andesite and diorite units.

VI INDUCED POLARIZATION AND RESISTIVITY SURVEY

Report on the Induced Polarization and Resistivity Survey on the In claim groups by P. Hallof and M. Goudie forms Appendix B of this report.

Two widely separated lines, 1500S and 7000S, were surveyed. Only parts of the lines were on claims of the In #53 group.

Both metal factor and frequency effect anomalies were indicated on Line 1500S. Small amounts of pyrite noted in the canyon of the northeasterly flowing stream that crosses Line 1500S at 57AE, if persistent throughout the andesite unit may be responsible for scattered weak frequency effect anomalies from 40AE to 77AE.

On Line 7000S a definite to probable resistivity and frequency effect anomaly extends almost continuously from 22E to 40E a distance of 1800 feet. As this anomaly occurs in an area of no geological information, additional field work including both magnetic and induced polarization surveys will likely be required.

A similar anomalous area extending eastward from 94E on Line 7000S can probably be related to a sulfide bearing rhyolite formation that outcrops about one mile south of the surveyed area.

Drilling and additional geophysical work were recommended by the contractors.

VII CONCLUSIONS

Geological mapping supplemented by induced polarization and resistivity surveys has adequately covered the In #53 Group claims in preliminary reconnaissance fashion. A scarcity of outcrops severely limits the correlation between the two types of surveys. Geochemical and magnetic surveys of the claim group are recommended. With the

exception of the southeastern corner of the group where the potential appears quite limited, the area is moderately attractive as a potential host for mineral deposits of the Liard Copper type.

REFERENCES

Souther, J.G., and Armstrong, J.E., 1966, North Central Belt of the Cordillera of British Columbia, in Tectonic History and Mineral Deposits of the Western Cordillera, C.I.M.M., Special Volume 8.

Souther, J.G., 1971-1, Geology and Mineral Deposits of Tulsequah Map Area, British Columbia, Geological Survey of Canada, Memoir 362.

1971-2, Telegraph Creek Map Area, British Columbia, Geological Survey of Canada, preliminary manuscript.

Sutherland-Brown, A., 1970, Geology Exploration and Mining in British Columbia, B. C. Department of Mines and Petroleum Resources.

APPENDIX A

IN #53 GROUP CLAIMS

Name	Date of Record	Record No.
In # 53 M.C.	August 5, 1971	52184
55	"	52186
57	"	52188
59	"	52190
61	"	52192
63	"	52194
75	August 6, 1971	53209
76	"	53210
77	"	53211
78	"	53212
79	"	53213
80	"	53214
81	"	53215
82	"	53216
83	"	53217
84	"	53218
85	"	53219
86	"	53220
101	August 5, 1971	52202
102	"	52203
103	"	52204
104	"	52205
105	"	52206
106	"	52207
107	"	52208
108	"	52209
109	"	52210
110	"	52211
111	"	52212
112	"	52213

IN #53 GROUP CLAIMS

(Continued)

Name	Date of Record	Record No.
In #127 M.C.	August 6, 1971	53235
128	"	53236
129	"	53237
130	"	53238
131	"	53239
132	"	53240
133	"	53241
134	"	53242
135	"	53243
136	"	53244

APPENDIX B

Induced Polarization and Resistivity survey by P. Hallof, Ph.D., P.Eng., and Marion A. Goudie, B.Sc.

See accompanying report by McPhar Geophysics Ltd.

APPENDIX C STATEMENT OF COSTS

A. SUMMARY

Field Expenditures	
1. Wages and Salaries plus employee costs and benefits	$1,665.20
2. Camp Operations - 56.5 man days at $10.00/man day	565.00
3. Contractors' charges - pro-rated to In #53 claim group	1,458.92
4. Field Transportation Costs	554.00
Total Field Expenditures	$4,243.12
Office Expenditures	
1. Wages and Salaries plus employee costs and benefits	$ 161.00
2. Miscellaneous, drafting and printing supplies, secretarial, et al	25.00
	$ 186.00
Total Expenditures In #53 Group	$4,429.12

B. DETAILS OF EXPENDITURES

Field Expenditures

1. Wages and Salaries (22 day month)

J. Mackie, Sept. 26, 1971 - 1 day @ $950/mo.	$ 43.00
H. Linder, Sept. 26, 28, 30 (½ day), 1971 2½ days @ $90/day	225.00
E. Ostensoe, Sept. 28, 1971, July 18, 1972 2 days @ $1170/mo.	106.00
G.D. House, July 16, 23, 29, August 1, 1972 4 days @ $950/mo.	172.00
Ed Kruchkowski, July 26-29, July 31, August 1, 2, 1972, 7 days @ $750/mo.	240.00
Don Bartell, July 27 - August 3, 1972, 8 days @ $650/mo.	236.00
Chuck Beaulieu, July 27 - August 3, 1972 8 days @ $650/mo.	236.00
Bert Smulders, July 27 - August 3, 1972 8 days @ $525/mo.	190.00
Sub-total Wages and Salaries	$1,448.00

STATEMENT OF COSTS

(Continued)

B/F		$1,448.00
Add 15% overhead and employee benefits, UIC, WCB, CPP, et al		217.20
Total Wages and Salaries plus employee costs and benefits		$1,665.20
2. Camp Operations		
56.5 man days (40 man days Hecla employees, 16.5 man days McPhar employees) @ $10/day		565.00
3. Geophysical Contractors Charges - In #53 group portion of survey only, pro-rated -		
$\frac{2.75 \text{ miles}}{6.29 \text{ miles}} \times \$3,353.85 =$		1,458.92
4. Field Transportation costs - essential helicopter service to mobilize crews, geophysical gear and camps from Schaft Creek camp to job site:-		
Bell 47G3B2 helicopter @ $155/hr. plus $5/hr. surcharge for extra fuel costs -		
July 23 - 1 hr. 50 min. July 24 - 1 hr. 40 min. Aug. 5 - 1 hr. 05 min. Aug. 6 - 2 hr. 15 min.		
TOTAL 6 hr. 50 min.		
Pro-rated - $\frac{2.75}{6.29} \times$ 6 hr.50 min.=		
2 hr. 30 min. @ $160/hr =	$400.00	
Bell 206 helicopter @ $265/hr.		
July 18, 1972 - total flying time 2 hrs. 30 min. of which 1 hr. 20 min. was applicable to In claims - pro-rated to In #53 claim group -		
$\frac{2.75 \text{ miles}}{6.29 \text{ miles}} \times$ 1 hr.20 min. x $265/hr =	$154.00	
Total Field Transportation Costs		554.00
Total Field Costs		$4,243.12

STATEMENT OF COSTS

(Continued)

B/F		$4,243.12
Office Expenditures		
1. Wages and Salaries		
E. Ostensoe, 2 days @ $1170/mo	$106.00	
Al Craig, draftsman, 1 day @ $750/mo.	34.00	
Sub-total	$140.00	
Add 15% employee costs and benefits	21.00	
Total Wages and Salaries plus employee costs and benefits	$161.00	
2. Miscellaneous, secretarial, drafting and printing supplies	25.00	
Total Office Expenditures		186.00
Total Expenditures In #53 Group		$4,429.12

I hereby certify that the above detailed Statement of Costs represents a true and accurate statement of direct costs incurred in carrying out the surveys described in the accompanying report. E & O E

October 16, 1972

P. I. Conley, P. Eng.,
Vice President and Manager
Hecla Mining Company of
Canada Ltd.

APPENDIX D - Statement of Qualifications

The field work for this report was done by Jim Mackie, P.Eng., H. Linder, Ph.D., P.Eng., E. A. Ostensoe and Ed Kruchkowski, geologists. Lines were cut by Don Bartell and Chuck Beaulieu. Drafting was by Al Craig.

The professional qualifications of geologists not presently registered with the Association of Professional Engineers in the province of British Columbia are detailed below:

1. G. D. House, B.A. (Mod.), AMIMM, Geologist - completed B.A. (Mod.) at Trinity College, Dublin, Eire, in 1961. Employed as a geologist by: (a) Roundtower Minerals Ltd., from March 1962 through June 1963 in Ireland; (b) Denison Mines Ltd., from August through October 1963, in Ireland; (c) Ghana Geological Survey from November 1963 through March 1965 in Ghana; (d) Newmont Mining Corporation of Canada Ltd. from June through August 1965, at Alice Arm, B.C.; (e) Alrae Engineering Ltd. from September 1965 through January 1970 on contracts in British Columbia, Yukon, N.W.T. and Saskatchewan; (f) Hecla Operating Company from April 1970 through December 1971, and June through August 1972, on projects in Yukon and at Schaft Creek area, B.C.; (g) at present a student (M.Sc. program) at University of Alaska, College, Alaska.

2. E. A. Ostensoe, B.Sc. (Hons.), Member CIMM, Association of Exploration Geochemists, Geologist - completed B.Sc. Honours course at University of British Columbia in 1960 and course requirements for M.Sc. at Queen's University in 1966; employed by Newmont Mining Corporation of Canada Ltd., under direction of Dr. G.W.H. Norman, P.Eng., from May 1960 through August 1964 as field geologist in Granduc Mine area, B.C., by Mount Billings Venture in southeastern Yukon in summer 1965, by Scud Venture (Asarco) in Iskut

River area, B.C. in summer 1966 and by Granduc Mines, Limited (NPL) and Hecla Mining Company of Canada Ltd. from October 1966 to present as Chief Geologist and Exploration Supervisor under the direction of P.I. Conley, P.Eng.

3. Ed Kruchkowski, B.Sc., Geologist - completed B.Sc. course at University of Alberta (Edmonton) in May 1972; in 1969, 1971 and 1972 employed by Hecla Operating Company in Schaft Creek area as coresplitter, soil sampler and geologist respectively. In 1970 employed by consultant and assigned to projects in southeastern British Columbia; at present a student at University of Alberta (Edmonton) and candidate for M.Sc. degree.

Overall supervision of the field work reported on herein was provided by Philip I. Conley, P.Eng., whose qualifications are outlined below:

Philip I. Conley, P. Eng. - Granted degree of B.S. Geology (University of Idaho, 1943); employed by American Smelting & Refining Company, Wallace, Idaho and Vancouver, B.C., May 1946 through December 1964, in positions, successively, of Geological Engineer, Resident Mine Geologist, Exploration Geologist, Senior Geological Engineer and Chief Geologist, Canada and Northwestern U.S. Exploration Division; employed by Hecla Mining Company of Canada Ltd., Vancouver, B.C., December 1964 to present date, Vice President and Manager. Responsible for direction of all mineral exploration and development work of the company in Canada.

JOHNNIE LAKE

Raspberry Creek

MESS CREEK

In 53 In 76 In 75 In 102 In 101 In 128 In 127

In 78 In 77 In 104 In 103 In 130 In 129

Line 15S

In 55 In 80 In 79 In 106 In 105 In 132 In 131

In 57 In 82 In 81 In 108 In 107 In 134 In 133

CAMPSITE

In 59 In 84 In 83 In 110 In 109 In 136 In 135

Lake

Lake

In 61 In 86 In 85 In 112 In 111

Line 70S

In 63

Shear

Shear

Shears

Tr. pyrite

Shears

Tr. pyrite 82

O claim post-approx
□ claim post-verified

5	Quartz monzonite and granite, red & pink, coarse to medium grained
4	Diorite, mixed with andesite
3	Andesite, tuffaceous andesite
2	Limestone, white to blue grey, recrystallized; chert lenses
1	Rhyolite, varicoloured, dense
O	Hornblende andesite dykes, dark grey
77/	Attitude of planar feature, bedding

P.I. Conley

HECLA OPERATING CO.

HICKMAN PROJECT

SCHAFT CREEK, B.C.

GEOLOGY of In 53 Claim Group

To accompany report by E. OSTENSOE & P.I. CONLEY, P.Eng. Sept. 1972.

Scale:	Date:		DWG No.
1"=1000'	August 1972		H-72-3

Report of

Geological Mapping, Geochemical Soil Survey

and Magnetometer Survey

IN #153 Claim Group, Northwest of Mess Lake,

Liard Mining Division, B. C.

57°30'N - 131°00'W

Map Sheet 104G-NE

by

Erik Ostensoe, B.Sc.

for Hecla Operating Company

Supervised by P.I. Conley, P.Eng.

July - October 18, 1971

Date of Report: September 5, 1972
Revised: October 2, 1972

P.I. Conley

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ILLUSTRATIONS (cont'd)

I SUMMARY

Employees of Hecla Operating Company worked on the In #153 Group claims in September and October 1971. Geological mapping, geochemical (soils) surveys and magnetic surveys were completed on a grid of cut lines that was established over the claims. The claims are located five to six miles northwest of Mess Lake in the Stikine area of northern British Columbia.

The In #153 Group claims are on the eastern edge of the Hickman Batholith and are underlain by granitic, monzonitic and dioritic(?) rocks and by tuffaceous and crystalline andesitic volcanic rocks. In parts of the area northerly-striking faults appear to control outcrop patterns.

Minor amounts of copper sulfide mineralization are present. The soil geochemistry coverage is insufficient to be a reliable guide to heavy metal content in bedrock. Magnetic patterns can be correlated with geology.

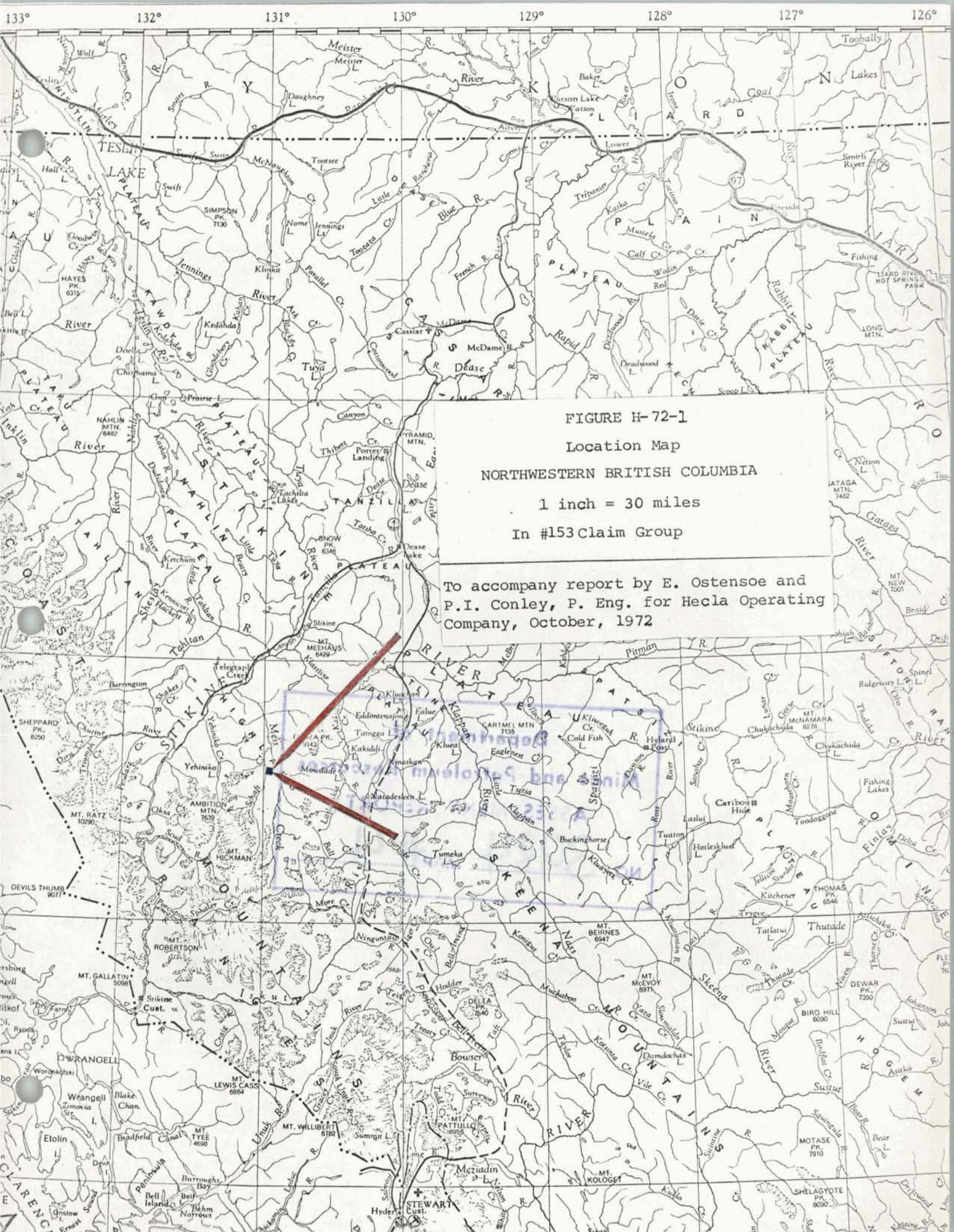
II INTRODUCTION

This Summary Report describes the work done during the 1971 field season following staking of claims of the In #153 Group. These claims are located on a plateau-like surface immediately east of Schaft Creek and west of a small lake, locally known as "Johnnie Lake". The settlement of Telegraph Creek is 25 miles north and the Schaft Creek exploration camp of Hecla Operating Company is 14 miles south. The Coordinates of the claim area are 57°30'N latitude and 131°00'W longitude and it appears on NTS Map Sheet 104G, Telegraph Creek (figure H-72-1).

Access to the property was by helicopters belonging to Vancouver Island Helicopters Ltd. based at Schaft Creek camp. Personnel and supplies were routed via Schaft Creek camp which was serviced regularly by aircraft from Terrace and Smithers. Daily radio telephone contact was maintained with Schaft Creek camp using a Spilsbury and Tindall SBX-10 transceiver.

Elevations in the area mapped range from 3,000' above sea level in the lakes and swamp areas to 3,800' El. on the glacially rounded knolls. Two miles south of the claim block the ridge between Mess Lake and Skeeter Lake valley rises to over 6,000' El. The knolls and hills are steep sided, whereas the lower areas are generally flat and swampy with development of tussocks of clump grass in muskegs.

Climactically, the area lies between the heavy precipitation zone of the coastal mountains and the rain shadow zone of the dry interior. Summers are warm to hot, and the winters are cold with snowfall to about five feet.


133°
132°
131°
130°
129°
128°
127°
126°
FIGURE H-72-1
Location Map
NORTHWESTERN BRITISH COLUMBIA
1 inch = 30 miles
In #153 Claim Group
To accompany report by E. Ostensoe and P.I. Conley, P. Eng. for Hecla Operating Company, October, 1972

Vegetation varies from black swamp spruce to jackpine and poplar, with alders and willow bushes in damper areas. The hills and knolls are generally open with spruce, jackpine and poplar. The lower more swampy areas have heavy stands of black spruce with willow and alder.

III CLAIMS

Claims of the In #153 claim group discussed in this report are listed in Appendix A and are illustrated in figure H-72-2b.

IV PREVIOUS WORK

Prior to 1971 the entire Mess Creek and Schaft Creek area was prospected several times by self-employed prospectors and on behalf of various mining companies. Hecla geologists have made several traverses in the "Johnnie Lake" area in the previous several years. During the early part of the 1971 season a Hecla prospecting party camped at "Johnnie Lake" and prospected the area.

Following claim staking in mid-July 1971 a decision was taken to evaluate the In #153 area and in early September the program herein described commenced.

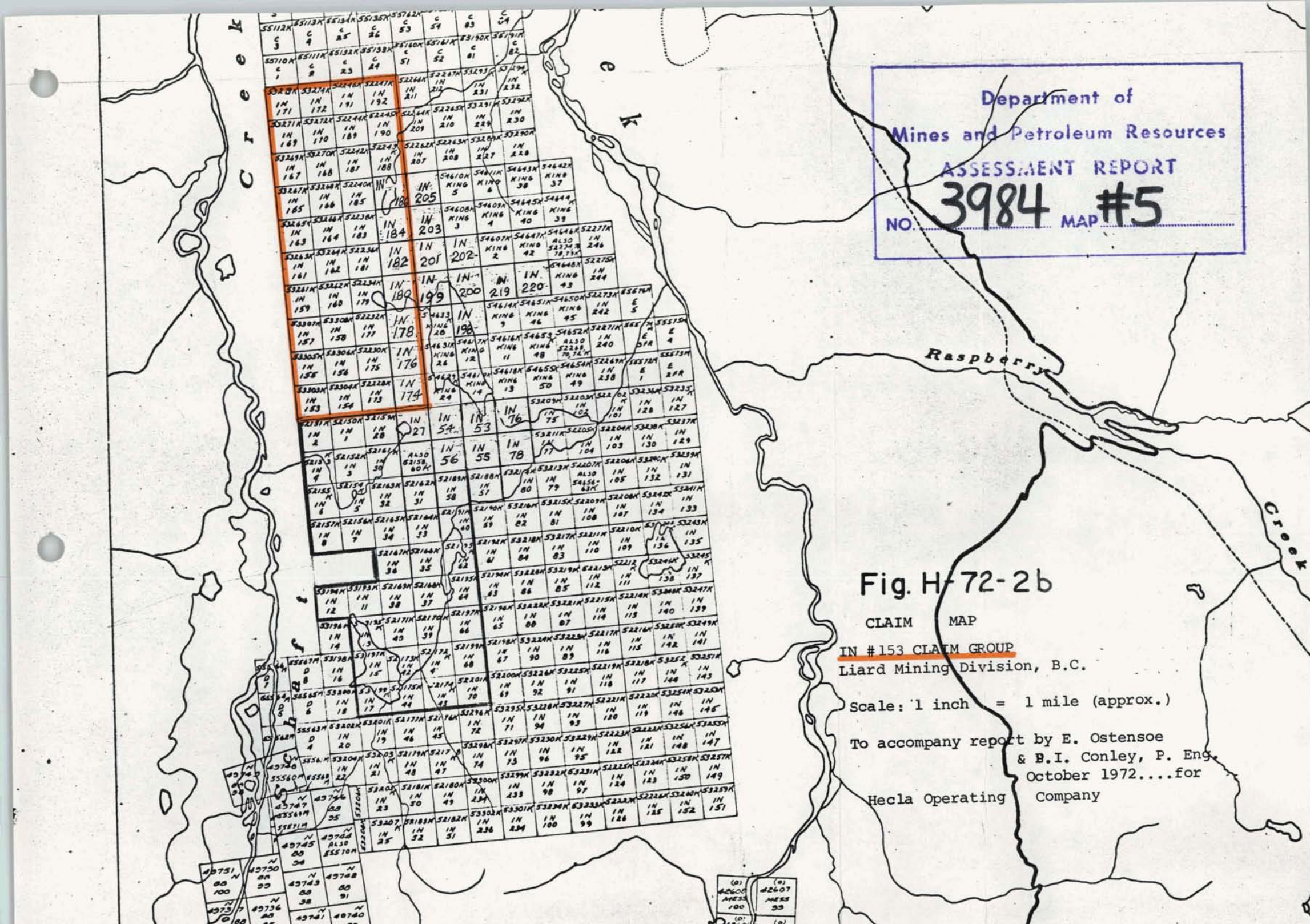
V FIELD WORK - 1971

The grid on the In #153 claim group consisted of a picketed base line on bearing of 175°, 14,200 feet long. Cross lines at right angles were cut at 1000 foot intervals and extended approximately 4,500 feet to the west and some lines were cut to the east edge of the claim block, a distance varying from 1500 to 2200 feet. A total of 73,800 feet of cross line was cut in the period September 10 to October 18, 1971. Slope corrections were applied as necessary to all chainages.

During the period September 10 to October 18, 1971, geological mapping was carried out over the entire In #153 claim group grid. A geochemical soil survey and a magnetometer survey commenced on October 3 and were completed on October 18, 1971.

The field work was done by: Jim Mackie, P.Eng., Harold Linder, Ph.D., P.Eng., and Erik Ostensoe, B.Sc. geologists; David Colley, geological technician; Don Bartell, Paul Dombrovski, Chuck Beaulieu, Bill Meilleur, Victor Mukans, linecutters; and Frank Gyenis, field assistant.

Field work was supervised by P. I. Conley, P.Eng., Vice President and Manager of Hecla Mining Company of Canada, Limited Harold Linder, Ph.D., P.Eng. in his capacity as consultant to Hecla,


Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3984 MAP #5
Raspberry
Creek
Fig. H-72-2b
CLAIM MAP
IN #153 CLAIM GROUP
Liard Mining Division, B.C.
Scale: 1 inch = 1 mile (approx.)
To accompany report by E. Ostensoe
& B.I. Conley, P. Eng.
October 1972....for
Hecla Operating Company

recommended the program of field work and assisted in its completion. This report was assembled from various sources, including field notes, inter office memoranda and preliminary reports. Final text was organized by Erik Ostensoe. Maps were prepared by C. L. Cory.

VI REGIONAL GEOLOGY

The regional geological setting of the Mess Creek - Schaft Creek area is discussed by Souther (1971-1, page 10 and 1971-2 page 4). Briefly stated, he places the area in a triangle formed by the south edge of the Stikine Arch, the east side of the Coast Crystalline Belt and the northwest side of the Bowser Basin. Granitic rocks of the Coast Crystalline Belt "exhibit a long complex history of emplacement, extending from early Mesozoic to Tertiary time". The Hickman Batholith, a major element in the area under discussion, is dated by Souther (1971-2, page 9) as latest Triassic to earliest Jurassic age. Sutherland Brown (p.49) gives it a Triassic age. Souther and Armstrong (p.172) illustrate a number of north-striking faults along the northwest rim of Bowser Basin. The following comment, (Souther, 1971-2, p.21) is particularly apt with respect to the Mess Creek - Schaft Creek area:

> "The Triassic and Lower to Middle Jurassic terrain is broken into a mosaic of fault-bounded blocks between which there is little structural continuity. The structural style of any given block is determined largely by the competency of the rocks within it."

Regional geological work by Hecla geologists supports the concept that Mess Creek valley and the "Start Lake - Skeeter Lake valley" a few miles south of the subject area, are occupied by major faults. The area west of Mess Creek was apparently uplifted and eroded in post Early Tertiary time but in general escaped burial by volcanic flows of the Spectrum Range and Mt. Edziza Tertiary and Recent volcanic events.

VII GEOLOGY OF THE In #153 CLAIM GROUP

a) Introduction

The geology of the In #153 claim group area was determined by mapping grid lines and noting the geology of nearby outcrops. In addition, most of the area between the lines was systematically traversed and an attempt was made to check on the ground, outcrops noted on aerial photographs or spotted from prominences. A photomosaic compiled by McElhanney Engineering Ltd. on scale 1 inch = 1000 feet was used to help maintain position and to field plot geology.

The main rock types in the area west and northwest of Johnnie Lake are intrusive rocks of the Hickman Batholith, mainly granite and quartz monzonite, and various types of andesitic volcanic rocks (figure H-72-3). A small amount of recrystallized limestone outcrops on In #191 claim. Diorite dykes are common in granitic and andesitic terrain.

Epidotization, chloritization and weakly developed feldspathization are common alteration effects. Magnetite is abundant in some areas and a common accessory mineral. Pyrite and chalcopyrite are present in small quantities. Jointing, shearing and foliation are present in virtually all outcrops.

b) Intrusive Rocks

The main intrusive rocks present in the In #153 claim group area are thought to be related to the Hickman Batholith which occupies several hundred square miles west of Schaft Creek. In the vicinity of Johnnie Lake the granitic rocks are either the fringes of the main body or outliers along its eastern edge. A typical "Hickman"-type granitic rock in that area is white, pink or reddish granite or quartz monzonite, coarse grained, weakly foliated, cut by a few fractures healed with quartz, calcite, chlorite or epidote and containing up to 15% mafic minerals, hornblende or biotite, that have been extensively chloritized. Sulfides, if present, are on fractures or are very fine grained and disseminated. Many outcrops are glacially polished and roche moutonee is a common feature.

c) Andesite and Diorite

Except in the southwestern portion of the claim group, the granitic intrusive rocks are intermixed with various andesitic and dioritic rocks. The andesite is correlated with a similar unit that is extensive throughout the Schaft Creek - Mess Creek area. It varies in texture from massive and fine grained to tuffaceous and coarse grained. As a result of the type of mapping carried out, members within the unit were not defined and consequently some structural details that might have been garnered were, in fact, missed.

Textures and alteration were profoundly influenced by the proximity of the Hickman Batholith and related intrusive bodies and some assimilation of the andesite by the granitic rocks has obviously occurred. The diorite is likely in part a product of the latter process. The diorite dykes, however, frequently exhibit chilled contacts indicating that they probably belong to a later-stage, i.e. post-Hickman Intrusion, event.

Weakly developed feldspathization is pervasive in the andesite. Epidote is erratic in occurrence but almost invariably is associated with some fracturing action such as dyke emplacement, shearing or jointing. Chlorite is present as an alteration product of the finer grained components of the andesite or tuff and occasionally occurs on shear planes.

d) Basic Volcanic Unit

At the northwest end of In #153 Group on In #171 and 172 claims, a prominent knoll, rising to about 3700 feet elevation, is comprised of fine grained very dark green andesite. This unit has been correlated, on the basis of textures and apparent composition, with the "augite porphyry basalt" unit found in the Liard Copper areas about 15 miles to the south. The rock is non-magnetic and the matrix is strongly chloritized. It appears that augite(?) phenocrysts have been altered to biotite. Small quantities of very finely disseminated chalcopyrite were noted in parts of the outcrops.

e) Limestone

Limestone mapped on In #191 claim is part of a large outcrop that caps a north-striking ridge. The west side of the ridge is a sharply-defined escarpment and may be a fault. Somewhat similar limestone was located about one and one-half miles to the southeast and the subject outcrop may be a fault emplaced remnant of a regionally occurring limestone unit that is present in Skeeter Lake and Mess Creek valleys a few miles to the south.

Most of the limestone is white, coarse-grained and recrystallized. Cream-yellow portions are dolomitic. The unit weathers dark grey or blue grey and contains interbedded dark grey siltstone layers a few millimeters thick. Recorded attitudes indicate an overall northwest strike, i.e. 325°, and steep northeasterly dips, i.e. 80°NE.

The obvious resistance of the limestone to physical weathering in a formerly glaciated a area is noteworthy.

f) Structural Geology

On the basis of rock fabrics and minor structures, including bedding, banding, jointing and shearing, the dominant structural trend in the In #153 claim group area is northeasterly. On the basis of major structures that are to a greater extent inferred from topography or extrapolated from regional geology, a co-dominant northerly trend can be established. By what may be gross simplification, the structural geology may be characterized

as poorly defined minor distortion due to rather passive emplacement of the Hickman Batholith by assimilation, stoping and warping, followed by strike-slip activity of the Mess Creek and Schaft Creek faults, development of oblique secondary faults and rotation and tilting of the resultant blocks. The mechanism by which the limestone on In #191 claim was emplaced is obscure. The limestone outcrops are abruptly terminated by small escarpments on east and west sides and the unit was probably a fault "slice" down thrown into its present position. The west side of the basic volcanic unit (augite porphyry basalt?) on In #171 claim is similarly formed by a steep escarpment and a north-striking fault may be present in that position.

VIII GEOCHEMICAL SOIL SURVEY

a) Introduction

Where soil conditions permitted, soil samples were taken at 200 foot intervals on all grid lines on In #153 Group claims. 330 soils were analysed for copper, molybdenum, lead and arsenic (Appendix B).

Soil conditions in the In #153 claims area are quite variable as a result of 1) drainage, 2) different soil types - (a) residual soil (b) glacial till (c) alluvium and (d) swamp. Swamps were not sampled. The B soil horizon is usually darkest red at the top and becomes lighter red at depth. Gritty textures are attributed to metallic salts in the soil but may also in part result from presence of partly weathered volcanic ash. The C soil horizon is distinctively yellow-grey in color and thus was easily eliminated from the soil samples.

Samples were taken using standard methods. A mattock was used to chop through roots and organic soils to expose the B soil horizon - a reddish brown granular textured layer usually found from 4 to 12 inches below surface. A few ounces of B horizon soil was placed in a numbered kraft envelope which was air-dried for a few days then shipped to Chemex Labs Ltd., North Vancouver, B. C. for analyses. Chemex Labs Ltd. employed standard techniques of geochemical analysis using the atomic absorption method for copper, molybdenum, lead, zinc and silver and lead and a colorimetric method for arsenic. Quality control was ensured by frequent reference to known standards prepared for the purpose. Upon receipt at the laboratory, samples were dried at 80°C for 24 hours, then sieved to -80 mesh in stainless steel and nylon sieves. A 2 to 3 hour perchloric acid - nitric acid digestion of 0.5 grams of sample at 230°C was followed by dilution with distilled water to 25 mls. volume. Techtron atomic absorption spectrometers and a Bausch and Lomb Spectronic 20 colorimeter were employed.

More detailed sampling has been recommended as well as determination of pH of soils and a program of rock chip analysis.

b) Copper

A cumulative percentage plot of copper analyses indicated background of 32 ppm. Values above 90 ppm were considered anomalous. Figure H-72-4 on scale 1" = 400 ft. depicts distribution of copper in soils. Although adequate to reveal large scale anomalies the grid of lines at 1000 foot spacing does not permit meaningful contouring. With the exception of anomalous values in the vicinity of In #172 claim, no significant trends of copper in soil were recognized.

c) Molybdenum

A cumulative percentage plot of molybdenum analyses indicated a background of 1 ppm and anomalous level at 4 ppm. A prominent zone of anomalous molybdenum in soils, with values up to a maximum of 55 ppm, is indicated by the plot of analyses: Figure H-72-5. It extends from the vicinity of "Duck" Lake at Line 40 North, south to the zero line with widths to 1000 feet. No unusual amounts of molybdenum are associated with anomalous copper values in the vicinity of In #172 claim.

d) Lead

Lead content of soils was found to be quite uniform, in the range of 14 to 22 ppm. No anomalous zones were indicated by the soil survey and the plan was not contoured: Figure H-72-6.

e) Arsenic

Arsenic was selected for analysis as a possible "pathfinder" or guide to base metal occurrences. Values in the range of 2 to 7 prevail throughout the In #153 Group claims area (Figure H-72-7) and the plan was not contoured.

IX MAGNETOMETER SURVEY

a) Introduction

The In #153 Group claims were surveyed using a McPhar Model M700 fluxgate-type magnetometer, serial number 6811. Operator was D. Colley. A total of 16.5 line miles of grid was surveyed.

A control station was established at the Long Lake campsite and the instrument was re-set to a constant reading each day. Diurnal variations were also checked by repeating readings at certain

points (usually at the base line) several times daily. Corrections were applied when significant variations occurred. Readings were taken at 100 foot intervals on grid lines spaced 1000 feet apart (figure H-72-8).

The absolute earth's magnetic field at Long Lake control station was determined by the method described in the McPhar handbook that accompanies the M-700 instrument. A value of +41,500 gammas was obtained.

b) Discussion of Magnetometer Survey

Within the In #153 claim group magnetic susceptibilities are between -400 gammas and +800 gammas. A north-northeasterly striking magnetic trend was derived by contouring at 200 gamma intervals (figure H-72-8). The biased grid, with readings at 100 foot spacing on lines 1000 feet apart, undoubtedly influenced contouring but reasonable correlation with geology was achieved.

On In #191 claims the limestone in outcrop is defined by a -600 gamma contour. The basic volcanic unit that occupies part of In #171 claim is similarly prominent, with readings up to 600 gammas in terrain with background from 0 to -200 gammas. The inferred fault west of this unit (page 6) is suggested by the linearity of the 0 and 200 gamma contours on In #171 and In #169 claims.

Elsewhere in the area granitic terrain has magnetic susceptibilities in the 0 to -200 gammas magnitude and andesite is more variable but generally in the +200 to +400 gamma range. The significance of a magnetic gradient traceable on strike N45°E from the southwest corner of In #157 claim to In #186 claim west of Long Lake is not known.

X CONCLUSIONS AND RECOMMENDATIONS

The In #153 Group claims have been partially investigated by geological mapping, soil geochemistry studies and a magnetometer survey. The grid of lines at 1000 foot spacing is adequate only to permit statement of preliminary conclusions.

The geology of the claims is dominated by "acid" intrusive rocks. Basic volcanic rocks and limestone occur at the north edge of the group.

Anomalous values of copper in soil occur in the vicinity of outcroppings of the basic volcanic unit. Strongly anomalous amounts of molybdenum in soil occur in the southeast portion of the

groups but are not explained by known occurrences of molybdenite. In most of the area there is no correlation between values of copper and molybdenum in soils. Nothing of value was gained from lead and arsenic analyses of the soils. The magnetometer survey was useful and facilitated extrapolation of geological data.

Additional grid work to provide coverage with lines at 500 foot spacing, followed by additional geological mapping, prospecting, soil sampling and magnetometer surveys is recommended. Soils should be analysed for copper and molybdenum. A suite of bedrock samples for rock geochemistry studies should be collected.

REFERENCES

Souther, J.G., and Armstrong, J.E., 1966, North Central Belt of the Cordillera of British Columbia, in Tectonic History and Mineral Deposits of the Western Cordillera, C.I.M.M., Special Volume 8.

Souther, J.G., 1971-1, Geology and Mineral Deposits of Tulsequah Map Area, British Columbia, Geological Survey of Canada, Memoir 362.

1971-2, Telegraph Creek Map Area, British Columbia, Geological Survey of Canada, preliminary manuscript.

Sutherland-Brown, A., 1970, Geology Exploration and Mining in British Columbia, B. C. Department of Mines and Petroleum Resources.

APPENDIX A

IN #153 CLAIM GROUP

Name	Date of Record	Record No.
In #153	August 5, 1971	53303
154	"	53304
155	"	53305
156	"	53306
157	"	53307
158	"	53308
159	August 6, 1971	53261
160	"	53262
161	"	53263
162	"	53264
163	"	53265
164	"	53266
165	"	53267
166	"	53268
167	"	53269
168	"	53270
169	"	53271
170	"	53272
171	"	53273
172	"	53274
173	August 5, 1971	52228
174	"	52229
175	"	52230
176	"	52231
177	"	52232
178	"	52233
179	"	52234
180	"	52235
181	"	52236
182	"	52237
183	"	52238
184	"	52239
185	"	52240
186	"	52241
187	"	52242
188	"	52243
189	"	52244
190	"	52245
191	"	52246
192	"	52247

APPENDIX B

GEOCHEMICAL ANALYSES

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 10018

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B.C.

INVOICE NO. 6420

DATE RECEIVED Oct. 21/71

DATE ANALYSED Oct. 27/71

ATTN: Mr. P. Conley

"Shaft Cr."

SAMPLE NO.:	PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L-0 44W	236	2	18	2
40	24	0	16	2
38	14	0	16	4
36	74	0	18	2
34	20	2	18	1
32	80	0	18	1
28	46	0	18	5
26	46	0	20	3
24	16	0	16	2
22	400	7	31	3
20	18	0	20	3
18	21	0	22	2
16	28	4	14	3
14	96	13	20	1
12	14	4	18	3
8	30	17	24	4
6	28	5	20	3
4+25W	60	5	28	4
BL	18	3	20	3
2+25E	24	0	24	3
4+25	20	0	22	3
6	30	0	26	3
8	38	1	20	2
10	24	0	24	3
12	18	0	26	2
14+35	21	0	24	6
16	28	0	28	5
L-10N 42W	22	0	12	2
38+55	24	0	12	2
36	33	1	10	2
32	40	1	8	3
30	70	1	14	2
28+25	13	2	10	4
26	28	0	14	2
24	31	0	14	2
22	41	0	10	4
20	36	1	14	3
18	22	1	16	3
16	24	0	18	2
10	90	25	16	2
8	26	3	14	2
6	20	1	14	3
4	28	1	12	3
2W	33	0	16	2
BL	18	0	12	2
2E	30	0	14	2
4	22	1	14	4
6	138	1	16	3
L-10N 8E	48	0	14	2
Std. #28	52	17	20	3

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 16820
INVOICE NO. 6420
DATE RECEIVED Oct. 21/71
DATE ANALYSED Oct. 28/71

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN: Mr. P. Conley

"Shaft Cr."

SAMPLE NO.:	PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L-10N 14E	22	2	14	2
L-20N 44W	12	1	12	3
42	33	1	16	2
34	28	0	12	3
32	30	1	12	2
26	33	1	30	5
24	20	2	14	3
22	16	3	22	3
20	16	0	14	2
18	22	1	14	2
14	62	25	18	4
12	54	9	14	3
8	16	2	14	3
6	13	2	14	3
4	20	2	16	2
L-20N 2W	44	7	18	2
L-30N 45W	16	3	18	3
34	18	1	12	2
32	16	0	14	3
30	18	0	18	1
28	52	0	20	2
16	16	1	20	3
14	13	1	22	4
12	31	10	22	5
10	44	55	30	5
8	52	32	28	3
6	42	17	26	3
L-30N 4W	14	20	24	2
L-40N 44W	126	1	28	2
42	10	1	20	3
40	24	0	22	2
38	20	0	20	3
36	16	1	18	3
34	10	1	14	2
32	28	0	14	3
30	14	0	16	1
20	51	0	28	7
18	28	2	22	4
16	46	2	22	3
14	16	2	18	3
L-40N 12W	14	0	20	2
Std. #24	54	17	22	4

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CERTIFICATE NO. 16821

INVOICE NO. 6420

DATE RECEIVED Oct. 21/71

DATE ANALYSED Oct. 28/71

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN: Mr. P. Conley "Shaft Cr."

SAMPLE NO.:	PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L-40N 10W	80	2	20	3
8	16	3	22	3
6	16	19	24	2
4W	21	25	20	5
L40N BL	22	0	22	3
L-50N 42W	31	0	16	3
40	24	0	20	4
38	14	1	24	3
36	12	0	18	3
34	56	1	14	2
30	16	2	18	3
26	33	0	18	4
12	31	3	20	5
10	18	1	18	3
8	13	0	20	3
6	18	0	22	2
4	34	3	26	3
2W	36	1	24	3
L 50N BL	33	0	26	10
L 60N 44W	12	0	14	2
42	13	0	18	2
40	18	0	14	2
38	10	0	10	3
36	13	0	14	2
34	24	0	18	3
32	20	0	18	3
30	16	0	18	4
28	14	0	20	4
26	21	0	12	4
24	16	0	14	3
22	14	0	12	2
20	31	1	14	2
14	31	0	12	2
12	18	2	12	3
7+30	16	1	12	3
6	14	1	6	2
4	18	0	14	3
2W	20	0	16	3
BL	18	0	12	2
L60N 2E	16	2	14	3
STd. #24	52	17	20	5

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Certified by

SAMPLE NO.:	PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L-60N 4E	88	2	18	5
6	31	1	20	4
8	21	0	18	4
10	26	2	20	6
12+25	26	0	20	4
14	22	0	18	3
16	24	1	20	6
18	18	2	20	6
20	18	1	18	3
22	80	0	22	10
L-70N 42W	28	0	8	3
40	20	0	10	2
38	21	0	10	3
36	16	2	14	2
34	18	0	16	2
32	14	0	18	2
L-70N 29+70W	16	0	18	2
Std. #24	52	16	18	4
L-70N 28W	16	0	16	3
26	14	0	14	2
24	28	0	14	2
22	13	0	18	2
20	26	0	18	10
18	46	0	16	3
16	56	0	16	2
14	21	0	14	2
12	36	1	18	3
10	33	0	30	4
8	16	0	20	3
6	24	0	20	3
4	21	0	18	3
2W	41	0	20	7
L-70N BL	44	0	20	5
L-80N 44W	26	0	16	3
42	14	0	14	2
40	14	1	16	3
38	42	1	10	3
36	14	0	12	2
34	22	0	12	2
32	14	0	14	2
30	22	0	12	3
28	18	1	16	3
26	14	0	14	2
24	13	0	16	2
22	21	0	14	2
20	20	0	14	2
18	31	0	18	5
16	22	0	18	3
14	21	0	18	3
12	13	1	18	3
10	26	1	18	3
8	10	0	18	2
6	8	0	16	3
4	14	0	22	3
2W	33	0	20	4
BL	16	0	18	3
2E	31	0	16	3
L-80N 4E	16	0	18	3
Std. #24	52	16	18	4

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L-80N 6E	110	0	20	4
8	13	3	20	3
10	22	1	20	2
14	18	1	18	5
16	40	0	18	10
18	12	2	20	3
20	26	0	24	5
22	18	1	18	4
L-90N 44W	20	0	14	3
42	13	0	10	3
40	13	1	14	3
38	14	0	12	2
36	16	0	16	2
L-90N 34W	16	0	14	2
Std. #24	52	17	20	3
L-90N 32W	30	0	14	2
30	18	0	14	2
28	18	0	16	3
26	84	0	20	2
24	20	2	16	5
22	24	0	18	4
16	42	0	22	4
14	90	0	24	3
12	28	0	18	4
10	26	0	20	5
8	20	0	16	3
6	13	0	20	3
4	33	1	18	5
L-90N 2W	21	0	16	2
L-90N BL	18	0	18	5
L-100N 44W	26	0	16	2
42	24	0	18	2
40	16	0	14	2
38	12	0	16	3
36	10	0	16	2
34	26	0	16	2
32	20	0	18	3
30	13	0	18	2
28	14	0	18	3
26	66	0	20	2
24	16	0	16	2
22	51	0	18	3
20	24	0	20	3
18	36	0	20	2
16	12	0	20	3
14	14	0	22	3
12	12	1	20	3
10	14	0	20	3
8	10	1	20	2
6	8	1	18	2
4	8	1	22	2
2W	14	0	20	4
L-100N BL	20	0	22	2
L-110N 45W	33	0	18	3
L-110N 44W	10	0	16	2
Std. #24	54	17	20	4

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TO: Hecla Mining Co. of Can. Ltd.,
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Vancouver, B. C.

INVOICE NO. 6430
DATE RECEIVED Oct. 21/71
DATE ANALYSED Oct. 29/71

ATTN: Mr. P. Conley "Shaft Cr."

SAMPLE NO.:		PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L110N	42W	14	0	18	3
	40	26	0	18	3
	38	31	0	16	3
	36	16	0	18	2
	34	13	0	16	3
	32	13	1	18	2
	30	13	1	20	3
	28	18	0	16	2
	26	22	0	18	3
	24	21	0	20	3
	22	14	0	20	2
	20	16	0	18	3
	18	8	0	22	2
	16	14	0	22	2
	14	14	0	22	2
	12	8	0	16	2
	10	14	3	20	3
	8	8	0	20	2
	2W	7	0	18	3
	BL	20	0	20	3
	2E	12	0	20	3
	4	14	0	24	3
	6	14	0	22	5
	8	21	0	20	5
	12	33	0	20	6
	14	10	0	22	2
	16	13	0	22	6
	20	30	1	18	10
	22	14	1	18	3
L 120N	44W	30	0	20	3
	42	44	0	18	5
	40	34	0	16	3
	38	28	0	20	2
	36	28	0	18	2
	34	14	0	18	2
	32	22	0	16	3
	30	40	0	16	3
	28	12	0	14	2
	26	31	0	16	6
	24	22	0	18	5
	22	20	0	20	10
	16	20	0	18	4
	14	20	0	20	3
	12	21	0	20	4
	10	13	1	22	3
	8	63	0	22	3
	6	22	0	20	3
	4	24	0	20	3
	2W	41	0	20	3
	BL	30	0	20	3
	2E	30	0	18	3
	4	22	0	16	2
	6	54	0	24	6
L120N	8E	36	0	18	3
STd. #24 5		51	17	18	3

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CERTIFICATE NO. 16828
INVOICE NO. 6430
DATE RECEIVED Oct. 21/71
DATE ANALYSED Oct. 29/71

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings,
Vancouver. B. C.

ATTN: Mr. P. Conley "Shaft Cr."

SAMPLE NO.:	PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L 120N 10E	22	0	16	3
12+90	21	0	20	2
14	18	0	18	8
16	26	0	16	7
18+75	33	0	16	5
20+85	13	0	20	5
22	13	0	18	10
L 130N 45W	31	0	12	3
44	46	1	14	5
42	48	0	10	3
40	28	0	10	3
L 130N 38W	20	0	12	3
L130N 36W	48	0	12	2
34	14	0	14	3
32	16	0	14	3
30	34	0	14	5
28	24	0	12	3
26	14	0	16	3
24	36	0	16	5
22	10	0	18	3
20	42	0	18	5
18	58	0	18	5
16	76	0	22	5
12	42	0	16	3
10	41	0	20	5
8	20	0	16	5
4	36	0	16	10
2W	16	0	20	10
BL	30	0	16	12
2E	22	2	18	5
4	28	1	18	8
6	22	0	18	15
8	54	0	20	7
10	14	2	22	6
12	40	0	18	7
14	26	2	20	7
16	38	0	18	5
20	14	0	16	6
22	13	0	18	7

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 16830
INVOICE NO. 6430
DATE RECEIVED Oct. 21/71
DATE ANALYSED Oct. 29/71

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings,
Vancouver, B. C.

ATTN: Mr. P. Conley "Shaft Cr."

SAMPLE NO.:	PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L 140N 45W	13	0	14	3
44	28	0	12	3
42	14	0	12	3
40	20	0	10	3
38	18	3	16	3
36	16	0	14	7
34	13	0	16	3
32	26	0	18	12
30	14	2	18	3
20	62	0	22	7
18	58	1	20	5
16	98	1	20	7
14	41	0	22	6
10	33	0	16	6
8	41	0	20	4
6+25W	30	0	20	4
BL	46	2	18	5
2E	20	2	20	5
4	28	2	18	8
6	22	1	18	6
10	30	0	18	10
12	24	3	18	7
14	14	0	20	6
16	20	0	18	4
18	63	3	20	3
20	20	4	18	4
22	60	2	18	9
L 140N 24E	41	0	20	9
Std. #24	51	17	20	6

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by

APPENDIX C STATEMENT OF EXPENDITURES

A. SUMMARY OF EXPENDITURES

Field Expenditures

1.	Wages and Salaries plus 15% employee costs and benefits	$3,781.00
2.	Geochemical Analyses	1,138.50
3.	Camp Operations and Supplies	1,070.00
4.	Magnetometer Rentals	157.50
	Total Field Expenditures	$6,147.00

Office Expenditures

1.	Wages and Salaries	$ 646.37
2.	Drafting Services	75.00
3.	Miscellaneous, secretarial, drafting and printing supplies	25.00
	Total Office Expenditures	$ 746.37

Total Expenditures IN #153 claim Group $6,893.37

B. DETAILS OF EXPENDITURES

Field Expenditures

1. Wages and Salaries (22 day month)

J. Mackie, Sept. 27, October 1, 2, 4, 5, 7-12, 1971 11 days @ $950/mo.	$ 475.00
H. Linder, October 6,1971 1 day @ $90/day	90.00
E. Ostensoe, Sept. 18, Oct. 12, 15, 1971 3 days @ $1170/mo.	160.00
D. Colley, Oct. 2, 6 (1/2 day), 8-11, 16, 18, 1971 7½ days @ $575/mo.	196.00

STATEMENT OF EXPENDITURES
(Continued

F. Gyenis, Oct. 2, 6 (1/2 day), 8-11, 16, 18, 1971 7½ days @ $20/day		$ 150.00
D. Bartell, Sept. 12-21, 26, Oct. 1, 1971 16 days @ $600/mo		436.00
C. Beaulieu, Sept. 12-21, 26, Oct. 1, 1971 16 days @ $600/mo.		436.00
W. Meilleur, Sept. 12-21, 26, Oct. 12, 1971 27 days @ $600/mo.		736.00
P. Dombrovski, Sept. 12-15, 1971 4 days @ $600/mo.		109.00
V. Mukans, Sept. 29 - October 12, 1971 14 days @ $800/mo.		500.00
Sub-total Wages and Salaries		$3,288.00
Plus 15% Employee Costs and Benefits		493.00
Total Wages and Salaries		$3,781.00
2. Geochemical Analyses		
330 soil samples - preparation @ 0.20/spl.	$ 66.00	
- analysed for copper, molybdenum lead and arsenic @ $3.25/spl.	1,072.50	
Total -		$1,138.50
3. Camp Operations and Supplies		
107 man days @ $10/man day		1,070.00
4. Magnetometer Rentals		
7½ days @ $21/day		157.50
Total Field Expenditures		$6,147.00

Office Expenditures

1. Wages and Salaries		
D. Colley, Nov. 15-30, 1971 1/2 month @ $575/mo.	$ 287.50	
E. Ostensoe, total of 5 days @ $1170/mo.	275.00	
Subtotal	$ 562.50	

STATEMENT OF EXPENDITURES
(Continued)

Subtotal	$ 562.50	
Plus 15% Employee Costs and Benefits	84.37	
Total Wages and Salaries		$ 646.37
2. Drafting Services		
C.L. Cory, 15 hrs. @ $5/hr.		75.00
3. Miscellaneous, secretarial, printing and drafting supplies		25.00
Total Office Expenditures		$ 746.37
Total Expenditures IN #153 claim Group		$6,893.37

I hereby certify that the above detailed Statement of Expenditures represents a true and accurate statement of direct costs incurred in carrying out the surveys described in the accompanying report. E & O E

October 26, 1972

P I Conley

P. I. Conley, P. Eng.,
Vice President and Manager
Hecla Mining Company of Canada Ltd.

APPENDIX D Statement of Qualifications

The professional qualifications of technical personnel engaged in the work reported on herein, who are not presently registered with the Association of Professional Engineers in the province of British Columbia, are detailed below:

1. E. A. Ostensoe, B.Sc. (Hons.), Member CIMM, Association of Exploration Geochemists, Geologist - completed B.Sc. Honours course at University of British Columbia in 1960 and course requirements for M.Sc. at Queen's University in 1966; employed by Newmont Mining Corporation of Canada Ltd., under direction of Dr. G.W.H. Norman, P.Eng., from May 1960 through August 1964 as field geologist in Granduc Mine area, B.C., by Mount Billings Venture in southeastern Yukon in summer 1965, by Scud Venture (Asarco) in Iskut River area, B.C. in summer 1966 and by Granduc Mines, Limited (NPL) and Hecla Mining Company of Canada Ltd. from October 1966 to present as Chief Geologist and Exploration Supervisor under the direction of P. I. Conley, P.Eng.

2. David Colley, geological technician, formerly student in geological engineering and applied mathematics at University of British Columbia and University of Victoria; employed by Amax Explorations in summers of 1969 through 1971 as field assistant and geochemical sampler, and by Hecla Operating Company from September through December 1971 as geochemical sampler and geophysical technician.

Report of

Geological, Geochemical

and

Magnetometer Surveys

IN #198 Group, located 5 1/2 miles north of Mess Lake

Liard Mining Division, B. C.

by

Erik Ostensoe, B.Sc.

for

Hecla Operating Company

Under Supervision of P. I. Conley, P. Eng.

Date of Work - September to October, 1971

Date of Report - October, 1972

P I Conley

Photograph 1. View of Johnnie Lake, looking west to In #199 claim; Hickman Batholith in distance.

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

ILLUSTRATIONS

I SUMMARY

Employees of Hecla Operating Company worked on the In #198 Group claims in September and October 1971. Geological mapping, geochemical (soils) surveys and magnetic surveys were completed on a grid of cut lines that was established over the claims. The claims are located five to six miles northwest of Mess Lake in the Stikine area of northern British Columbia.

The In #198 Group claims are near the eastern edge of the Hickman Batholith and are underlain by granitic, monzonitic and dioritic(?) rocks and by tuffaceous and crystalline andesitic volcanic rocks.

Minor amounts of copper sulfide mineralization are present. The soil geochemistry coverage is insufficient to be a reliable guide to heavy metal content in bedrock. Magnetic patterns can be correlated with geology.

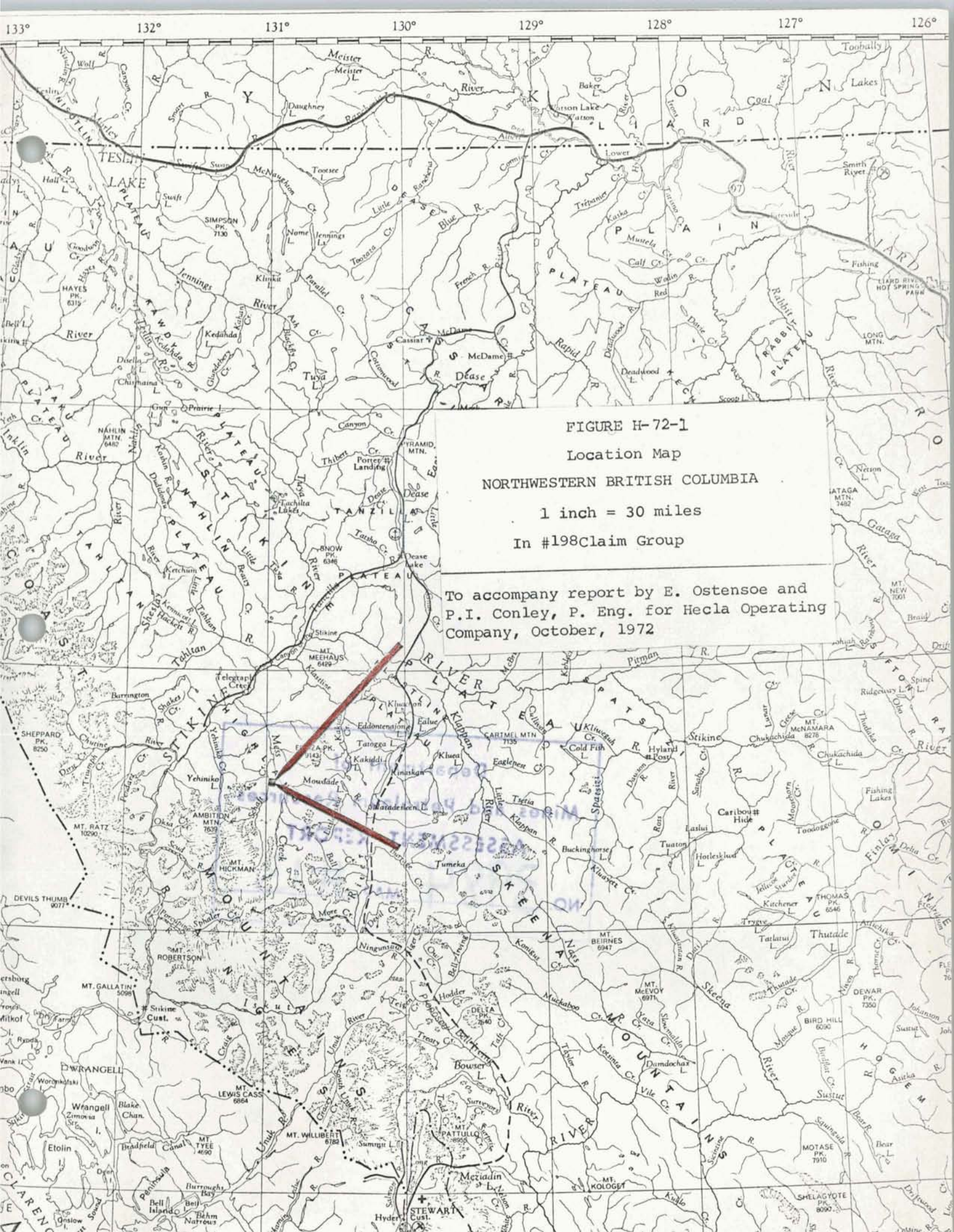
II INTRODUCTION

This Summary Report describes the work done during the 1971 field season following staking of claims of the In #198 Group. These claims are located on a plateau-like surface immediately west of Mess Creek and north and east of a small lake, locally known as "Johnnie Lake". The settlement of Telegraph Creek is 25 miles north and the Schaft Creek exploration camp of Hecla Operating Company is 14 miles south. The coordinates of the claim area are 57°30'N latitude and 131°00'W longitude and it appears on NTS Map Sheet 104G, Telegraph Creek (figure H-72-1).

Access to the property was by helicopters belonging to Vancouver Island Helicopters Ltd. based at Schaft Creek camp. Personnel and supplies were routed via Schaft Creek camp which was serviced regularly by aircraft from Terrace and Smithers. Daily radio telephone contact was maintained with Schaft Creek camp using a Spilsbury and Tindall SBX-10 transceiver.

Highest elevations in the area mapped are close to 3,200' above sea level, with general relief of up to 300 feet. (photograh 1) The northeast corner in the vicinity of In #232 claim is as low as 2,200 feet elevation. Two miles south of the claim block the ridge between Mess Lake and Skeeter Lake valley rises to over 6,000' El. The knolls and hills are gently rounded, whereas the lower areas are generally flat and swampy with development of tussocks of clump grass in muskegs.

Climactically, the area lies between the heavy precipitation zone of the coastal mountains and the rain shadow zone of the dry interior. Summers are warm to hot, and the winters are cold with snowfall to about five feet.


133°
132°
131°
130°
129°
128°
127°
126°
FIGURE H-72-1
Location Map
NORTHWESTERN BRITISH COLUMBIA
1 inch = 30 miles
In #198Claim Group
To accompany report by E. Ostensoe and P.I. Conley, P. Eng. for Hecla Operating Company, October, 1972

Vegetation varies from black swamp spruce to jackpine and poplar, with alders and willow bushes in damper areas. The hills and knolls are generally open with spruce, jackpine and poplar. The lower more swampy areas have heavy stands of black spruce with willow and alder.

III CLAIMS

Claims of the In #198 claim group discussed in this report are listed in Appendix A and are illustrated in figure H-72-2. The claims are in part in conflict with the "King" claims also staked in mid-July 1971 by Union Miniere Explorations and Mining Corporation.

IV PREVIOUS WORK

Prior to 1971 the entire Mess Creek and Schaft Creek area was prospected several times by self-employed prospectors and on behalf of various mining companies. Hecla geologists had made several traverses in the "Johnnie Lake" area in the previous several years. During the early part of the 1971 season a Hecla prospecting party camped at "Johnnie Lake" and prospected the subject area.

Following claim staking in mid-July 1971 a decision was taken to evaluate the entire area and in early September the program herein described commenced on the In #198 Group claims.

V FIELD WORK - 1971

The grid on the In #198 claim group consisted of a series of picketed lines slashed on bearing of 085°. The cross lines originated at a baseline on bearing 355° that extneds the length of the plateau-like area and lies about 2,000 feet west of the west edge of the In #198 Group claims. A total of 22,600 feet of grid line was cut on the claims in the period September 10 to October 18, 1971. Slope corrections were applied as necessary to all chainages.

During the period September 10 to October 18, 1971, geological mapping was carried out over the In #198 claim group grid lines. A geochemical soil survey and a magnetometer survey commenced on October 3 and were completed on October 18, 1971.

The field work was done by : Jim Mackie, P.Eng., Harold Linder, Ph.D., P.Eng., and Erik Ostensoe, B.Sc. geologists; David Colley, geological technician; Don Bartell, Paul Dombrovski, Chuck Beaulieu, Bill Meilleur, Victor Mukans, linecutters; and Frank Gyenis, field assistant.

Field work was supervised by P. I. Conley, P.Eng., Vice President and Manager of Hecla Mining Company of Canada, Limited. Harold Linder, Ph.D., P.Eng. in his capacity as consultant to Hecla,

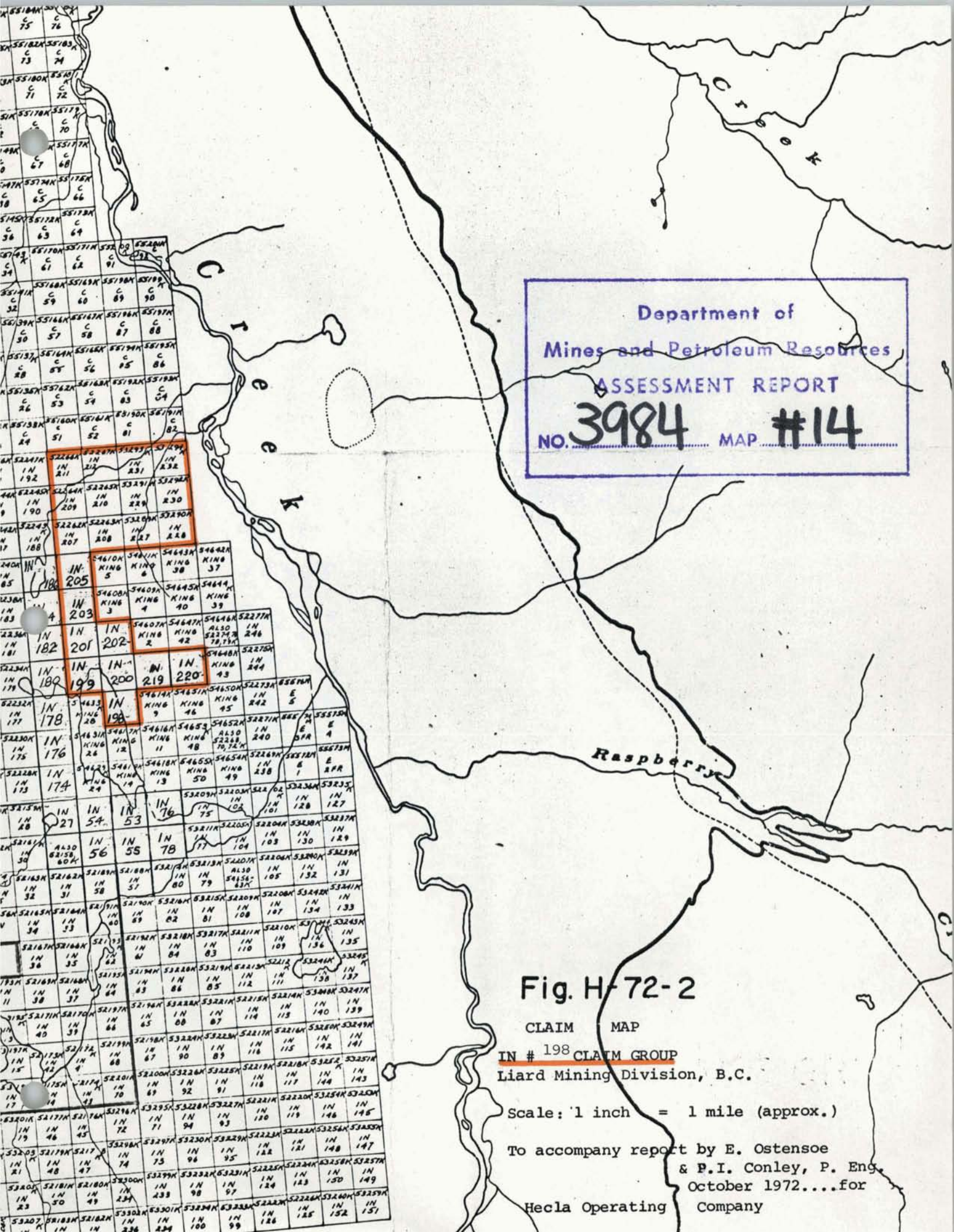


Fig. H-72-2

CLAIM MAP

IN # 198 CLAIM GROUP

Liard Mining Division, B.C.

Scale: 1 inch = 1 mile (approx.)

To accompany report by E. Ostensoe & P.I. Conley, P. Eng. October 1972....for

Hecla Operating Company

recommended the program of field work and assisted in its completion. This report was assembled from various sources, including field notes, inter office memoranda and preliminary reports. Final text was organized by Erik Ostensoe. Maps were prepared by C. L. Cory.

VI REGIONAL GEOLOGY

The regional geological setting of the Mess Creek - Schaft Creek area is discussed by Souther (1971-1, page 10 and 1971-2 page 4). Briefly stated, he places the area in a triangle formed by the south edge of the Stikine Arch, the east side of the Coast Crystalline Belt and the northwest side of the Bowser Basin. Granitic rocks of the Coast Crystalline Belt "exhibit a long complex history of emplacement, extending from early Mesozoic to Tertiary time". The Hickman Batholith, a major element in the area under discussion, is dated by Souther (1971-2, page 9) as latest Triassic to earliest Jurassic age. Sutherland Brown (p.49) gives it a Triassic age. Souther and Armstrong (p.172) illustrate a number of north-striking faults along the northwest rim of Bowser Basin. The following comment, (Souther, 1971-2 p.21) is particularly apt with respect to the Mess Creek - Schaft Creek area:

> "The Triassic and Lower to Middle Jurassic terrain is broken into a mosaic of fault-bounded blocks between which there is little structural continuity. The Structural style of any given block is determined largely by the competency of the rocks within it."

Regional geological work by Hecla geologists supports the concept that Mess Creek valley and the "Start Lake - Skeeter Lake valley" a few miles south of the subject area, are occupied by major faults. The area west of Mess Creek was apparently uplifted and eroded in post Early Tertiary time but in general escaped burial by volcanic flows of the Spectrum Range and Mt. Edziza Tertiary and Recent volcanic events.

VII GEOLOGY OF THE In #198 CLAIM GROUP

a) Introduction

The geology of the In #198 claim group area was determined by mapping grid lines and noting the geology of nearby outcrops. In addition, most of the area between the lines was systematically traversed and an attempt was made to check on the ground, outcrops noted on aerial photographs or spotted from prominences. A photomosaic compiled by McElhanney Engineering Ltd. on scale 1 inch = 1000 feet was used to help maintain position and to field plot geology.

The main rock types in the area north and east of Johnnie Lake are intrusive rocks of the Hickman Batholith, mainly granite and quartz monzonite, and various types of andesitic volcanic rocks (figure H-72-3). A small amount of recrystallized limestone outcrops on In #200 claim.

Epidotization, chloritization and weakly developed feldspathization are common alteration effects. Specularite is present in some areas east of Johnnie Lake. Pyrite and chalcopyrite are present in small quantities. Jointing, shearing and foliation are present in virtually all outcrops and feldspathized andesite on In #204 claim has been brecciated by invasion of granitic material.

May outcrops are glacially polished and roche moutonée is a common feature.

b) Intrusive Rocks

The main intrusive rocks present in the In #198 claim group area are thought to be related to the Hickman Batholith which occupies several hundred square miles west of Schaft Creek. In the vicinity of Johnnie Lake the granitic rocks are either the fringes of the main body or outliers along its eastern edge. A typical "Hickman"-type granitic rock in the area east of the lake is pink or reddish granite or quartz monzonite, coarse grained, weakly foliated, cut by a few fractures healed with quartz, calcite, chlorite or epidote and containing up to 15% mafic minerals, hornblende or biotite, that have been extensively chloritized.

The red colored granite was traced in discontinuous outcrop from the north end of In #225 - In #226 claims to the south edge of the group. At the north end it is separated from feldspathized andesite by what may be a transition zone of pegmatitic textured quartz diorite and diorite. This marginal rock type may represent contact contamination and assimilation of the andesite country rock. Elsewhere in the area, in particular on In #200 and In #219 claims, where andesite and coarse grained granite are in contact, the degree of granitization of the andesite varies from nil to very extensive.

Calcite and quartz veinlets are characteristic of the granite. In the vicinity of the border between In #200 and In #202 claims, chalcopyrite occurs as fracture fillings related to a narrow zone of northeasterly striking vertical sheeting and in quartz calcite veinlets.

c) Andesite and Dioritized Andesite

Andesite and its altered equivalents are the main rocks in the Johnnie Lake area. The andesite is correlated with a similar

unit that is extensive throughout the Schaft Creek - Mess Creek area. It is dark green and varies in texture from massive and fine grained to tuffaceous and coarse grained. As a result of the type of mapping carried out, members within the unit were not defined and consequently some structural details that might have been garnered were, in fact, missed. Remnants of limestone, present in the andesit on In #200 claim, are useful in defining small scale structures but are too small and discontinuous to help define the larger structures.

Textures and alteration were profoundly influenced by the proximity of the Hickman Batholith and related intrusive bodies and assimilation of the andesite by the granitic rocks has already been discussed. The diorite is likely in part a product of the latter process.

Dioritized andesite is medium grained, foliated and exhibits knotted or xenolithic patterns. Hornblende and coarse minette-type micas are characteristic of this phase which was observed always within a few hundred feet of granite in outcrops. Fragmental or tuffaceous andesite was mapped on In #198 claim, close to the east side of Johnnie Lake. Minor amounts of limestone occur interbedded throughout the fragmental unit.

Weakly developed feldspathization is pervasive in the andesite. Epidote is erratic in occurrence but almost invariably is associated with some fracturing action such as dyke emplacement, shearing or jointing. Chlorite is present as an alteration product of the finer grained components of the andesite or tuff and occasionally occurs on shear planes.

d) Limestone

Small amounts of ivory-white and grey-white coarsely recrystallized limestone occur in several outcrops east of Johnnie Lake on In #198 and In #200 claims. The limestone is intimately mixed with andesite. Coarse grained orange-red stringers of pegmatitic granite, up to 5 inches in width, are unusually abundant in the vicinity. The limestone shows much evidence of partial assimilation by the andesite and of plastic deformation, having flowed, thinned and thickened to accommodate distortion of the more competent andesite.

The limestone weathers dark grey and perhaps as a result of small amounts of contained cherty material is relatively resistant to weathering. Bands of limestone vary in thickness from a few inches to several feet. Reliable bedding attitudes were not recorded but a northerly trend of banding as well as of outcroppings and an overall easterly dip prevail.

e) Structural Geology

Few useful structural features were observed in the In #198 claim group area. The red granite unit appears to trend northerly through the mid-part of the claims. West of the granite the rock type is heterogeneous andesite with minor limestone. To the north, dioritized and weakly feldspathized andesite prevails. Recorded attitudes of banding and bedding(?) indicate northerly striking, easterly dipping structures.

The limestone is similar to, but more altered than, a bedded limestone that outcrops about one mile to the northwest and one mile to the southeast.

VIII GEOCHEMICAL SOIL SURVEY

a) Introduction

Where soil conditions permitted, soil samples were taken at 200 foot intervals on all grid lines on In #198 Group claims. Soils were analysed for copper, molybdenum, lead and arsenic. (Appendix B)

Soil conditions in the In #198 claims area are quite variable as a result of 1) drainage, 2) different soil types - (a) residual soil (b) glacial till (c) alluvium and (d) swamp. Swamps were not sampled. The B soil horizon is usually darkest red at the top and becomes lighter red at depth. Gritty textures are attributed to metallic salts in the soil but may also in part result from presence of partly weathered volcanic ash. The C soil horizon is distinctively yellow-grey in color and thus was easily eliminated from the soil samples.

Samples were taken using standard methods. A mattock was used to chop through roots and organic soils to expose the B soil horizon - a reddish brown granular textured layer usually found from 4 to 12 inches below surface. A few ounces of B horizon soil was placed in a numbered kraft envelope which was air-dried for a few days then shipped to Chemex Labs Ltd., North Vancouver, B. C. for analyses. Chemex Labs Ltd. employed standard techniques of geochemical analysis using the atomic absorption method for copper, molybdenum and lead, and a colorimetric method for arsenic. Quality control in the laboratory was ensured by frequent reference to known standards prepared for the purpose.

Upon receipt at the laboratory, samples were dried at 80°C for 24 hours, then sieved to -80 mesh in stainless steel and nylon sieves. A 2 to 3 hour perchloric acid - nitric acid digestion of 0.5 grams of sample at 230°C was followed by dilution with distilled

water to 25 mls. volume. Techtron atomic absorption spectrometers and a Bausch and Lomb Spectronic 20 colorimeter were employed.

More detailed sampling is required and determination of pH of soils and a program of rock chip analysis to determine characteristics of the area would be useful.

b) Copper

A cumulative percentage plot of copper analyses from the In claims area indicated background of 32 ppm. Values above 90 ppm were considered anomalous. Figure H-72-4 on scale 1" = 400 ft. depicts distribution of copper in soils. A small number of the copper analyses may be considered anomalous. Maximum values are slightly above 100 ppm and even contouring at the 50 ppm level does not suggest any significant trends of copper in soils. The area of higher readings on In #228, #229 and #230 claims might be worthy of check soil sampling and possibly more detailed sampling.

c) Molybdenum

A cumulative percentage plot of molybdenum analyses from the In claims area indicated a background of 1 ppm and anomalous level at about 4 ppm on grid lines on the In #198 Group claims, molybdenum values ranged from 0 to 3 ppm. Figure H-72-5 illustrates molybdenum content of soils.

d) Lead

Lead content of soils was found to be quite uniform, in the range of 12 to 20 ppm. No anomalous zones were indicated by the soil survey and the plan, Figure H-72-6, was not contoured.

e) Arsenic

Arsenic was selected for analysis as a possible "pathfinder" or guide to base and precious metal occurrences. In the In #198 claim group area most soil samples contained 3 to 5 ppm arsenic and 8 ppm or greater was considered anomalous: Figure H-72-7. The 8 ppm arsenic contour encompassed large parts of In #209, #210, #212 and #232 claims and a small part of In #228 and #230 claims. The source of arsenic in soils was not determined.

IX MAGNETOMETER SURVEY

a) Introduction

The In #198 Group claims were surveyed using a McPhar Model M700 fluxgate-type magnetometer, serial number 6811. Operator was D. Colley. A total of 4.2 line miles of grid was surveyed and data from claims adjoining In #198 Group was extrapolated to supplement the somewhat limited information available.

A control station was established at the Long Lake camp-site and the instrument was re-set to a constant reading each day. Diurnal variations were also checked by repeating readings at certain points (usually at the base line) several times daily. Corrections were applied when significant variations occurred. Readings were taken at 100 foot intervals on grid lines spaced 1,000, 2,000 and 3,000 feet apart.

The absolute earth's magnetic field at Long Lake control station was determined by the method described in the McPhar handbook that accompanies the M-700 instrument. A value of +41,500 gammas was obtained.

b) Discussion of Magnetometer Survey

Within the In #198 claim group magnetic susceptibilities are between -800 gammas and +1000 gammas with spot "highs" greater than 2000 gammas. An over-all north striking magnetic trend was derived by contouring at 200 gamma intervals (figure H-72-9). The biased grid, with readings at 100 foot spacing on lines 1000 or more feet apart, undoubtedly influenced contouring and no reliable correlation with geology was achieved.

A general observation is that the southwestern portion of the claim group where bedrock is mainly andesite exhibits magnetic intensities of 200 gammas or more and that negative readings prevail elsewhere. Completion of the grid to include lines at 1000 foot or closer spacings and to include the area east of Johnnie Lake where bedrock exposure is more abundant might permit better integration of magnetic data with geological information.

X CONCLUSIONS AND RECOMMENDATIONS

The In #198 Group claims have been partially investigated by geological mapping, soil geochemistry studies and a magnetometer survey. The grid is incomplete and is adequate only to permit statement of preliminary conclusions.

The geology of the claims is dominated by "acid" intrusive rocks and andesitic volcanic rocks. Limestone occurs east and northeast of Johnnie Lake.

Soil geochemistry produced few positive results other than in arsenic where anomalous values were determined over a modest sized area. Additional soil sampling on a more adequate grid is recommended. Influenced by the biased grid, magnetic patterns are too subjective to be usefully applied. Additional grid work is recommended.

REFERENCES

Souther, J.G., and Armstrong, J.E., 1966, North Central Belt of the Cordillera of British Columbia, in Tectonic History and Mineral Deposits of the Western Cordillera, C.I.M.M., Special Volume 8.

Souther, J.G., 1971-1, Geology and Mineral Deposits of Tulsequah Map Area, British Columbia, Geological Survey of Canada, Memoir 362.

1971-2, Telegraph Creek Map Area, British Columbia, Geological Survey of Canada, preliminary manuscript.

Sutherland-Brown, A., 1970, Geology Exploration and Mining in British Columbia, B. C. Department of Mines and Petroleum Resources.

APPENDIX A IN #198 GROUP CLAIMS

Name	Date of Record	Record No.
In 198	August 5, 1971	52253
199	"	52254
200	"	52255
201	"	52256
202	"	52257
203	"	52258
205	"	52260
207	"	52262
208	"	52263
209	"	52264
210	"	52265
211	"	52266
212	"	52267
219	August 6, 1971	53281
220	"	53282
227	"	53289
228	"	53290
229	"	53291
230	"	53292
231	"	53293
232	"	53294

APPENDIX B

GEOCHEMICAL ANALYSES

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

✓ 1

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 16822
INVOICE NO. 6420
DATE RECEIVED Oct. 21/71
DATE ANALYSED Oct. 28/71

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN: Mr. P. Conley "Shaft Cr."

SAMPLE NO.:	PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L-60N 4E	88	2	18	5
6	31	1	20	4
8	21	0	18	4
10	26	2	20	6
12+25	26	0	20	4
14	22	0	18	3
16	24	1	20	6
18	18	2	20	6
20	18	1	18	3
22	80	0	22	10
26	16	0	16	3
28	20	2	20	5
30	18	0	16	3
34	21	0	16	2
38	52	1	28	5
40	18	1	20	2
44	20	1	18	4
46	20	0	18	3
48	20	3	22	4
50	16	0	14	3
52	13	1	16	3
54	16	1	18	3
56	12	3	18	3
58	21	1	20	3
62	14	0	14	3
64	14	6	20	4
66	22	2	20	3
68	21	2	20	8
70	22	0	20	8
74	21	1	18	3
76	48	0	20	7
78	38	0	20	8
L-60N 80E	22	0	12	2
Std. #24	52	18	18	4

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by

~~L 110N~~	~~24~~	~~10~~	~~3~~	~~24~~	~~3~~
	26	18	0	20	2
	28	64	0	20	3
	30	18	1	20	2
	32	22	2	20	3
	~~34~~	~~30~~	~~3~~	~~16~~	~~5~~
	36	10	0	18	3
	38	26	0	20	2
	39	18	0	16	5
	47	24	2	20	4
~~L110N~~	~~49E~~	~~28~~	~~0~~	~~22~~	~~2~~
Std. #24		54	17	20	4

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by Glen Amaron

L-110N	51E	24	2	22	2
	53	48	2	20	8
	55	38	3	20	2
	57	114	0	16	2
	59	44	2	22	3
	61	33	2	22	3
	63	16	0	20	3
	65	16	0	20	5
	68	14	0	22	3
	70+40	20	0	24	5
	72	22	0	20	4
	74	20	0	22	8
	76	14	0	22	10
	78	20	0	24	10
L110N	80E	24	0	24	8

L 80 N	24 E	14	1	16	3
	26	18	1	12	2
	28	22	1	16	2
	30	14	1	20	3
	32	13	0	16	3
	34	14	2	18	3
	38	13	0	18	4
	40	16	1	18	1
	42	21	0	14	3
	44	18	0	18	2
	46	20	3	18	2
	48	14	1	16	3
	52	13	1	16	2
	54	18	2	16	10
	56	28	2	14	3
	58	22	1	16	3
	60	13	3	18	2
	62	20	0	18	3
	66	30	0	16	3
	68	28	1	16	2
	70	22	0	18	3
	72	24	2	18	2
	74	20	1	16	3
	76	28	0	18	2
	78	16	2	16	3
L-80N	80E	78	1	14	2

Ste. 2009 - 1177 W. Hastings,
Vancouver. B. C.

DATE RECEIVED Oct. 21/71

DATE ANALYSED Oct. 29/71

ATTN: Mr. P. Conley

"Shaft Cr."

SAMPLE NO.:		PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L 120N	10E	22	0	16	3
	12+90	21	0	20	2
	14	18	0	18	8
	16	26	0	16	7
	18+75	33	0	16	5
	20+85	13	0	20	5
	22	13	0	18	10
	24	18	0	16	5
	26	36	0	16	7
	28	34	0	16	8
	30	24	0	14	8
	32	22	0	20	10
	34	18	0	24	7
	36	20	0	18	3
	38	16	2	18	7
	40	28	0	16	15
	42	18	1	20	8
	44	24	0	16	8
	46	20	0	18	4
	48	102	0	18	7
	50	18	2	16	4
	52	20	0	18	10
	54	16	0	18	7
	56	31	2	16	5
	58	14	1	18	3
	62	22	0	16	7
	64	24	0	18	8
	65+75	28	0	20	6
	68	14	0	14	6
	70+70	18	1	16	8
	72	14	0	14	8
	74	22	0	18	15
	76	28	0	18	8
	78	18	0	16	10
L 120N	80E	18	2	14	3
L 130N	24	14	0	16	7
	27+75	26	0	18	4
	30	14	0	18	7
	32	16	0	18	8
	36	13	0	16	5
	40	14	0	16	6
	42	13	0	16	7
	44	20	0	18	8
	46	20	0	18	4
	48	20	0	16	4
	50	14	0	18	5
	52	13	0	18	5
L130N	54E	8	0	16	4
Std. #24		51	17	18	5

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

• CHEMISTS • GEOCHEMISTS • ANALYSTS • ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 16830
INVOICE NO. 6430
DATE RECEIVED Oct. 21/71
DATE ANALYSED Oct. 29/71

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings,
Vancouver, B. C.

ATTN: Mr. P. Conley "Shaft Cr."

SAMPLE NO.:	PPM Copper	PPM Molybdenum	PPM Lead	PPM Arsenic
L 130N 56E	26	0	18	7
58	22	0	18	8
59	46	0	16	7
60	36	0	18	15
62	30	0	14	10
64	24	0	16	3
67+65	14	0	18	7
70	13	0	18	5
72	21	0	16	10
74	24	0	16	5
76	26	0	18	7
L 130N 78E	16	0	12	5
L 140N 26E	28	0	20	7
28	14	0	20	5
30	18	2	18	3
32	12	2	18	6
34	30	0	20	5
36	18	0	20	8
38	14	1	18	9
40	14	0	18	8
42	14	0	20	5
44	31	1	18	10
46	13	0	18	8
48	22	0	20	6
50	16	0	20	7
52	21	0	22	7
54	28	0	20	20
56	20	1	18	40
58	14	0	18	30
60	30	2	18	7
62	20	1	20	40
64	36	0	16	15
66	24	2	16	8
68+35	16	0	14	5
70	16	1	18	4
72	14	0	18	7
74	16	1	20	7
76	21	0	54	6
78	20	0	28	7
L 140N 80E	14	0	22	10
std. #24	52	17	20	7

APPENDIX C STATEMENT OF EXPENDITURES

A SUMMARY OF EXPENDITURES

Field Expenditures	
1. Wages and salaries, plus 15% employee costs and benefits	$1,181.00
2. Geochemical Analyses	427.80
3. Magnetometer Rentals	63.00
4. Camp Operations and Supplies	310.00
Total Field Expenditures	$1,981.80
Office Expenditures	
1. Wages and salaries	170.00
2. Drafting services	30.00
3. Miscellaneous, secretarial, drafting and printing supplies, et al	10.00
Total Office Expenditures	$ 210.00
Total Expenditures IN #198 Claim Group	**$2,191.80**

B DETAILS OF EXPENDITURES

Field Expenditures

1. Wages and salaries (22 day month)

J. Mackie - Sept. 28-30, Oct. 3, 6, 1971 5 days @ $950/mo.	$ 216.00
E. Ostensoe - Oct. 6, 17, 1971 2 days @ $1170/mo	106.00
H. Linder - Oct. 7, 1971, 1 day @ $90/day	90.00
D. Colley - Oct. 6 (½ day), 7, 12, 15, 17, 1971 4½ days @ $575/mo.	117.00
F. Gyenis - Oct. 6 (½ day), 7, 12, 15, 17, 1971 4½ days @ $20/day	90.00
Don Bartell - Sept. 22-25, 1971 4 days @ $600/mo	109.00
Chuck Beaulieu - Sept. 22-25, 1971 4 days @ $600/mo.	109.00
Bill Meilleur - Oct. 3, 5, 6, 1971 3 days @ $600/mo.	81.00
Viktor Mukans - Oct. 3, 5, 6, 1971 3 days @ $800/mo.	109.00

	Sub-total Wages and Salaries	$1,027.00	
	Plus 15% Employee Costs and Benefits	154.00	
	Total Wages and Salaries	$1,181.00	
2.	Geochemical Analyses -		
	124 samples prepared @ .20/spl. - $ 24.80 124 samples analysed for copper molybdenum lead arsenic @ 3.25/spl. - $403.00	427.80	
3.	Magnetometer Rentals		
	3 days @ $21/day	63.00	
4.	Camp Operations and Supplies		
	31 man days @ $10/man day	310.00	
	Total Field Expenditures		$1,981.80
	Office Expenditures		
1.	Wages and salaries		
	J. Mackie - 1 day @ $ 950/mo.	$ 43.00	
	E. Ostensoe - 1 day @ $1170/mo.	53.00	
	D. Colley - 2 days @ $575/mo.	52.00	
	Subtotal	$ 148.00	
	Plus 15% Employee Costs and Benefits	22.00	
	Total Wages and Salaries	$ 170.00	
2.	Drafting Services - C. L. Cory		
	6 hours at $5/hr.	30.00	
3.	Miscellaneous, secretarial, printing and drafting supplies	10.00	
	Total Office Expenditures		210.00
	Total Expenditures IN #198 Group		$2,191.80

I hereby certify that the above detailed Statement of Costs represents a true and accurate statement of direct costs incurred in carrying out the surveys described in the accompanying report.
E & O E

October 1972

P/Conley

P. I. Conley, P. Eng.
Vice President and Manager
Hecla Mining Company of
Canada Ltd.

APPENDIX D Statement of Qualifications

The professional qualifications of technical personnel engaged in the work reported on herein, who are not presently registered with the Association of Professional Engineers in the province of British Columbia, are detailed below:

1. E. A. Ostensoe, B.Sc. (Hons.), Member CIMM, Association of Exploration Geochemists, Geologist - completed B.Sc. Honours course at University of British Columbia in 1960 and course requirements for M.Sc. at Queen's University in 1966; employed by Newmont Mining Corporation of Canada Ltd., under direction of Dr. G.W.H. Norman, P.Eng., from May 1960 through August 1964 as field geologist in Granduc Mine area, B.C., by Mount Billings Venture in southeastern Yukon in summer 1965, by Scud Venture (Asarco) in Iskut River area, B.C. in summer 1966 and by Granduc Mines, Limited (NPL) and Hecla Mining Company of Canada Ltd. from October 1966 to present as Chief Geologist and Exploration Supervisor under the direction of P. I. Conley, P.Eng.

2. David Colley, geological technician, formerly student in geological engineering and applied mathematics at University of British Columbia and University of Victoria; employed by Amax Explorations in summers of 1969 through 1971 as field assistant and geochemical sampler, and by Hecla Operating Company from September through December 1971 as geochemical sampler and geophysical technician.

Report of

Geological, Geochemical, Magnetometer

and Induced Polarization Surveys

C #1 Claim Group

Eight Miles Northwest of Mess Lake

Liard Mining Division, B.C.

57°30'N - 131°00'W

Map Sheet 104G-NE

by

Erik Ostensoe, B.Sc.

for Hecla Operating Company

Supervised by P. I. Conley, P.Eng.

Date of Field Work: June - August, 1972

Date of Report: October, 1972

P I Conley

TABLE OF CONTENTS

ILLUSTRATIONS

I SUMMARY

Field crews employed by Hecla Operating Company and under contract from McPhar Geophysics Limited worked on the C #1 Group claims in June, July and August, 1972. Geological mapping, geochemical soil sampling, magnetometer survey, induced polarization and resistivity surveys were completed on a grid of cut lines that was established over the claims. The claims are located seven to nine miles northwest of Mess Lake in the Stikine area of northwestern British Columbia.

The C #1 Group claims are on the eastern edge of the Hickman Batholith and are underlain by granitic, dioritic and andesitic rocks of probable Mesozoic Age. Recrystallized limestone outcrops at the south end of the Group.

Minor amounts of copper sulfide mineralization are present in outcrops in the southern half of the claim Group. Plotting the distribution of copper in soils delineates a substantial area of anomalously large amounts of copper that can be related to the occurrence of copper in bedrock. Molybdenum content of soils is low throughout the area, except for a small anomalous area on C #33 and C #34 claims. Magnetic susceptibilities vary from negative values in the very south part of the claim Group to a maximum of 4470 gammas on C #35 claim.

Induced polarization and resistivity effects were measured over part of the claim Group. Coincident anomalous metal factors and frequency effects were determined in several areas. Resistivities vary widely, reflecting rock changes and possibly, variance in content of sulfide mineralization.

II INTRODUCTION

This report summarizes 1972 field work on claims of the C #1 Group. The claims are situated east of Schaft Creek about four miles upstream (south) from its confluence with Mess Creek. The village of Telegraph Creek is twenty-two miles north and the Schaft Creek exploration camp of Hecla Operating Company is eighteen miles south of the claims. The coordinates of the claim area are 57°30'N latitude and 131°00'W longitude, and it appears on NTS Map Sheet 104G, Telegraph Creek (Fig. H-72-1).

A tent camp was established on C #31 claim. Access to the property was by helicopters belonging to Vancouver Island Helicopters Ltd. and based at Schaft Creek camp. Personnel and supplies were routed via Schaft Creek camp which was serviced regularly by aircraft from Terrace, Smithers and Vancouver. Daily radio telephone contact was maintained with Schaft Creek camp using a Spilsbury and Tindall SBX-10 transceiver.

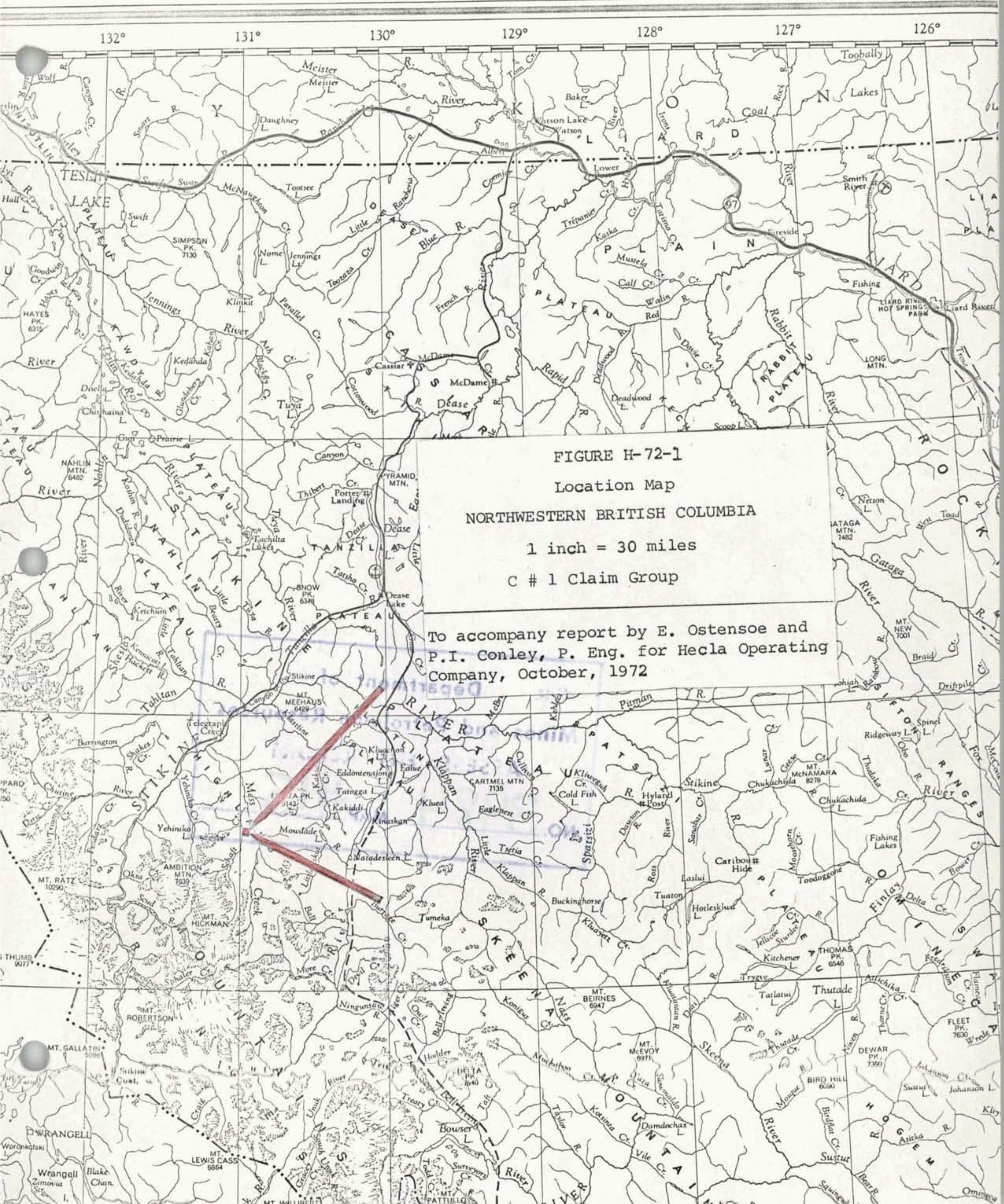

FIGURE H-72-1

Location Map

NORTHWESTERN BRITISH COLUMBIA

1 inch = 30 miles

C # 1 Claim Group

To accompany report by E. Ostensoe and P.I. Conley, P. Eng. for Hecla Operating Company, October, 1972

Elevations in the area mapped range from 2,300' above sea level near Schaft Creek to about 3,600' El. on the higher knolls. Five miles south of the claim block, the ridge between Mess Lake and Skeeter Lake valley rises to over 6,000' El. The claims are heavily wooded and the terrain is mostly steep. The lower and flatter areas are generally swampy.

Climatically the area lies between the heavy precipitation zone of the coastal mountains and the rain shadow zone of the dry interior. Summers are warm to hot, and the winters are cold with snowfall to about five feet.

Vegetation varies from black swamp spruce to jackpine and poplar, with alders and willow bushes in damper areas. The forest cover is a mixture of spruce, jackpine and poplar. The lower more swampy areas have heavy stands of black spruce with willow and alder.

III CLAIMS

Claims of the C #1 claim Group discussed in this report are listed in Appendix A and are illustrated in Fig. H-72-2.

IV PREVIOUS WORK

Prior to 1971 the entire Mess Creek and Schaft Creek area was prospected several times by self-employed prospectors and on behalf of various mining companies. Hecla geologists made several traverses in the area in the previous several years. During the early part of the 1971 season, a Hecla prospecting party camped at "Johnnie Lake" and prospected the area.

The C claims were staked in August 1971 and a decision to evaluate the entire area followed. In early September 1971 the programme of technical follow up work was started. When work ceased in mid-October 1971, the systematic coverage had not yet reached the C #1 claim Group.

V FIELD WORK - 1972

The grid on the C #1 claim Group consists of a picketed baseline on bearing of 355°, 12,700 feet long. Crosslines at right angles were cut at 1,000 foot intervals and extended approximately 4,500 feet to the west and up to 600 feet to the east.

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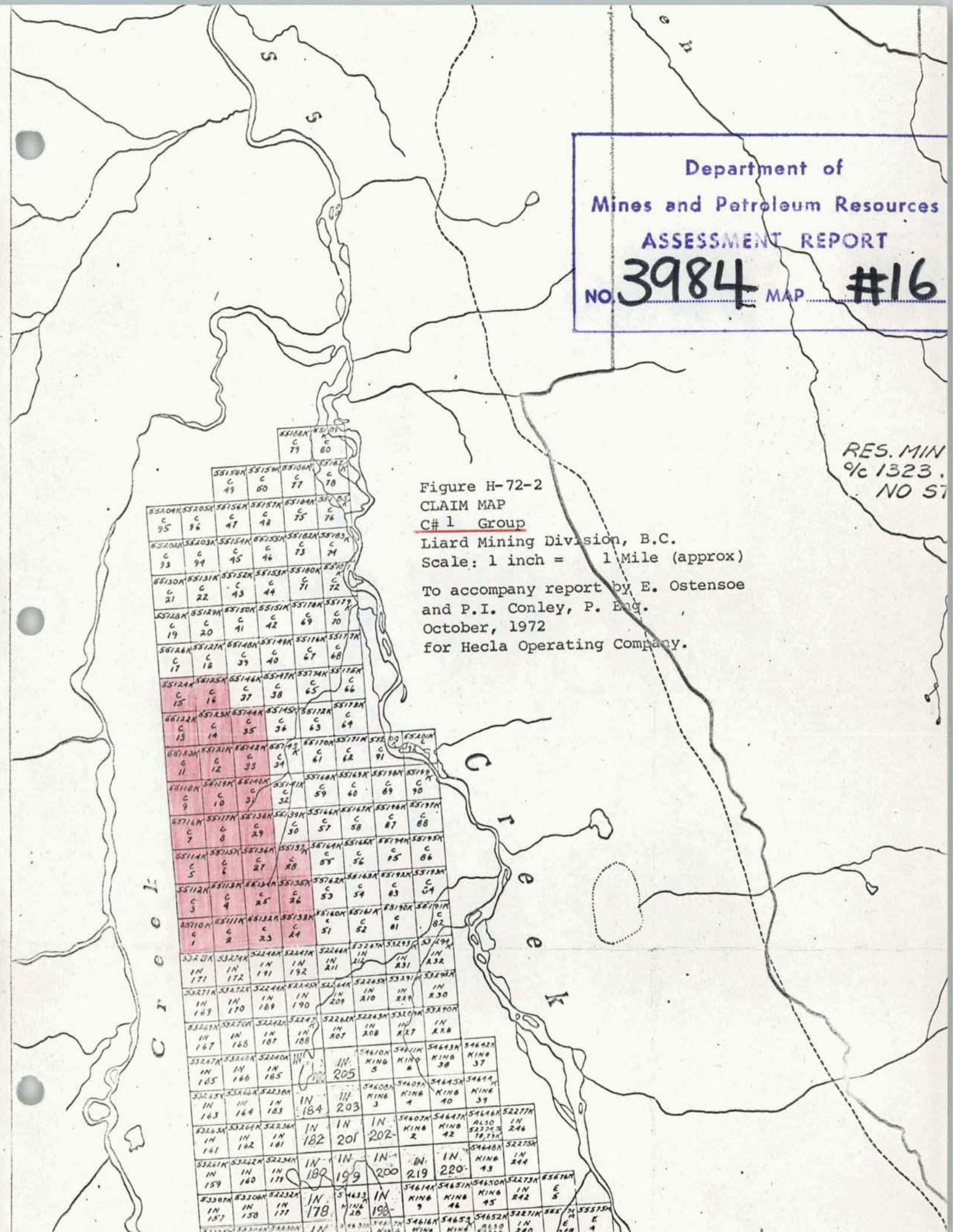


Figure H-72-2
CLAIM MAP
C# 1 Group
Liard Mining Division, B.C.
Scale: 1 inch = 1 Mile (approx)

To accompany report by E. Ostensoe
and P.I. Conley, P. Eng.
October, 1972
for Hecla Operating Company.

Intermediate lines were cut to provide coverage at 500 foot intervals west of the baseline from line 210N to line 270N. A total of 75,500 feet of baseline and crossline was cut in the period June 7 to August 1, 1972. Slope corrections were applied as necessary to all chainages. Claim locations were determined by plotting intersections of grid lines with claim lines.

During the period June 7 to August 21, 1972, geological mapping and a geochemical soil survey were carried out over the C #1 claim Group grid. A magnetometer survey commenced on July 14 to August 1, 1972.

The field work was done by: Gordon D. House, Ed Kruchkowski, Harold Linder, and Eric Ostensoe, geologists; and Don Bartell and Chuck Beaulieu, linecutters. Bert Smulders assisted the geophysical crew.

Field work was supervised by P. I. Conley, P. Eng., Vice President and Manager of Hecla Mining Company of Canada Ltd. Harold Linder, Ph.D., P. Eng., in his capacity as consultant to Hecla, recommended the programme of field work and assisted in its completion. This report was assembled from various sources, including field notes, inter-office memoranda and preliminary reports. Final text was organized by Erik Ostensoe. Maps were prepared by C. L. Cory.

VI REGIONAL GEOLOGY

The regional geological setting of the Mess Creek - Schaft Creek area is discussed by Souther (1971-1, page 10 and 1971-2, page 4). Briefly stated, he places the area in a triangle formed by the south edge of the Stikine Arch, the east side of the Coast Crystalline Belt and the northwest side of the Bowser Basin. Granitic rocks of the Coast Crystalline Belt "exhibit a long complex history of emplacement, extending from early Mesozoic to Tertiary time". The Hickman Batholith, a major element in the area under discussion, is dated by Souther (1971-2, page 9) as latest Triassic to earliest Jurassic age. Sutherland Brown (p.49) gives it a Triassic age. Souther and Armstrong (p.172) illustrate a number of north-striking faults along the northwest rim of Bowser Basin. The following comment, (Souther, 1971-2, p.21) is particularly apt with respect to the Mess Creek - Schaft Creek area:

> "The Triassic and Lower to Middle Jurassic terrain is broken into a mosaic of fault-bounded blocks between which there is little structural continuity. The structural style of any given block is determined largely by the competency of the rocks within it."

Regional geological work by Hecla geologists supports the concept that Mess Creek valley and the "Start Lake - Skeeter Lake valley" a few miles south of the subject area, are occupied by major faults. The area west of Mess Creek was apparently uplifted and eroded in post Early Tertiary time but in general escaped burial by volcanic flows of the Spectrum Range and Mt. Edziza Tertiary and Recent volcanic events.

VII GEOLOGY OF THE C #1 CLAIM GROUP

a) Introduction

The geology of the C #1 claim Group area was determined by mapping grid lines and noting the geology of nearby outcrops. In addition, most of the area between the lines was systematically traversed and an attempt was made to check on the ground outcrops noted on aerial photographs or spotted from prominences. A photo-mosaic compiled by McElhanney Engineering Ltd. on scale 1 inch = 1,000 feet was used to help maintain position and to field plot geology.

The predominant rock types in the C #1 claim Group area are fragmental and massive andesitic rocks, granitic rocks of Hickman Batholith-type, and quartz diorite of uncertain but probably similar affinity. All rocks are assumed to be of Mesozoic Age. Souther (1971-2) has mapped the area and has assigned a Permian Age to limestone that outcrops at the south edge of the claim Group.

b) "Hickman-type" Granitic Rocks

"Hickman-type" granitic rocks occur in the western and northwestern part of the C #1 claim Group. The rock is mainly coarse grained hypidiomorphic, pink to red, quartz monzonite with approximately 10% quartz, 50% potash feldspar, 25% plagioclase, and 15% mafic and opaque minerals. The mafic silicates, mostly hornblende, are usually chloritized.

In border areas, large scale assimilation of country rock has occurred with the product being a darker and less homogenous rock.

c) Diorite

The main rock type on C #14 and C #15 claims is a relatively "fresh" diorite. In contrast to the granitic intrusive rocks mapped a few thousand feet to the south, this unit is hetero-geneous and generally only slightly altered. The mafic minerals

include pyroxenes and amphiboles but not, apparently, both species together. Biotite is also present. Magnetite and, to a lesser extent, hematite are common accessory minerals. Chalcopyrite occurs in the diorite as small disseminated specs closely related to mafic mineral grains. Only rarely is it present in more than trace amounts. Chloritization of mafics in diorite is slight but near contacts this form of alteration becomes prominent. Epidote is present in most areas of shearing. In some zones it is abundant as a fracture filling material.

d) Andesite

Andesite includes a variety of green volcanic rocks of intermediate composition, including flows, tuffs, agglomerates and dykes. To facilitate mapping, two groupings of andesitic rocks were delineated: (i) crystalline and (ii) tuffaceous.

The crystalline andesite unit includes massive holocrystalline volcanic rocks, virtually lacking in internal textures, and in particular, thick flows and dykes, and possibly, hornfelsed fine textured tuffs.

The tuffaceous andesite is a fragmental unit and includes crystal tuff, ash deposits, thin-bedded flows, and various waterlane tuffs. The coarsest fragments recognized were up to 1" in diameter. Colour varies from gray-green to dark green or mottled. Beding is of varying prominence.

Both andesitic units have been metamorphosed by the influence of the intrusive rocks, and hornfels is the commonest derivative. Other metamorphic effects include development of chlorite, biotite, feldspar and magnetite, and the introduction of epidote and silica, with concomitant loss of tuffaceous textures.

e) Basic Intrusive Rock

A massive dense dark green rock that outcrops on C #1 and C #2 claims is correlated with the Liard Copper (Schaft Creek area) augite porphyry basalt unit. The matrix is fine to medium grained and crystalline with augite phenocrysts up to 20 mm. long. The matrix is generally somewhat chloritized whereas the augite grains appear to be relatively fresh and unaltered. The rock weathers to a rough and blotchy appearance.

Intrusive contacts between the basalt and andesite were mapped in several locations, and the basic intrusive may represent some type of dyke, feeder, neck or laccolith.

f) Limestone

Limestone mapped on C #23 claim is part of a large outcrop that caps a north striking ridge. The west side of the ridge is a sharply defined escarpment and may be a fault. Somewhat similar limestone was located about 1½ miles to the southeast, and the subject outcrop may be a fault emplaced remnant of a regionally occurring limestone unit that is present in Skeeter Lake and Mess Creek valleys a few miles to the south.

Most of the limestone is white, coarse grained and recrystallized. Cream-yellow portions are dolomitic. The unit weathers dark gray or blue-gray, and contains interbedded dark gray siltstone layers a few millimeters in thickness. Recorded attitudes indicate an overall northwesterly strike, i.e., 325°, and steep northeasterly dips, i.e., 80° northeast. The limestone's thickness is estimated to be greater than 70 ft.

g) Structural Geology

Few specific comments concerning the structural geology of the C #1 Group claims can be made. Bedding attitudes suggest that the limestone has a northerly strike and rather steep easterly dips, whereas a few thousand feet to the northwest banding in andesitic tuffs indicates a northeasterly strike and moderate to steep southeasterly dips. The augite porphyry basalt occurs as part of a prominent topographically high feature that appears to result from the relatively superior competency and thus, resistance to erosion, of the basalt as compared to the more abundant tuffaceous andesite.

VIII GEOCHEMICAL SOIL SURVEY

a) Introduction

In the period June to August 1972, 392 soil samples were collected from a total of 11.9 miles of gridline on the C #1 Group claims. Sampling and initial interpretation was by Ed Kruchkowski, a geologist with special training and experience in applied geochemistry.

Following receipt of chemical analyses from soils taken at 200 ft. intervals on the 1,000 ft. grid, additional soils were taken at 100 ft. intervals and from the 500 ft. spacing gridlines. In selected areas, samples were taken on a 100 ft. pattern. All samples were analyzed for copper and molybdenum (Appendix B).

Soil conditions in the C #1 claims area are quite variable as a result of (1) drainage, (2) varying depth to bedrock, and

(3) different soil types. Residual soils, glacial till, alluvium and swamp are present. Swamps were not sampled. The B soil horizon is usually darkest red at the top and becomes lighter red at depth. Gritty textures are attributed to metallic salts in the soil but may also in part result from presence of partly weathered volcanic ash. The C soil horizon is usually distinctively yellow gray or nearly white in colour and thus is easily eliminated from the soil samples.

Samples were taken using standard methods. A mattock was used to chop through roots and organic soils to exposed B soil horizon--a reddish brown granular textured layer usually found from four to twelve inches below surface. A few ounces of B horizon soil was placed in a numbered kraft envelope which was air dried for a few days, then shipped to Chemex Labs Ltd., North Vancouver, B. C., for analyses. Chemex Labs Ltd. employed standard techniques of geochemical analysis using the atomic absorption method for copper and molybdenum. Quality control in the laboratory was ensured by frequent reference to known standards prepared for the purpose.

Upon receipt at the laboratory, samples were dried at 80°C. for 24 hours, then sieved to -80 mesh in stainless steel and nylon sieves. A two to three hour perchloric acid-nitric acid digestion of 0.5 grams of sample at 230°C. was followed by dilution with distilled water to 25 mls. volume. Techtron atomic absorption spectrometers were employed to obtain final analytical data.

b) Copper

Copper analyses are plotted on figure H-72-10. Background level for copper in soils in the C claims area is 18 ppm. and threshold is 32 ppm., a somewhat lower level than that indicated on the In claims a few claim lengths to the south, where a 32 ppm. copper background prevails.

Figure H-72-10 is contoured at 40 ppm. intervals. The pattern of significant amounts of copper in soils indicates two areas on the C #1 claim Group: (1) on lines 150N to 170N on C #1 to C #4 inclusive claims where copper is associated with outcroppings of augite porphyry basalt, and (2) on lines 210N north to and including line 245N where copper mineralization in andesitic bedrock is reflected in the soils pattern.

c) Molybdenum

Molybdenum analyses are plotted on Figure H-72-11. The apparent background level of molybdenum in soils in the C claims area is <1 ppm.

A small number of analyses on the C #1 Group claims exceeded 1 ppm., and the plan was not contoured. Maximum values, up to 8 ppm., were obtained from 207N to 216N on the baseline and within 600 ft. of the baseline in an area where copper is similarly enriched in soils. Bedrock is tuffaceous andesite with calcite and quartz veining and chalcopyrite and hematite mineralization.

IX MAGNETOMETER SURVEY

a) Introduction

The C #1 Group claims were surveyed using a McPhar Model M700 fluxgate-type magnetometer, serial number 6811. Operator was Peter Neilans. A total of 11.3 line miles of grid was surveyed and data from claims adjoining C #1 Group was extrapolated to supplement the information available.

A control station consisting of a McPhar Model M700 magnetometer equipped with a Rustrak recorder was established at the main campsite and the instrument being used in the field was reset to a constant reading each day. Diurnal variations were also checked by repeating readings at certain points (usually at the baseline) several times daily. Corrections were applied when significant variations occurred. Readings were taken at 100 ft. intervals on the grid lines, fig. H-72-12.

b) Discussion of Magnetometer Survey

In mineral exploration surveys the M700 fluxgate-type magnetometer is used to measure variations in the vertical component of the earth's magnetic field. The pattern of such changes is then interpreted in terms of variations of bedrock characteristics such as bedrock structures, variations in type or intensity of alteration or mineralization and changes in rock type. Interpretation is facilitated by knowledge of the depth of overburden and weathering, and the relative magnetic susceptibilities of the various rock types present in the area under consideration.

In the C #1 Group claims overburden is generally quite shallow, 10 ft. or less in depth, except near the west side of the Group where a thick mantle of glacial morainal debris lies along the east side of Schaft Creek. Weathering is superficial throughout the claim Group.

Magnetic susceptibilities of 800 to 1,100 gammas were recorded in areas of Hickman Batholith-type granitic rocks on C #15 claim. On C #13 and C #14 claims fragmental andesite within a few hundred feet of granite has relatively low magnetic susceptibility, in the range of 600 to 800 gammas. In part, this may be due to a contact effect whereby some of the iron formerly in magnetite or mafic minerals has been altered to pyrite. Immediately to the south, on C #11, C #12, and C #13 claims, the fragmental tuff is heavily mineralized with magnetite, as is reflected in the pattern of magnetic responses of 2,000 gammas and higher. Near the baseline between 190N and 215N on C #31, C #33, and C #35 claims, a trend of very high magnetic susceptibilities, up to greater than 4,000 gammas, appears to be related to a unique amphibolite rock that was not found in place. Boulders consisting entirely of hornblende crystals were found at, and immediately west of the baseline. The angular appearance of the boulders and the friable nature of the rock suggested a local source, and this impression was substantiated by the magnetometer survey. Elsewhere in the C #1 claims area, the magnetic patterns could not be readily related to bedrock geology.

X INDUCED POLARIZATION AND RESISTIVITY SURVEY

Report on the Induced Polarization and Resistivity Survey on the C Claim Groups by P. Hallof and M. Goudie forms Appendix C of this Report.

Induced polarization and resistivity surveys were completed on the following lines within the C #1 claim Group:

Line 240N - 10W to 42W
" 235N - 14W to 45W
" 230N - 13W to 45W
" 220N - 0 to 44W
" 210N - 0 to 42W

The McPhar Geophysics report (Appendix C) is a complete discussion of the survey, including methods and equipment used, means of interpretation and recommendations for follow up work.

Although a detailed analysis of the geophysical results has not yet been undertaken, preliminary analysis indicates that the various anomalous zones reported on Claims of the C #1 Group correlate reasonably well with areas of known mineralization. Similarly some correlations between induced polarization and resistivity effects and geology are obvious.

Drilling and additional geophysical work were recommended by the contractors.

XI CONCLUSIONS

Claims of the C #1 Group have been investigated by means of geological mapping, soil geochemical studies, magnetometer surveys and by induced polarization and resistivity surveys. Several areas which are geologically attractive as targets for further exploration work are also delineated by geochemical and induced polarization surveys. In particular, these areas are on C #1 to C #4 inclusive claims, on C #13 and #14 claims and on C #33 and C #35 claims. Additional work on these claims is justified and is presently under consideration.

REFERENCES

Souther, J.G., and Armstrong, J.E., 1966, North Central Belt of the Cordillera of British Columbia, in Tectonic History and Mineral Deposits of the Western Cordillera, C.I.M.M., Special Volume 8.

Souther, J.G., 1971-1, Geology and Mineral Deposits of Tulsequah Map Area, British Columbia, Geological Survey of Canada, Memoir 362.

1971-2, Telegraph Creek Map Area, British Columbia, Geological Survey of Canada, preliminary manuscript.

Sutherland-Brown, A., 1970, Geology Exploration and Mining in British Columbia, B. C. Department of Mines and Petroleum Resources.

APPENDIX A

C #1 GROUPS CLAIMS

Name	Date of Record	Record No.
C 1	August 28, 1971	55110
C 2	"	55111
C 3	"	55112
C 4	"	55113
C 5	"	55114
C 6	"	55115
C 7	"	55116
C 8	"	55117
C 9	"	55118
C 10	"	55119
C 11	"	55120
C 12	"	55121
C 13	"	55122
C 14	"	55123
C 15	"	55124
C 16	"	55125
C 23	"	55132
C 24	"	55133
C 25	"	55134
C 26	"	55135
C 27	"	55136
C 28	"	55137
C 29	"	55138
C 31	"	55140
C 33	"	55142
C 35	"	55144

APPENDIX D STATEMENT OF EXPENDITURES - C #1 CLAIM GROUP

A. SUMMARY OF EXPENDITURES

Field Expenditures

1.	Wages and Salaries plus 15% Employee Costs and Benefits	$3,389.00
2.	Geochemical Analyses	603.00
3.	Magnetometer Rentals	63.00
4.	Induced Polarization and Resistivity Survey	1,782.00
5.	Camp Operations and Supplies	945.00
	Total Field Expenditures - C #1 Claim Group	$6,882.00

B. DETAILS OF EXPENDITURES

Field Expenditures

1. Wages and Salaries (22 day month)
Pro-rated on line mile basis where information not otherwise readily available

G.D. House, 28.5 days in period June 5 to Aug. 21, 1972 28.5 days @ $950/mo.	$1,235.00
Ed Kruchkowski, 21.5 days in period June 5 to July 22 and August 10 to August 21, 1972 21.5 days @ $750/mo.	733.00
J. Peter Neilans, 3 days in period July 20 to Aug. 1, 1972 3 days @ $650/mo	89.00
Bert Smulders, 1½ days in period July 17 to July 24 and August 7 to August 9, 1972 1½ days @ $525/mo.	36.00
Erik Ostensoe, July 17 and August 19, 1972 2 days @ $1250/mo.	114.00
Harold Linder, July 23, 1972 - 1 day @ $90/day	90.00
Don Bartell, 11 days in period June 5 to July 22, 1972 11 days @ $650/mo.	325.00
Chuck Beaulieu, 11 days in period June 5 to July 22, 1972 11 days @ $650/mo.	325.00
Sub-total Wages and Salaries	$2,947.00
Plus 15% Employee Costs and Expenses	442.00
Total Wages and Salaries	$3,389.00

Field Expenditures (Continued)

2. Geochemical Analyses

392 samples - prepared @ $0.20/spl.	$ 74.00	
392 samples - analysed for copper and molybdenum @ $1.35/spl.	529.00	603.00

3. Magnetometer Rentals

3 days @ $21/day — 63.00

4. Induced Polarization and Resistivity Survey
Pro-rated on basis of a total of 6.1 line miles surveyed on C claims of which 3.4 miles was on C #1 Claim Group

$$\frac{3.4 \text{ miles}}{6.1 \text{ miles}} \times \$3,181.79 = 1,782.00$$

5. Camp Operations and Supplies

Hecla employees - 78.5 man days

McPhar employees - $\frac{3.4}{6.1} \times 29$ man days = 16 man days

Total - 94.5 man days @ $10/man day — 945.00

Total Field Expenditures - C #1 Claim Group — $6,882.00

I hereby certify that the above detailed Statement of Expenditures represents a true and accurate statement of direct costs incurred in carrying out the surveys described in the accompanying report. E & O E

October 26, 1972.

P. I. Conley, P. Eng.,
Vice President and Manager
Hecla Mining Company of
Canada Ltd.

APPENDIX B

GEOCHEMICAL ANALYSES

(refer to last section of binder)

APPENDIX C

Induced Polarization and Resistivity survey by P. Hallof, Ph.D., P.Eng., and Marion A. Goudie, B.Sc.

See accompanying report by McPhar Geophysics Ltd.

APPENDIX E Statement of Qualifications

The professional qualifications of technical personnel engaged in the work reported on herein, who are not presently registered with the Association of Professional Engineers in the province of British Columbia, are detailed below:

1. G. D. House, B.A. (Mod.), AMIMM, Geologist - completed B.A. (Mod.) at Trinity College, Dublin, Eire, in 1961. Employed as a geologist by: (a) Roundtower Minerals Ltd., from March 1962 through June 1963 in Ireland; (b) Denison Mines Ltd., from August through October 1963, in Ireland; (c) Ghana Geological Survey from November 1963 through March 1965 in Ghana; (d) Newmont Mining Corporation of Canada Ltd. from June through August 1965, at Alice Arm, B. C.; (e) Alrae Engineering Ltd. from September 1965 through January 1970 on contracts in British Columbia, Yukon, N.W.T., and Saskatchewan; (f) Hecla Operating Company from April 1970 through December 1971, and June through August 1972, on projects in Yukon and at Schaft Creek area, B.C.; (g) at present a student (M.Sc. program) at University of Alaska, College, Alaska.

2. E. A. Ostensoe, B.Sc. (Hons.), Member CIMM, Association of Exploration Geochemists, Geologist - completed B.Sc. Honours course at University of British Columbia in 1960 and course requirements for M.Sc. at Queen's University in 1966; employed by Newmont Mining Corporation of Canada Ltd., under direction of Dr. G.W.H. Norman, P.Eng., from May 1960 through August 1964 as field geologist in Granduc Mine area, B.C., by Mount Billings Venture in south-eastern Yukon in summer 1965, by Scud Venture (Asarco) in Iskut River area, B.C. in summer 1966 and by Granduc Mines, Limited (NPL) and Hecla Mining Company of Canada Ltd. from October 1966 to present at Chief Geologist and Exploration Supervisor under the direction of P. I. Conley, P.Eng.

3. Ed Kruchkowski, B.Sc., Geologist - completed B.Sc. course at University of Alberta (Edmonton) in May 1972; in 1969, 1971 and 1972 employed by Hecla Operating Company in Schaft Creek area as coresplitter, soil sampler and geologist respectively. In 1970 employed by consultant and assigned to projects in southeastern British Columbia; at present a student at Unversity of Alberta (Edmonton) and candidate for M.Sc. degree.

4. J. Peter Neilans - Magnetometer Operator - completed three years of B.A.Sc. degree programme at University of British Columbia; employed by Noranda Mines, Ltd. in July and August of 1967 and 1968 as a helper on geological - geochemical reconnaissance project - Brenda Mines area, B. C.; employed by subsidiary of International Nickel from November 1968 through April 1969 as geophysical operator, on Widgiemooltha Project, Kalgoorlie area, Western Australia; employed by Granduc Mines, Ltd. from May through September of 1969 and 1970 as a Magnetometer Operator on field surveys in the Stewart area of B.C., and by Hecla Operating Company from May through August, 1971 in similar capacity in Schaft Creek area of B. C.

Report of

Geological, Geochemical, Magnetometer

and Induced Polarization Surveys

C #17 Claim Group

Eight Miles Northwest of Mess Lake

Liard Mining Division, B.C.

57°30'N - 131°00'W

Map Sheet 104G-NE

by

Erik Ostensoe, B.Sc.

for Hecla Operating Company

Supervised by P. I. Conley, P. Eng.

Date of Field Work: June - August, 1972

Date of Report: October, 1972

P I Conley

TABLE OF CONTENTS

ILLUSTRATIONS

I SUMMARY

Field crews employed by Hecla Operating Company and under contract from McPhar Geophysics Limited worked on the C #17 Group claims in June, July and August, 1972. Geological mapping, geochemical soil sampling, magnetometer survey, induced polarization and resistivity surveys were completed on a grid of cut lines that was established over the claims. The claims are located nine to ten miles northwest of Mess Lake in the Stikine area of northwestern British Columbia.

The C #17 Group claims are on the eastern edge of the Hickman Batholith and are underlain by granitic, dioritic and andesitic rocks of probable Mesozoic Age.

Minor amounts of copper sulfide mineralization are present in outcrops in the southern most part of the claim Group. Plotting the distribution of copper in soils delineates several small anomalous areas. Molybdenum content of soils is low throughout the area. Magnetic susceptibilities vary from less than 700 to more than 1900 relative gammas without significant recognizable patterns.

Induced polarization and resistivity effects were measured in a small area near the south end of the claim Group. Coincident but weak anomalous metal factor and frequency effects were determined.

II INTRODUCTION

This report summarizes 1972 field work on claims of the C #17 Group. The claims are situated east of Schaft Creek about two to four miles upstream (south) from its confluence with Mess Creek. The village of Telegraph Creek is twenty-two miles north and the Schaft Creek exploration camp of Hecla Operating Company is eighteen miles south of the claims. The coordinates of the claim area are 57°33'N latitude and 131°00'W longitude, and it appears on NTS Map Sheet 104G, Telegraph Creek (Fig. H-72-1).

A tent camp was established on C #31 claim south of the Group. Access to the property was by helicopters belonging to Vancouver Island Helicopters Ltd. and based at Schaft Creek camp. Personnel and supplies were routed via Schaft Creek camp which was serviced regularly by aircraft from Terrace, Smithers and Vancouver. Daily radio telephone contact was maintained with Schaft Creek camp using a Spilsbury and Tindall SBX-10 transceiver.

Elevations in the area mapped range from 2,300' above sea level near Schaft Creek to about 3,600' El. on the higher knolls. Five miles south of the claim block, the ridge between Mess Lake and Skeeter Lake valley rises to over 6,000' El. The claims are heavily wooded and the terrain is mostly steep. The lower and flatter areas are generally swampy.

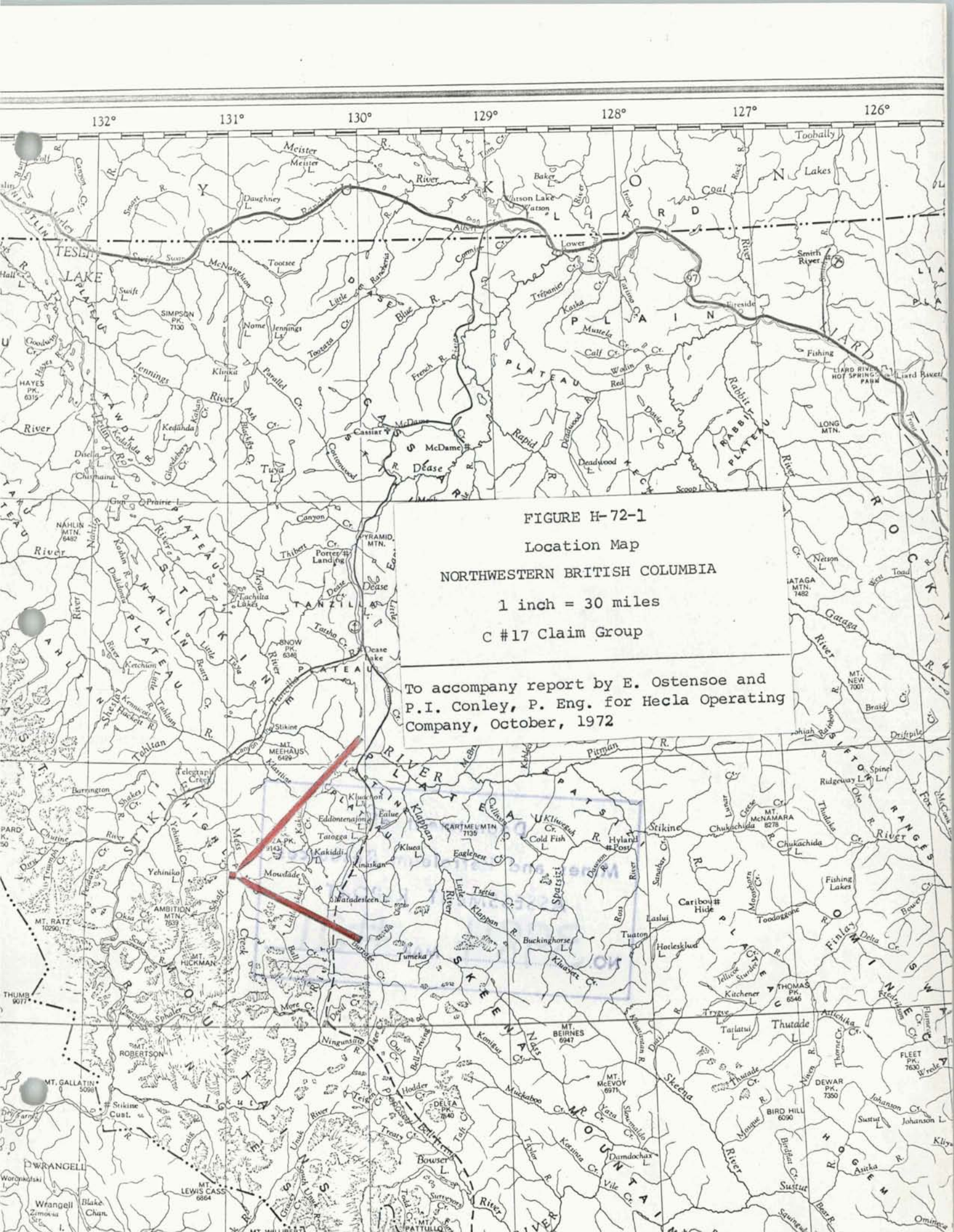


FIGURE H-72-1

Location Map

NORTHWESTERN BRITISH COLUMBIA

1 inch = 30 miles

C #17 Claim Group

To accompany report by E. Ostensoe and P.I. Conley, P. Eng. for Hecla Operating Company, October, 1972

Climatically the area lies between the heavy precipitation zone of the coastal mountains and the rain shadow zone of the dry interior. Summers are warm to hot, and the winters are cold with snowfall to about five feet.

Vegetation varies from black swamp spruce to jackpine and poplar, with alders and willow bushes in damper areas. The forest cover is a mixture of spruce, jackpine and poplar. The lower more swampy areas have heavy stands of black spruce with willow and alder.

III CLAIMS

Claims of the C #17 claim Group discussed in this report are listed in Appendix A and are illustrated in Fig. H-72-2.

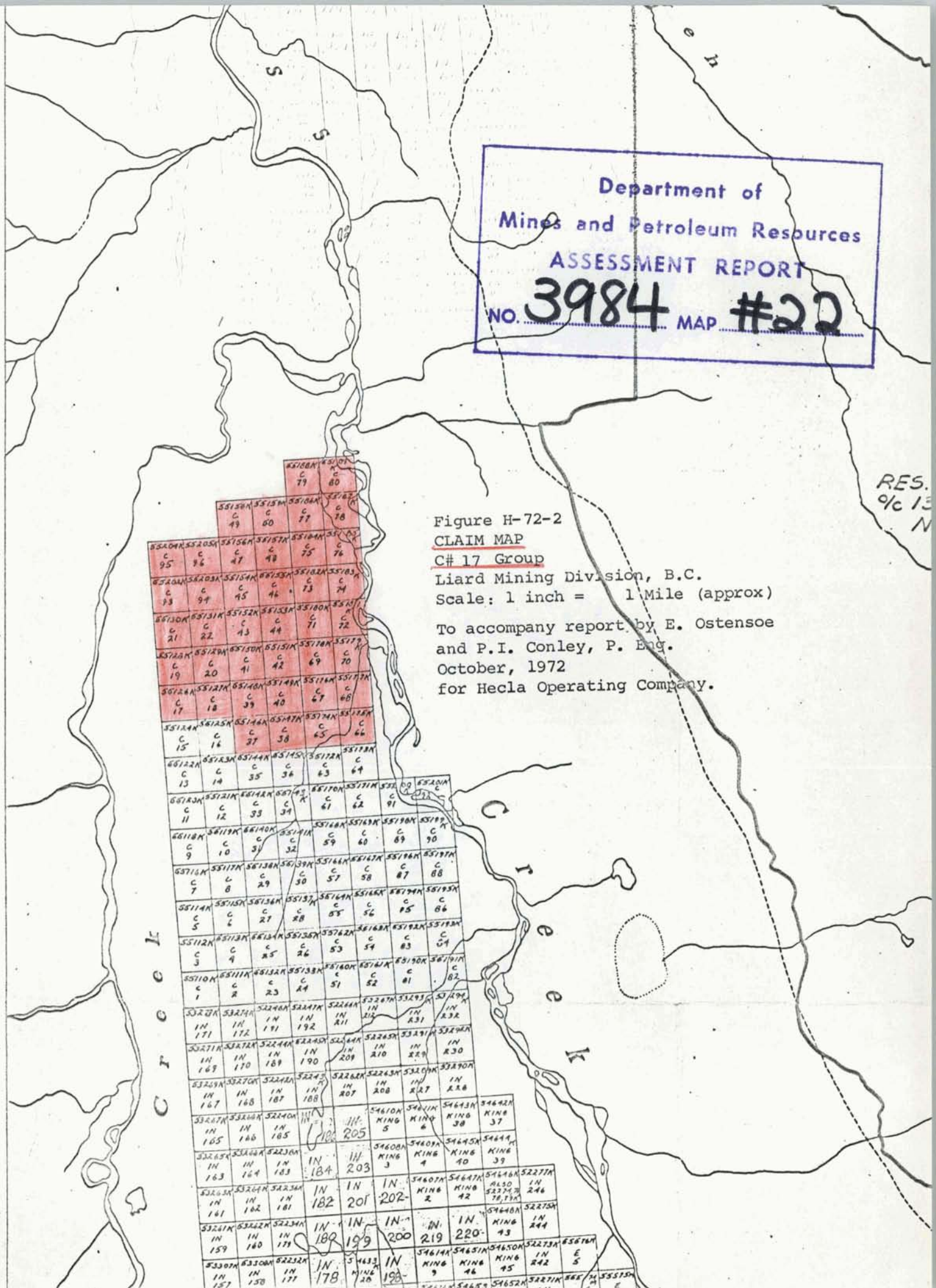
IV PREVIOUS WORK

Prior to 1971 the entire Mess Creek and Schaft Creek area was prospected several times by self-employed prospectors and on behalf of various mining companies. Hecla geologists made several traverses in the area in the previous several years. During the early part of the 1971 season, a Hecla prospecting party camped in the vicinity of the C claims and prospected the area.

The C claims were staked in August 1971 and a decision to evaluate the entire area followed. In early September 1971 the programme of technical follow up work was started. When work ceased in mid-October 1971, the systematic coverage had not yet reached the C #17 claim Group.

V FIELD WORK - 1972

The grid on the C #17 claim Group consists of a picketed baseline on bearing of 355°, 10,100 feet long. Crosslines at right angles were cut at 1,000 foot intervals and extended approximately 4,000 feet to the west and 4,000 feet to the east. Intermediate lines were cut to provide coverage at 500 foot intervals west of the baseline from line 230N to line 270N. A total of 79,500 feet of baseline and crossline was cut in the period June 7 to August 1, 1972. Slope corrections were applied as necessary to all chainages. Claim locations were determined by plotting intersections of grid-lines with claim lines.


Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3984 MAP #22
Figure H-72-2
CLAIM MAP
C# 17 Group
Liard Mining Division, B.C.
Scale: 1 inch = 1 Mile (approx)
To accompany report by E. Ostensoe
and P.I. Conley, P. Eng.
October, 1972
for Hecla Operating Company.
TO WEST SEE MAP 10 /11E
RES.
C r e e k
S S
e n

During the period June 7 to August 21, 1972, geological mapping and a geochemical soil survey were carried out over the C #17 claim Group grid. A magnetometer survey commenced on July 14 and was completed by August 1, 1972.

The field work was done by: Gordon D. House, Ed Kruchkowski, Harold Linder, and Eric Ostensoe, geologists; and Don Bartell and Chuck Beaulieu, linecutters. Bert Smulders assisted the geophysical crew. Peter Neilans carried out the magnetometer survey.

Field work was supervised by P. I. Conley, P. Eng., Vice President and Manager of Hecla Mining Company of Canada Ltd. Harold Linder, Ph.D., P.Eng., in his capacity as consultant to Hecla, recommended the programme of field work and assisted in its completion. This report was assembled from various sources, including field notes, inter-office memoranda and preliminary reports. Final text was organized by Erik Ostensoe. Maps were prepared by C. L. Cory.

VI REGIONAL GEOLOGY

The regional geological setting of the Mess Creek - Schaft Creek area is discussed by Souther (1971-1, page 10 and 1971-2, page 4). Briefly stated, he places the area in a triangle formed by the south edge of the Stikine Arch, the east side of the Coast Crystalline Belt and the northwest side of the Bowser Bason. Granitic rocks of the Coast Crystalline Belt "exhibit a long complex history of emplacement, extending from early Mesozoic to Tertiary time". The Hickman Batholith, a major element in the area under discussion, is dated by Souther (1971-2, page 9) as latest Triassic to earliest Jurassic age. Sutherland Brown (p.49) gives it a Triassic age. Souther and Armstrong (p.172) illustrate a number of north-striking faults along the northwest rim of Bowser Basin. The following comment, (Souther, 1971-2, p.21) is particularly apt with respect to the Mess Creek - Schaft Creek area:

> "The Triassic and Lower to Middle Jurassic terrain is broken into a mosaic of fault-bounded blocks between which there is little structural continuity. The structural style of any given block is determined largely by the competency of the rocks within it."

Regional geological work by Hecla geologists supports the concept that Mess Creek valley and the "Start Lake - Skeeter Lake valley" a few miles south of the subject area, are occupied by major faults. The area west of Mess Creek was apparently uplifted and eroded in post Early Tertiary time but in general escaped burial by

volcanic flows of the Spectrum Range and Mt. Edziza Tertiary and Recent volcanic events.

VII GEOLOGY OF THE C #17 CLAIM GROUP

a) Introduction

The geology of the C #17 claim Group area (Fig. H-72-9) was determined by mapping grid lines and noting the geology of nearby outcrops. In addition, most of the area between the lines was systematically traversed and an attempt was made to check on the ground outcrops noted on aerial photographs or spotted from prominences. A photomosaic compiled by McElhanney Engineering Ltd. on scale 1 inch = 1,000 feet was used to help maintain position and to field plot geology.

The predominant rock types in the C #17 claim Group area are fragmental and massive andesitic rocks and diorite of uncertain but probably Hickman Batholith affinity. All rocks are assumed to be of Mesozoic Age. Strong shearing is recognized in the diorite.

b) Diorite

The main rock type on C #17 Group claims is a relatively "fresh" diorite. In contrast to the granitic intrusive rocks mapped a few thousand feet to the south, this unit is heterogeneous and generally only slightly altered. The mafic minerals include pyroxenes and amphiboles but not, apparently, both species together. Biotite is also present. Magnetite and, to a lesser extent, hematite are common accessory minerals. Chalcopyrite occurs in the diorite as small disseminated specs closely related to mafic mineral grains. Only rarely is it present in more than trace amounts. Chloritization of mafics in diorite is slight but near contacts this form of alteration becomes prominent. Epidote is present in most areas of shearing. In some zones it is abundant as a fracture filling material.

c) Andesite

Andesite includes a variety of green volcanic rocks of intermediate composition, including flows, tuffs, agglomerates and dykes. To facilitate mapping, two groupings of andesitic rocks were delineated: (i) crystalline and (ii) tuffaceous.

The crystalline andesite unit includes massive holocrystalline volcanic rocks, virtually lacking in internal textures, and in particular, thick flows and dykes, and possibly, hornfelsed fine textured tuffs.

The tuffaceous andesite is a fragmental unit and includes crystal tuff, ash deposits, thin-bedded flows, and various water-lain tuffs. The coarsest fragments recognized were up to 1" in diameter. Colour varies from gray-green to dark green or mottled. Bedding is of varying prominence.

Both andesitic units have been metamorphosed by the influence of the intrusive rocks, and hornfels is the commonest derivative. Other metamorphic effects include development of chlorite, biotite, feldspar and magnetite, and the introduction of epidote and silica, with concomitant loss of tuffaceous textures.

On C #37 and C #38 claims, small amounts of chalcopyrite occur in veinlets with siderite calcite and quartz in andesite.

d) Structural Geology

Much detail of jointing, banding and cleavage was recorded but few general comments concerning the structural geology of the C #17 Group claims can be made. A strong pattern of northerly and northeasterly-striking shears is dominant in the diorite and many of the minor fracture features are secondary effects resulting from this main structure. Of secondary prominence are east-west striking fractures.

The relationship between the strong northerly striking shear structure and suspected similar major shear or fault zones in Schaft and Mess Creek valley is a subject for further investigation.

VIII GEOCHEMICAL SOIL SURVEY

a) Introduction

In the period June to August 1972, 430 B horizon soil samples were collected from a total of 15 miles of gridline on the C #17 Group claims. Sampling and initial interpretation was by Ed Kruchkowski, a geologist with special training and experience in applied geochemistry

Following receipt of chemical analyses from soils taken at 200 ft. intervals on the 1,000 ft. grid, additional soils were taken at 100 ft. intervals and from the 500 ft. spacing gridlines. In selected areas, samples were taken on a 100 ft. pattern. All samples were analyzed for copper and molybdenum (Appendix B).

Soil conditions in the C #17 claims area are quite variable as a result of topography and land forms. The area east of the baseline is low lying, flat, and quite wet. The area to the west is higher, steeper, drier and bedrock is at surface or at shallow depth.

Residual soils, glacial till, alluvium and swamp are present. Swamps were not sampled. The B soil horizon is usually darkest red at the top and becomes lighter red at depth. Gritty textures are attributed to metallic salts in the soil but may also in part result from presence of partly weathered volcanic ash. The C soil horizon is usually distinctively yellow gray or nearly white in colour and thus is easily eliminated from the soil samples.

Samples were taken using standard methods. A mattock was used to chop through roots and organic soils to exposed B soil horizon--a reddish brown granular textured layer usually found from four to twelve inches below surface. A few ounces of B horizon soil was placed in a numbered kraft envelope which was air dried for a few days, then shipped to Chemex Labs Ltd., North Vancouver, B. C., for analyses. Chemex Labs Ltd. employed standard techniques of geochemical analysis using the atomic absorption method for copper and molybdenum. Quality control in the laboratory was ensured by frequent reference to known standards prepared for the purpose.

Upon receipt at the laboratory, samples were dried at 80°C. for 24 hours, then sieved to -80 mesh in stainless steel and nylon sieves. A two to three hour perchloric acid-nitric acid digestion of 0.5 grams of sample at 230°C. was followed by dilution with distilled water to 25 mls. volume. Techtron atomic absorption spectrometers were employed in obtaining the analyses.

b) Copper

Copper analyses are plotted on figure H-72-10. Background level for copper in soils in the C claims area is 18 ppm. and threshold is 32 ppm., a somewhat lower level than that indicated on the In claims a few claim lengths to the south, where a 32 ppm. copper background prevails.

Figure H-72-10 is contoured at 40 ppm. intervals. Only one area with significant amounts of copper in soils is indicated on the C #17 claim Group: on lines 230N to 260N on C #37 to #40 inclusive and C #42 claims where copper mineralization is associated with outcroppings of tuffaceous andesite. Bedrock in this area is somewhat crackled with sideritic veinlets and the resulting soils likely have slightly alkaline pH, inhibiting mobilization and transport of copper. Maximum values exceed 400 ppm. copper.

c) Molybdenum

Molybdenum analyses are plotted on Figure H-72-11. The apparent background level of molybdenum in soils in the C claims area is <1 ppm. All analyses were close to background and the plan was not contoured.

IX MAGNETOMETER SURVEY

a) Introduction

The C #17 Group claims were surveyed using a McPhar Model M700 fluxgate-type magnetometer, serial number 6811. Operator was Peter Neilans. A total of 15 line miles of grid was surveyed and data from claims adjoining C #17 Group was extrapolated to supplement the information available.

A control station consisting of a McPhar Model M700 magnetometer equipped with a Rustrak recorder was established at the main campsite and the instrument being used in the field was reset to a constant reading each day. Diurnal variations were also checked by repeating readings at certain points (usually at the baseline) several times daily. Corrections were applied when significant variations occurred. Readings were taken at 100 ft. intervals on the gridlines.

b) Discussion of Magnetometer Survey

In mineral exploration surveys the M700 fluxgate-type magnetometer is used to measure variations in the vertical component of the earth's magnetic field. The pattern of such changes is then interpreted in terms of variations of bedrock characteristics such as bedrock structures, variations in type or intensity of alteration or mineralization and changes in rock type. Interpretation is facilitated by knowledge of the depth of overburden and weathering, and the relative magnetic susceptibilities of the various rock types present in the area under consideration.

In the C #17 Group claims overburden is generally quite shallow, 10 ft. or less in depth, except near the west side of the Group where a thick mantle of glacial morainal debris lies along the east side of Schaft Creek. Weathering is superficial throughout the claim Group. The northern and eastern portions of the C #17 Group claims are largely covered by glacial and fluvial deposits of unconsolidated material. Elsewhere overburden is generally quite shallow with an abundance of bedrock outcroppings. Weathering of bedrock is insignificant.

Magnetic susceptibilities range from less than 700 to more than 1900 relative gammas. As would be expected, the large area of glacial-fluvial unconsolidated material east of the baseline is magnetically featureless. The western portion of the area, underlain by dioritic rock, with extensive shearing and alteration, is appreciably more magnetically variable and some linear patterns, presumably related to main fractures, are present just east of Schaft Creek. The area of induced polarization anomalies is magnetically featureless in the lower range.

X INDUCED POLARIZATION AND RESISTIVITY SURVEY

Report on the Induced Polarization and Resistivity Survey of the C Claim Groups by P. Hallof and M. Goudie forms Appendix B of this Report.

Induced polarization and resistivity surveys were completed on the following lines within the C #17 claim Group:

Line 240N - 10W to 2E
" 235N - 14W to 5E
" 230N - 13W to 14E

The McPhar Geophysics report (Appendix B) is a complete discussion of the survey, including methods and equipment used, means of interpretation and recommendations for follow up work.

Although a detailed analysis of the geophysical results has not yet been undertaken, preliminary analysis indicates that the anomalous zones reported on claims of the C #17 Group correlate reasonably well with areas of known mineralization. Similarly some correlation between induced polarization and resistivity effects and geology are obvious.

Drilling and additional geophysical work were recommended by the contractors.

XI CONCLUSIONS

Claims of the C #17 Group have been investigated by means of geological mapping, soil geochemical studies, magnetometer surveys and in part by induced polarization and resistivity surveys. The southernmost part of the claims is geologically attractive as a target for further exploration work and the relevant areas are also delineated by geochemical and induced polarization surveys. In particular, these areas are on C #37 to C #40 inclusive claims. Additional work on these claims is justified and is presently under consideration.

REFERENCES

Souther, J.G., and Armstrong, J.E., 1966, North Central Belt of the Cordillera of British Columbia, in Tectonic History and Mineral Deposits of the Western Cordillera, C.I.M.M., Special Volume 8.

Souther, J.G., 1971-1, Geology and Mineral Deposits of Tulsequah Map Area, British Columbia, Geological Survey of Canada, Memoir 362.

1971-2, Telegraph Creek Map Area, British Columbia, Geological Survey of Canada, preliminary manuscript.

Sutherland-Brown, A., 1970, Geology Exploration and Mining in British Columbia, B. C. Department of Mines and Petroleum Resources.

APPENDIX A

C #17 GROUP CLAIMS

Name	Date of Record	Record No.
C 17	August 28, 1971	55126
C 18	"	55127
C 19	"	55128
C 20	"	55129
C 21	"	55130
C 22	"	55131
C 37	"	55146
C 38	"	55147
C 39	"	55148
C 40	"	55149
C 41	"	55150
C 42	"	55151
C 43	"	55152
C 44	"	55153
C 45	"	55154
C 46	"	55155
C 47	"	55156
C 48	"	55157
C 49	"	55158
C 50	"	55159
C 65	"	55174
C 66	"	55175
C 67	"	55176
C 68	"	55177
C 69	"	55178
C 70	"	55179
C 71	"	55180
C 72	"	55181
C 73	"	55182
C 74	"	55183
C 75	"	55184
C 76	"	55185
C 77	"	55186
C 78	"	55187
C 79	"	55188
C 80	"	55189
C 93	"	55202
C 94	"	55203
C 95	"	55204
C 96	"	55205

APPENDIX B

GEOCHEMICAL ANALYSES

(refer to last section of binder)

APPENDIX C

Induced Polarization and Resistivity survey by P. Hallof, Ph.D., P.Eng., and Marion A. Goudie, B.Sc.

See accompanying report by McPhar Geophysics Ltd.

APPENDIX D STATEMENT OF EXPENDITURES - C #17 CLAIM GROUP

A. SUMMARY OF EXPENDITURES

Field Expenditures

1. Wages and Salaries plus 15% Employee Costs and Benefits	$3,718.00
2. Geochemical Analyses	666.00
3. Magnetometer Rentals	63.00
4. Induced Polarization and Resistivity Survey	574.00
5. Camp Operations and Supplies	970.00
Total Field Expenditures - C #17 Claim Group	$5,991.00

B. DETAILS OF EXPENDITURES

Field Expenditures

1. Wages and Salaries (22 day month)
Pro-rated on line mile basis where information not otherwise readily available

G. D. House, 30 days in period June 5 to August 21, 1972 30 days @ $950/mo.	$1,295.00
Ed Kruchkowski, 23 days in period June 5 to July 22 and August 10 to August 21, 1972 23 days @ $750/mo.	784.00
J. Peter Neilans, 3 days in period July 20 to August 1,1972 3 days @ $650/mo.	90.00
D. Bartell, 18 days in period June 5 to July 22, 1972 18 days @ $650/mo.	532.00
Chuck Beaulieu, 18 days in period June 5 to July 22, 1972 18 days @ $650/mo.	532.00
Sub-total Wages and Salaries	$3,233.00
Plus 15% Employee Costs and Benefits	485.00
Total Wages and Salaries	$3,718.00

Field Expenditures (Continued)

2. Geochemical Analyses

430 samples - prepared @ 0.20/spl.	$ 86.00	
- analysed for copper and molybdenum @ $1.35/spl.	580.00	666.00

3. Magnetometer and Recorder Rentals

3 days @ $21/day — 63.00

4. Induced Polarization and Resisitivity Survey pro-rated on the basis of a total of 6.1 line miles surveyed on C claims of which 1.1 miles was on C #17 Group claims.

$$\frac{1.1 \text{ miles}}{6.1 \text{ miles}} \times 3181.79 \text{ total} =$$ 574.00

5. Camp Operations and Supplies

Hecla employees, 92 man days

McPhar employees, $\frac{1.1}{6.1} \times 29$ man days = 5 man days

Total - 97 man days @ $10/man day — 970.00

Total Field Expenditures - C #17 Claim Group — $5,991.00

I hereby certify that the above detailed Statement of Expenditures represents a true and accurate statement of direct costs incurred in carrying out the surveys described in the accompanying report. E & O E
October 26, 1972.

P I Conley

P. I. Conley, P. Eng.,
Vice President and Manager
Hecla Mining Company of
Canada Ltd.

APPENDIX E Statement of Qualifications

The professional qualifications of technical personnel engaged in the work reported on herein, who are not presently registered with the Association of Professional Engineers in the province of British Columbia, are detailed below:

1. G. D. House, B.A. (Mod.), AMIMM, Geologist - completed B.A. (Mod.) at Trinity College, Dublin, Eire, in 1961. Employed as a geologist by: (a) Roundtower Minerals Ltd., from March 1962 through June 1963 in Ireland; (b) Denison Mines Ltd., from August through October 1963, in Ireland; (c) Ghana Geological Survey from November 1963 through March 1965 in Ghana; (d) Newmont Mining Corporation of Canada Ltd. from June through August 1965, at Alice Arm, B. C.; (e) Alrae Engineering Ltd. from September 1965 through January 1970 on contracts in British Columbia, Yukon, N.W.T., and Saskatchewan; (f) Hecla Operating Company from April 1970 through December 1971, and June through August 1972, on projects in Yukon and at Schaft Creek area, B.C.; (g) at present a student (M.Sc. program) at University of Alaska, College, Alaska.

2. E. A. Ostensoe, B.Sc. (Hons.), Member CIMM, Association of Exploration Geochemists, Geologist - completed B.Sc. Honours course at University of British Columbia in 1960 and course requirements for M.Sc. at Queen's University in 1966; employed by Newmont Mining Corporation of Canada Ltd., under direction of Dr. G.W.H. Norman, P.Eng., from May 1960 through August 1964 as field geologist in Granduc Mine area, B.C., by Mount Billings Venture in south-eastern Yukon in summer 1965, by Scud Venture (Asarco) in Iskut River area, B.C. in summer 1966 and by Granduc Mines, Limited (NPL) and Hecla Mining Company of Canada Ltd. from October 1966 to present at Chief Geologist and Exploration Supervisor under the direction of P. I. Conley, P.Eng.

3. Ed Kruchkowski, B.Sc., Geologist - completed B.Sc. course at University of Alberta (Edmonton) in May 1972; in 1969, 1971 and 1972 employed by Hecla Operating Company in Schaft Creek area as coresplitter, soil sampler and geologist respectively. In 1970 employed by consultant and assigned to projects in southeastern British Columbia; at present a student at Unversity of Alberta (Edmonton) and candidate for M.Sc. degree.

4. J. Peter Neilans - Magnetometer Operator - completed three years of B.A.Sc. degree programme at University of British Columbia; employed by Noranda Mines, Ltd. in July and August of 1967 and 1968 as a helper on geological - geochemical reconnaissance project - Brenda Mines area, B. C.; employed by subsidiary of International Nickel from November 1968 through April 1969 as geophysical operator, on Widgiemooltha Project, Kalgoorlie area, Western Australia; employed by Granduc Mines, Ltd. from May through September of 1969 and 1970 as a Magnetometer Operator on field surveys in the Stewart area of B.C., and by Hecla Operating Company from May through August, 1971 in similar capacity in Schaft Creek area of B. C.

Report of

Geological, Geochemical, Magnetometer, Induced Polarization and Resistivity Surveys

C #30 Claim Group

Eight Miles North of Mess Lake

Liard Mining Division, B. C.

57°30'N - 131°00'W

Map Sheet 104G-NE

by

Erik Ostensoe, B.Sc.

for Hecla Operating Company

Under Supervision of P.I. Conley, P.Eng.

Date of Field Work: June 5 to August 22, 1972

Date of Report: October, 1972

P.I. Conley

TABLE OF CONTENTS

#23 Location map

#24 Claim map

I SUMMARY

Field crews employed by Hecla Operating Company and under contract from McPhar Geophysics Limited worked on the C #30 Group claims in June, July and August, 1972. Geological mapping, geochemical (soils) surveys, a magnetometer survey, and induced polarization and resistivity surveys were completed on a grid of cut lines that was established on the claims. The claims are located eight to nine miles north of Mess Lake in the Stikine area of northwestern British Columbia.

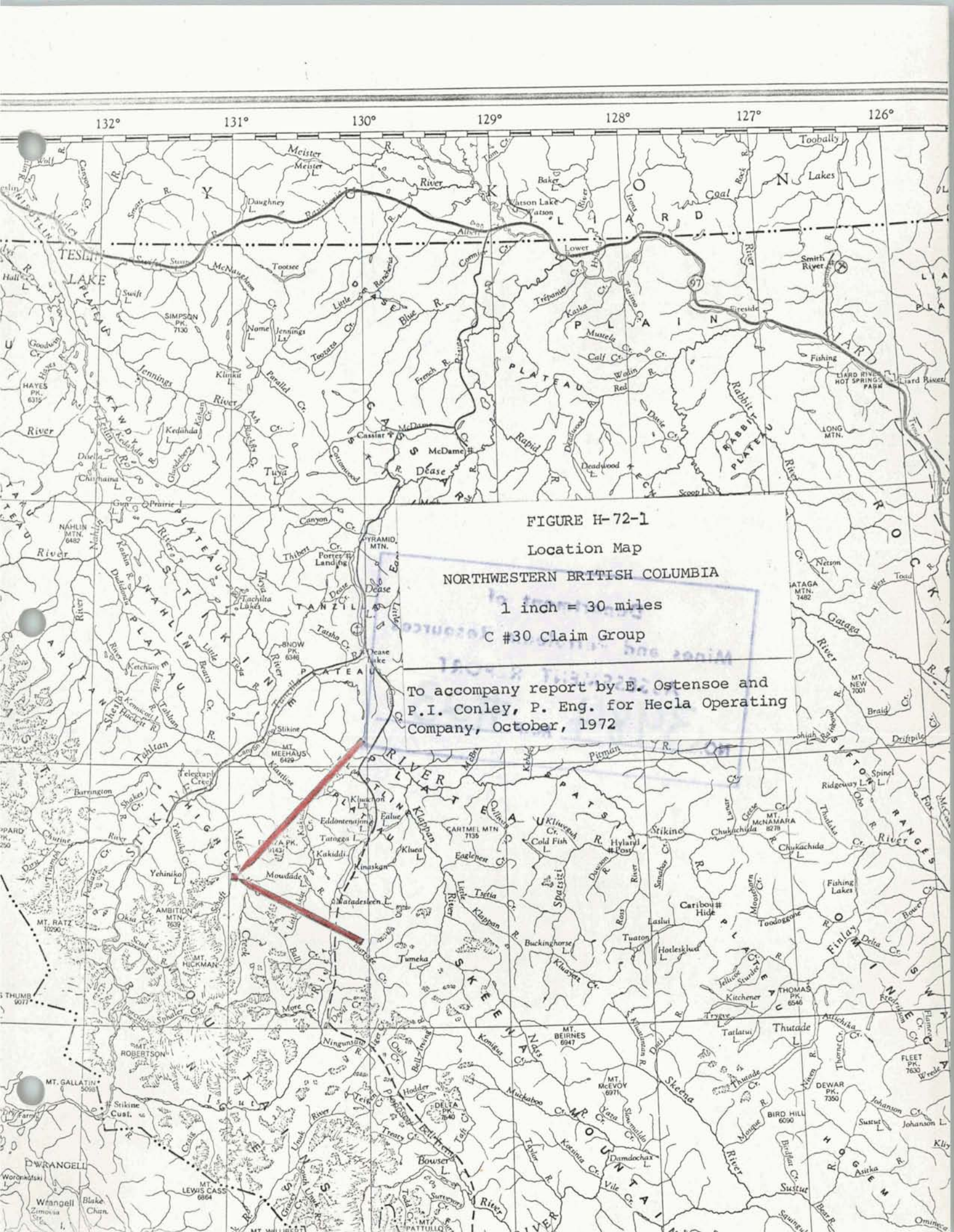
The C #30 Group claims are near the eastern edge of the Hickman Batholith and are underlain by tuffaceous andesitic rocks and by granitic rocks. Large parts of the claim Group are devoid of bedrock outcrops. The results of the soil geochemistry programme indicate that the western portion of the claim Group is somewhat enriched in copper above regional background. Molybdenum in soils is uniformly low throughout the claims. Magnetic susceptibilities show little variation and no useful patterns that could be correlated with geology were recognized. The induced polarization and resistivity surveys defined coincident frequency effect and metal factor anomalies on C #36, C #38, C #61, and C #62 claims.

II INTRODUCTION

This summary report describes the work done during the 1972 field season on claims of the C #30 Group. These claims are located between Mess and Schaft Creeks, about four miles south of their confluence (fig. H-72-1). The settlement of Telegraph Creek is 25 miles north and the Schaft Creek exploration camp of Hecla Operating Company is 18 miles south. The coordinates of the claim area are 57°30'N latitude and 131°00'W longitude, and it appears on NTS Map Sheet 104G, Telegraph Creek.

Access to a tent camp located a short distance west of the claims was by helicopters belonging to Vancouver Island Helicopters Ltd. based at Schaft Creek camp. Personnel and supplies were routed via Schaft Creek camp which was serviced regularly by aircraft from Terrace and Smithers. Daily radio telephone contact was maintained with Schaft Creek camp using a Spilsbury and Tindall SBX-10 transceiver.

Highest elevations in the area mapped are close to 3,500' above sea level, lowest are about 2,200'. The higher knolls and hills are gently rounded, whereas the lower areas are generally flat and swampy.


132°
131°
130°
129°
128°
127°
126°
FIGURE H-72-1
Location Map
NORTHWESTERN BRITISH COLUMBIA
1 inch = 30 miles
C #30 Claim Group
To accompany report by E. Ostensoe and P.I. Conley, P. Eng. for Hecla Operating Company, October, 1972

Climatically, the area lies between the heavy precipitation zone of the coastal mountains and the rain shadow zone of the dry interior. Summers are warm to hot, and the winters are cold with snowfall to about five feet.

Vegetation varies from black swamp spruce to jackpine and poplar, with alders and willow bushes in damper areas. The hills and knolls are generally forested with spruce, jackpine and poplar. The lower more swampy areas are either open grassy muskegs or have heavy stands of black spruce with willow and alder.

III CLAIMS

Claims of the C #30 claim Group discussed in this report are listed in Appendix A and are illustrated in figure H-72-2.

IV PREVIOUS WORK

Prior to 1971 the entire Mess Creek and Schaft Creek area was prospected several times by self-employed prospectors and on behalf of various mining companies. Hecla geologists had made several traverses in the C claims area in the previous several years. During the early part of the 1971 season, a Hecla prospecting party camped at "Johnnie Lake", a few miles to the south, and prospected the subject area.

Claims were staked in August 1971, but no productive field work was accomplished during the remainder of the 1971 season.

V FIELD WORK - 1972

The 1972 field programme on C #30 claim Group was directed by Gordon D. House, geologist. Ed Kruchkowski was responsible for soil sampling and also assisted in geological mapping. Additional geological work was done by Harold Linder and Eric Ostensoe. Lines were cut by Don Bartell and Chuck Beaulieu. Bert Smulders assisted the McPhar Geophysics crew. The magnetometer survey was done by Peter Neilans.

A total of 50,100' of gridline was cut on the C #30 Group claims. Slope corrections were applied as necessary to all chainages.

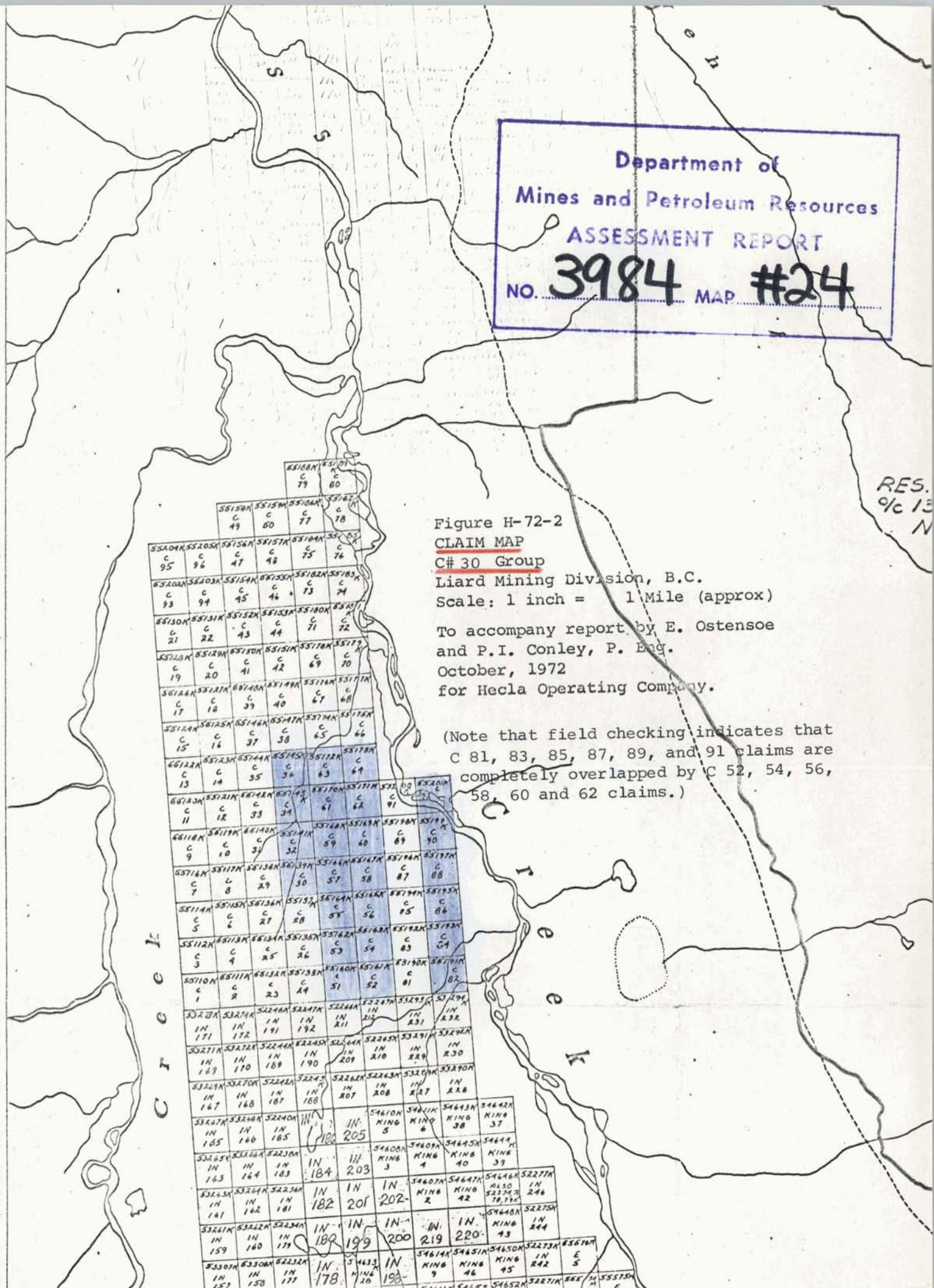


Figure H-72-2
CLAIM MAP
C# 30 Group
Liard Mining Division, B.C.
Scale: 1 inch = 1 Mile (approx)

To accompany report by E. Ostensoe
and P.I. Conley, P. Eng.
October, 1972
for Hecla Operating Company.

(Note that field checking indicates that C 81, 83, 85, 87, 89, and 91 claims are completely overlapped by C 52, 54, 56, 58, 60 and 62 claims.)

Field work was supervised by P. I. Conley, P.Eng., Vice President and Manager of Hecla Mining Company of Canada, Limited. Harold Linder, Ph.D., P.Eng. in his capacity as consultant to Hecla, recommended the programme of field work and assisted in its completion. This report was assembled from various sources, including field notes, inter-office memoranda and preliminary reports. Final text was organized by Erik Ostensoe. Maps were prepared by C. L. Cory.

VI REGIONAL GEOLOGY

The regional geological setting of the Mess Creek - Schaft Creek area is discussed by Souther (1971-1, page 10 and 1971-2, page 4). Briefly stated, he places the area in a triangle formed by the south edge of the Stikine Arch, the east side of the Coast Crystalline Belt and the northwest side of the Bowser Basin. Granitic rocks of the Coast Crystalline Belt "exhibit a long complex history of emplacement, extending from early Mesozoic to Tertiary time". The Hickman Batholith, a major element in the area under discussion, is dated by Souther (1971-2, page 9) as latest Triassic to earliest Souther and Armstrong (p.172) illustrate a number of north-striking faults along the northwest rim of Bowser Basin. The following comment, (Souther, 1971-2, p.21) is particularly apt with respect to the Mess Creek - Schaft Creek area:

> "The Triassic and Lower to Middle Jurassic terrain is broken into a mosaic of fault-bounded blocks between which there is little structural continuity. The structural style of any given block is determined largely by the competency of the rocks within it."

Regional geological work by Hecla geologists supports the concept that Mess Creek valley and the "Start Lake - Skeeter Lake valley" a few miles south of the subject area, are occupied by major faults. The area west of Mess Creek was apparently uplifted and eroded in post Early Tertiary time but in generally escaped burial by volcanic flows of the Spectrum Range and Mt. Edziza Tertiary and Recent volcanic events.

VII GEOLOGY OF THE C #30 CLAIM GROUP

a) Introduction

The geology of the C #30 claim Group area was determined by mapping grid lines and noting the geology of nearby outcrops. In addition, most of the area between the lines was systematically

traversed and an attempt was made to check on the ground, outcrops noted on aerial photographs or spotted from prominences. A photo-mosaic compiled by McElhanney Engineering Ltd. on scale 1 inch = 1,000 feet was used to help maintain position and to field plot geology.

As indicated on fig. H-72-9, most of the eastern half of C #30 claim Group lacks outcroppings of bedrock and consists of alluvium, glacial-fluvial deposits and muskeg.

b) "Hickman-type" Granitic Rocks

"Hickman-type" granitic rocks were mapped in the south-eastern and south central portion of the claim Group. The rock is a granite or quartz monzonite, and is characterized by large subhedral quartz crystals and reddish brown orthoclase feldspar grains. Mafic minerals and hematite account for 5% of the rock and chloritization is extensive. In some outcrops, particularly on C #54 claim, andesitic rock has been assimilated by the granite, and chloritic material constitutes as much as 50% of the rock.

In general, the granitic rock is sheared and shattered in appearance and this appearance is enhanced where assimilation has occurred.

c) Andesite

Andesite includes a variety of green volcanic rocks of intermediate composition, including flows, tuffs, agglomerates and dykes. To facilitate mapping, two groupings of andesitic rock types were delineated: (1) crystalline and (2) tuffaceous.

The crystalline andesite unit includes massive, holocrystalline volcanic rocks, that are virtually lacking in internal textures. These may represent thick flows, dykes, or possibly, hornfelsed fine textured andesitic tuffs. Crystalline andesite was mapped on C #36 claim.

The tuffaceous andesite is a fragmental unit and includes crystal tuff, ash deposits, thin-bedded flows, and various waterlain tuffs. The colour may vary from gray-green to dark green or mottled. Bedding is of varying prominence and is usually more obvious on weathered surfaces than on fresh broken surfaces.

Both andesitic units have been metamorphosed by the influence of the intrusive rocks, and hornfels is the commonest derivative. Other metamorphic effects include development of chlorite, biotite, feldspar and magnetite, and the introduction of epidote and silica with concomitant losses of tuffaceous textures.

d) Structural Geology

Because outcrops were found in only a very limited part of the claim Group, very little structural geological information was gathered. Outcrop distribution suggests that the granitic rocks are expressions of a lobe of Hickman intrusion that underlies much of the entire C claim block at relatively shallow depth. As is common throughout the region, shear and fracture patterns strike generally northerly and dominant dips are to the east.

VIII GEOCHEMICAL SOIL SURVEY

a) Introduction

In the period June 5 to August 21, 1972, 247 soil samples were collected from a total of approximately 9.5 mine miles of grid on the C #30 Group claims. Sampling and initial interpretation was done by Ed Kruchkowski, a geologist with special training and experience in applied geochemistry. All soil samples were analyzed for copper and molybdenum (Appendix B).

Soil conditions in the C #30 Group claims area are quite variable. Soils are reasonably well developed in the western part of the area, but in much of the central and northeastern part of the area, proper soil sampling is precluded by the prevalence of swampy ground, deep organic material or sand and gravel deposits. Where present the B soil horizon has a distinctive reddish to reddish brown colour and a slightly gritty texture.

Samples were taken using standard methods. A mattock was used to chop through roots and organic soils to expose the B soil horizon - a reddish brown granular textured layer usually found from 4 to 12 inches below surface. A few ounces of B horizon soil was placed in a numbered kraft envelope which was air-dried for a few days then shipped to Chemex Labs Ltd., North Vancouver, B. C. for analyses. Chemex Labs Ltd. employed standard techniques of geochemical analysis using the atomic absorption method for copper and molybdenum. Quality control in the laboratory was ensured by frequent reference to known standards prepared for the purpose.

Upon receipt at the laboratory, samples were dried at 80°C for 24 hours, then sieved to -80 mesh in stainless steel and nylon sieves. A 2 to 3 hour perchloric acid - nitric acid digestion of 0.5 grams of sample at 230°C was followed by dilution with distilled water to 25 mls. volume. Techtron atomic absorption spectrometers were employed to obtain final analytical data.

b) Copper

Background for copper in soil samples in the entire C claims area was determined to be 18 ppm. with a threshold, or upper limit of normal background fluctuation, at 30 ppm. Values of 200 to 400 ppm. would thus represent great enrichments over background and would suggest good mobilization in an area that is somewhat copper deficient.

Figure H-72-10 represents the distribution of copper in soils in the C claims area. Contouring at 40 ppm. contour intervals indicates a scattering of rather small weakly anomalous areas. In particular an elongated anomaly extends from C #61 to C #63 claims. Ordinarily this anomaly, with maximum values to 136 ppm., would be of little interest. Because of the existence of copper mineralization in bedrock and the pattern of geochemical dispersion in the area immediately to the west of this anomaly, a small amount of follow up work in the form of more detailed sampling and more detailed prospecting is justified.

c) Molybdenum

Molybdenum analyses for soils from the C claims Groups are shown on fig. H-72-11. Molybdenum values are uniformly low in the range of 1 ppm. or less, throughout the C #30 claims area.

IX MAGNETOMETER SURVEY

a) Introduction

Approximately 9.5 line miles of grid were surveyed using a McPhar Model M700 fluxgate-type magnetometer, serial number 6811. Operator was Peter Neilans.

A control station consisting of a second McPhar Model M700 magnetometer equipped with a Rustrak recorder was established at the campsite just west of the C #30 Group claims. The field instrument was checked daily at the control station and corrections for diurnal variation of the earth's magnetic field were based on the fluctuations recorded on the pressure - sensitive chart paper. Additional checks were obtained by repeating readings at various field stations (usually on the baseline) during the course of the work.

Observations were taken at 100 ft. spacings on gridlines which were at 1,000 ft. intervals. This grid pattern is unfortunately biased in the north-south direction with approximately a ten to one factor. The influence of this bias on interpretation

of the results is likely significant (fig. H-72-12).

b) Discussion of Magnetometer Survey

In mineral exploration surveys, the M700 magnetometer is used to measure variations in the vertical component of the earth's magnetic field. The pattern of such changes is then interpreted in terms of variations of bedrock characteristics such as bedrock structures, variations in type or intensity of alteration or mineralization and changes in rock type. Interpretation is facilitated by knowledge of the depth of overburden and the extent of weathering, and the relative magnetic susceptibilities of the various rock types present in the area under consideration.

In the C #30 Group claims area, outcroppings are largely confined to the southern half of the Group with some outcrops extending along the western side of the Group. In those areas overburden can be assumed to be relatively shallow, i.e., 25 ft. or less. Elsewhere in the area, glacial-fluvial deposits and alluvium prevail. Throughout the area, weathering is sufficiently superficial that it probably has no effect on the magnetic patterns.

Relative magnetic susceptibilities are less than 800 gammas in the eastern part of C #30 claim Group. A relatively high magnetic susceptibility pattern is centered in an area of no outcrop on claims C #57 to C #60 inclusive. Values in this area exceed 1,000 gammas to a maximum of greater than 1,900 gammas. The northerly trend of isomagnetic lines noted on fig. H-72-12, is likely a result of the biased grid.

X INDUCED POLARIZATION AND RESISTIVITY SURVEY

a) Introduction

Report on the induced polarization and resistivity survey on the C claim Groups by P. Hallof and M. Goudie forms Appendix C of this report.

Induced polarization and resistivity surveys were completed on the following lines within the C #30 claim Group:

Line 230N - 14E to 44E
220 - 3E to 22E

The McPhar Geophysics report (Appendix C) is a complete discussion of the survey, including methods and equipment used, means of interpretation and recommendations for further work.

b) Discussion of Induced Polarization and Resistivity Survey

Frequency effects anomalies were reported from 4E to 28E and from 35E to 37E on Line 230N. A "definite" category metal factor anomaly was reported from 14E to 18E. A probable metal factor anomaly was reported from 35E to 37E and "possible" metal factor anomalies are indicated from 32E to 35E and from 37E to 42E. On Line 220N "possible" frequency effect anomalies were recognized from 4E to 16E. A coincident "definite" metal factor anomaly was reported from 4E to 6E and a "possible" metal factor anomaly lies between 12E and 14E. Detailed analyis of the above mentioned geophysical results has not yet been undertaken. Soils in the area are weakly anomalous in copper. Scarcity of outcrops precludes any correlation between geology and geophysical results.

XI CONCLUSIONS

Claims of the C #30 Group have been investigated by means of geological mapping, soil geochemical studies, magnetometer survey and by induced polarization and resistivity surveys. Additional work should be directed to C #36, C #61 and C #63 claims.

REFERENCES

Souther, J.G., and Armstrong, J.E., 1966, North Central Belt of the Cordillera of British Columbia, in Tectonic History and Mineral Deposits of the Western Cordillera, C.I.M.M., Special Volume 8.

Souther, J.G., 1971-1, Geology and Mineral Deposits of Tulsequah Map Area, British Columbia, Geological Survey of Canada, Memoir 362.

1971-2, Telegraph Creek Map Area, British Columbia, Geological Survey of Canada, preliminary manuscript.

Sutherland-Brown, A., 1970, Geology Exploration and Mining in British Columbia, B. C. Department of Mines and Petroleum Resources.

APPENDIX A

C #30 GROUP CLAIMS

Name	Date of Record	Record No.
C 30	August 28, 1971	55139
C 32	"	55141
C 34	"	55143
C 36	"	55145
C 51	"	55160
C 52	"	55161
C 53	"	55162
C 54	"	55163
C 55	"	55164
C 56	"	55165
C 57	"	55166
C 58	"	55167
C 59	"	55168
C 60	"	55169
C 61	"	55170
C 62	"	55171
C 63	"	55172
C 64	"	55173
C 82	"	55191
C 84	"	55193
C 86	"	55195
C 88	"	55197
C 90	"	55199
C 92	"	55201

APPENDIX B

GEOCHEMICAL ANALYSES

(refer to last section of binder)

APPENDIX C

Induced Polarization and Resistivity survey by P. Hallof, Ph.D., P.Eng., and Marion A. Goudie, B.Sc.

See accompanying report by McPhar Geophysics Ltd.

APPENDIX D STATEMENT OF EXPENDITURES

A. SUMMARY OF EXPENDITURES

Field Expenditures

1. Wages and Salaries plus 15% employee costs and benefits	$2,629.00
2. Geochemical Analyses	382.00
3. Magnetometer Rentals	63.00
4. Induced Polarization and Resistivity Survey	652.00
5. Camp Operations and Supplies	690.00
Total Field Expenditures	$4,416.00

Office Expenditures

1. Wages and Salaries plus 15% employee costs and benefits	$ 654.00
2. Drafting Services	50.00
3. Miscellaneous, secretarial, drafting and printing supplies, et al.	20.00
Total Office Expenditures	$ 724.00
Total Expenditures C #30 Claim Group	$5,140.00

B. DETAILS OF EXPENDITURES

Field Expenditures

1. Wages and Salaries (22 day month) - pro-rated on line mile basis where information not readily available.

Gordon D. House, 18.5 days in period June 5 to August 21, 1972, 18.5 days @ $950/mo.	$ 800.00
Ed Kruchkowski, 14 days in period June 5 to July 22 and August 10 to August 21, 1972, 14 days @ $750/mo.	477.00
J. Peter Neilans, July 20 (1/2 day), 24 (1/2 day), 27 and 28, 1972, 3 days @ $650/mo.	89.00
Bert Smulders, 1-1/2 days in period July 17 to July 24 and August 7 to August 9, 1972, 1.5 days @ $525/mo.	36.00
Erik Ostensoe, July 16 and August 18, 1972, 2 days @ $1,250/mo.	114.00
Harold Linder, July 22,1972, 1 day @ $90/day	90.00

STATEMENT OF EXPENDITURES
(Continued)

Don Bartell, 11-1/2 days in period June 5 to July 22, 1972, 11.5 days @ $650/mo.		$ 340.00
Chuck Beaulieu, 11-1/2 days in period June 5 to July 22, 1972, 11.5 days @ $650/mo.		340.00
Sub-total Wages and Salaries		$2,286.00
Plus 15% employee costs and benefits		343.00
Total Wages and Salaries		$2,629.00

2. Geochemical Analyses

247 samples - prepared @ 0.20/spl.	$ 49.00	
247 samples - analysed for copper and molybdenum @ $1.35/spl.	333.00	$ 382.00

3. Magnetometer and Recorder Rentals

3 days @ $21/day — 63.00

4. Induced Polarization and Resistivity Survey pro-rated on the basis of a total of 6.1 line miles surveyed on C claims of which 1.25 miles on C #30 Claim Group.

$\frac{1.25 \text{ miles}}{6.1 \text{ miles}}$ X $3,181.79 total = 652.00

5. Camp Operations and Supplies

Hecla employees - 63 man days

McPhar employees - $\frac{1.23}{6.1}$ x 29 man days = 6 man days

Total - 69 man days @ $10/man day — 690.00

Total Field Expenditures — $4,416.00

Office Expenditures

1. Wages and Salaries

Gordon D. House, August 23 to 26, 1972 4 days @ $950/mo.	$ 173.00
Ed Kruchkowski, August 23 to 26, 1972 4 days @ $750/mo.	136.00
Harold Linder, 1 day in June, 1972 1 day @ $90/day	90.00
Erik Ostensoe, 1 day in June, 2 days in July, 1972 3 days @ $1,250/mo.	170.00
Sub-total Wages and Salaries	$ 569.00
Plus 15% employee costs and benefits	85.00
Total Wages and Salaries	$ 654.00

STATEMENT OF EXPENDITURES
(Continued)

2. Drafting Services	
C. L. Cory 10 hours @ $5.00/hr.	$ 50.00
3. Miscellaneous, secretarial, printing and drafting supplies	20.00
Total Office Expenditures	$ 724.00
Total Expenditures C #30 Claims	$5,140.00

I hereby certify that the above detailed Statement of Expenditures represents a true and accurate statement of direct costs incurred in carrying out the surveys described in the accompanying report. E & O E

October 26, 1972

P. I. Conley, P. Eng.,
Vice President and Manager
Hecla Mining Company of Canada Ltd.

APPENDIX E Statement of Qualifications

The professional qualifications of technical personnel engaged in the work reported on herein, who are not presently registered with the Association of Professional Engineers in the province of British Columbia, are detailed below:

1. G. D. House, B.A. (Mod.), AMIMM, Geologist - completed B.A. (Mod.) at Trinity College, Dublin, Eire, in 1961. Employed as a geologist by: (a) Roundtower Minerals Ltd., from March 1962 through June 1963 in Ireland; (b) Denison Mines Ltd., from August through October 1963, in Ireland; (c) Ghana Geological Survey from November 1963 through March 1965 in Ghana; (d) Newmont Mining Corporation of Canada Ltd. from June through August 1965, at Alice Arm, B. C.; (e) Alrae Engineering Ltd. from September 1965 through January 1970 on contracts in British Columbia, Yukon, N.W.T., and Saskatchewan; (f) Hecla Operating Company from April 1970 through December 1971, and June through August 1972, on projects in Yukon and at Schaft Creek area, B.C.; (g) at present a student (M.Sc. program) at University of Alaska, College, Alaska.

2. E. A. Ostensoe, B.Sc. (Hons.), Member CIMM, Association of Exploration Geochemists, Geologist - completed B.Sc. Honours course at University of British Columbia in 1960 and course requirements for M.Sc. at Queen's University in 1966; employed by Newmont Mining Corporation of Canada Ltd., under direction of Dr. G.W.H. Norman, P.Eng., from May 1960 through August 1964 as field geologist in Granduc Mine area, B.C., by Mount Billings Venture in south-eastern Yukon in summer 1965, by Scud Venture (Asarco) in Iskut River area, B.C. in summer 1966 and by Granduc Mines, Limited (NPL) and Hecla Mining Company of Canada Ltd. from October 1966 to present at Chief Geologist and Exploration Supervisor under the direction of P. I. Conley, P.Eng.

3. Ed Kruchkowski, B.Sc., Geologist - completed B.Sc. course at University of Alberta (Edmonton) in May 1972; in 1969, 1971 and 1972 employed by Hecla Operating Company in Schaft Creek area as coresplitter, soil sampler and geologist respectively. In 1970 employed by consultant and assigned to projects in southeastern British Columbia; at present a student at Unversity of Alberta (Edmonton) and candidate for M.Sc. degree.

4. J. Peter Neilans - Magnetometer Operator - completed three years of B.A.Sc. degree programme at University of British Columbia; employed by Noranda Mines, Ltd. in July and August of 1967 and 1968 as a helper on geological - geochemical reconnaissance project - Brenda Mines area, B. C.; employed by subsidiary of International Nickel from November 1968 through April 1969 as geophysical operator, on Widgiemooltha Project, Kalgoorlie area, Western Australia; employed by Granduc Mines, Ltd. from May through September of 1969 and 1970 as a Magnetometer Operator on field surveys in the Stewart area of B.C., and by Hecla Operating Company from May through August, 1971 in similar capacity in Schaft Creek area of B. C.

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18136
INVOICE NO. 7469
DATE RECEIVED July 13/72
DATE ANALYSED July 18/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN:

SAMPLE NO.:	PPM Copper	PPM Molybdenum
B100 212N	26	7
214	34	< 1
216	51	< 1
218	28	< 1
220	54	< 1
222	20	< 1
224	26	< 1
226	41	< 1
228	18	< 1
230	178	< 1
232	31	< 1
234	24	< 1
236	74	< 1
238	112	< 1
240	36	< 1
242	86	< 1
244	40	< 1
246	31	1
248	18	< 1
250	28	< 1
252	24	< 1
254	110	< 1
256	26	< 1
258	20	< 1
260	24	< 1
262	20	< 1
264	22	< 1
266	21	< 1
268	21	< 1
B100 270N	34	< 1
L250N 2E	134	1
4	98	1
6	56	1
8	58	1
10	16	1
12	80	1
14	22	1
18	16	1
20	122	1
L250N 22E	21	1
Std. #24	54	16

CTA MEMBER CANADIAN TESTING ASSOCIATION

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18137

INVOICE NO. 7469

DATE RECEIVED July 13/72

DATE ANALYSED July 18/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B.C.

ATTN:

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L250N 28E	18	< 1
30	24	3
32	14	< 1
34	20	< 1
36	26	< 1
38	22	< 1
L250N 40E	21	< 1
L250N 2W	42	< 1
4	21	< 1
6	40	< 1
8	18	< 1
10	24	< 1
12	28	< 1
14	14	< 1
16	20	< 1
18	18	< 1
20	24	< 1
22	33	< 1
24	33	< 1
26	24	< 1
28	21	< 1
30	18	< 1
32	44	< 1
34	94	< 1
36	20	1
38	13	< 1
L250N 40W	16	< 1
Std. #24	56	16

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. **18292**

INVOICE NO. **7533**

DATE RECEIVED **July 18/72**

DATE ANALYSED **July 24/72**

TO: **Hecla Mining Co. of Can. Ltd.,**
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B.C.

ATTN: **Mr.P.Conley**

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L150N 2E	31	< 1
4	16	< 1
6	21	< 1
10	14	< 1
12	13	4
14	13	< 1
16	16	< 1
18	16	4
20	14	4
22	12	< 1
24	20	< 1
26	14	< 1
28	36	< 1
30	16	< 1
32	8	< 1
34	14	< 1
36	34	< 1
38	20	< 1
40	21	< 1
42	12	< 1
44	12	< 1
46	21	< 1
48	62	< 1
50	14	< 1
52	14	< 1
54	21	< 1
56	33	< 1
58	74	< 1
60	31	< 1
62	18	< 1
64	22	< 1
66	22	< 1
68	20	< 1
L150N 70E	20	< 1
L150N 2W	16	< 1
4	82	< 1
6	58	< 1
8	44	< 1
10	24	< 1
L150N 12W	41	< 1
Std.	56	16

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CERTIFICATE NO. 18293
INVOICE NO. 7533
DATE RECEIVED July 18/72
DATE ANALYSED July 24/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver,B.C.

ATTN: Mr.P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L150N 14W	51	< 1
16	31	< 1
18	183	< 1
20	80	< 1
22	78	< 1
24	46	< 1
26	424	< 1
28	51	16
30	945	11
32	292	6
34	36	3
36	22	3
38	24	< 1
40	18	< 1
42	12	< 1
44	40	< 1
L150N 45W	34	< 1
L160N 8E	20	< 1
10	21	< 1
12	18	< 1
14	13	< 1
16	22	< 1
18	14	< 1
20	28	< 1
22	20	< 1
24	24	< 1
26	20	< 1
28	12	< 1
30	26	< 1
32	14	< 1
34	26	< 1
36	21	< 1
38	28	< 1
40	16	< 1
44	18	< 1
46	14	< 1
48	12	< 1
50	14	< 1
52	13	< 1
L160N 54E	30	< 1
Std.	54	16

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CERTIFICATE NO. 18294
INVOICE NO. 7533
DATE RECEIVED July 18/72
DATE ANALYSED July 24/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver,B.C.

ATTN: Mr.P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L160N 56E	13	< 1
58	13	< 1
60	33	< 1
62	24	< 1
64	28	< 1
68	13	< 1
L160N 70E	20	< 1
L160N 2W	28	< 1
4	20	< 1
6	21	< 1
8	51	< 1
10	44	< 1
12	14	< 1
14	18	< 1
16	14	< 1
18	51	6
20	120	< 1
22	82	< 1
24	51	< 1
26	30	< 1
28	51	7
30	200	8
32	48	3
34	224	2
36	18	3
38	12	< 1
40	13	< 1
42	18	< 1
44	13	< 1
L160N 45W	72	< 1
L170N 2E	13	< 1
4	18	< 1
8	13	< 1
10	38	< 1
12	28	< 1
14	14	< 1
16	20	< 1
18	24	< 1
20	14	2
L170N 22E	13	< 1
Std.	54	16

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CERTIFICATE NO. 18295
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TO: Hecla Mining Co. of Can. Ltd.,
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SAMPLE NO.:	PPM Copper	PPM Molybdenum
L170N 24E	106	< 1
26	31	< 1
28	48	< 1
30	18	< 1
33	12	< 1
34	14	< 1
36	20	< 1
38	18	< 1
40	12	< 1
42	14	< 1
44	21	< 1
46	18	< 1
48	26	< 1
50	16	< 1
52	30	< 1
54	16	< 1
56	16	< 1
58	26	< 1
60	56	< 1
62	18	< 1
64	26	< 1
L170N 66E	20	< 1
L170N 2W	21	< 1
4	14	< 1
6	18	< 1
8	131	< 1
10	12	< 1
12	12	< 1
14	18	< 1
16	14	< 1
18	14	< 1
20	48	< 1
22	20	< 1
24	54	< 1
26	154	< 1
28	20	< 1
30	12	< 1
32	44	< 1
34	36	< 1
L170N 36W	12	< 1
Std.	56	16

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CERTIFICATE NO. 18296
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TO: Hecla Mining Co. of Can. Ltd.,
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ATTN: Mr.P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L170N 38W	24	< 1
40	18	< 1
42	38	< 1
44	12	< 1
L170N 45W	16	< 1
L180N 2E	18	< 1
4	21	< 1
6	18	< 1
8	18	< 1
10	28	< 1
12	26	< 1
14	16	< 1
16	16	< 1
18	31	< 1
20	98	< 1
22	26	< 1
24	56	< 1
26	14	< 1
28	16	< 1
30	14	< 1
32	63	< 1
34	20	< 1
35	26	< 1
38	16	< 1
40	13	< 1
42	26	< 1
44	20	< 1
46	16	< 1
48	16	< 1
50	26	< 1
52	26	< 1
54	22	< 1
56	18	< 1
58	20	< 1
L180N 60E	56	< 1
L180N 2W	24	< 1
4	31	< 1
6	13	< 1
8	13	< 1
L180N 10W	16	< 1
Std.	58	16

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CERTIFICATE NO. 18297
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DATE RECEIVED July 18/72
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TO: Hecla Mining Co. of Can. Ltd.,
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ATTN: Mr.P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L180N 12W	18	< 1
14	18	< 1
16	16	< 1
18	40	< 1
20	14	< 1
22	40	< 1
26	14	< 1
30	44	< 1
32	60	< 1
34	16	< 1
36	20	< 1
38	30	< 1
L180N 40W	80	< 1
L190N 2E	18	< 1
4	18	< 1
6	14	< 1
8	22	< 1
10	10	< 1
12	18	< 1
14	16	< 1
16	14	< 1
18	13	< 1
20	51	< 1
22	10	< 1
24	8	< 1
26	10	< 1
28	16	< 1
30	16	< 1
32	10	< 1
34	13	< 1
36	12	< 1
38	18	< 1
40	70	< 1
42	20	< 1
44	38	< 1
48	31	< 1
50	14	< 1
52	18	< 1
54	18	< 1
L190N 56E	106	< 1
Std.	56	17

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18298
INVOICE NO. 7533
DATE RECEIVED July 18/72
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TO: Hecla Mining Co. of Can.Ltd.,
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Vancouver,B.C.

ATTN: Mr.P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L190N 2W	40	< 1
4	46	< 1
8	13	< 1
10	12	< 1
12	12	< 1
14	16	< 1
16	14	2
18	13	< 1
20	52	< 1
30	64	< 1
32	18	< 1
34	33	< 1
36	18	< 1
38	28	< 1
40	13	< 1
42	48	< 1
44	12	< 1
L190N 45W	14	< 1
L200N 2E	14	< 1
4	12	< 1
6	86	< 1
8	20	< 1
10	20	< 1
12	31	< 1
14	48	< 1
16	14	< 1
18	20	< 1
20	10	< 1
22	13	< 1
24	12	< 1
26	14	< 1
28	13	< 1
30	16	< 1
32	24	< 1
34	13	< 1
36	20	< 1
38	128	< 1
40	22	< 1
42	22	< 1
L200N 45E	16	< 1
Std.	54	16

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18299
INVOICE NO. 7533
DATE RECEIVED July 18/72
DATE ANALYSED July 24/72

TO: Hecla Mining Co. of Can.Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver,B.C.

ATTN: Mr.P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L200N 46E	20	< 1
48	14	< 1
50	26	< 1
52	96	< 1
54	14	< 1
56	20	< 1
58	18	< 1
L200N 60E	26	< 1
L200N 2W	16	< 1
4	14	< 1
6	30	< 1
8	24	< 1
10	24	< 1
12	18	< 1
14	33	< 1
16	16	< 1
24	41	< 1
26	24	< 1
28	51	< 1
30	30	< 1
32	21	< 1
34	13	< 1
36	18	< 1
38	14	< 1
40	30	< 1
42	36	< 1
44	14	< 1
L200N 45W	20	< 1
L200N 2E	22	3
4	28	< 1
6	24	< 1
8	50	< 1
10	21	< 1
12	14	< 1
14	76	< 1
16	18	< 1
18	12	< 1
20	13	< 1
22	24	< 1
L210N 24E	21	< 1
Std.	56	16

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Certified by Glen Ammeson

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18300
INVOICE NO. 7533
DATE RECEIVED July 18/72
DATE ANALYSED July 24/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver,B.C.

ATTN: Mr.P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L210N 26E	16	< 1
28	20	< 1
30	18	< 1
32	14	< 1
34	13	< 1
36	20	< 1
38	18	< 1
40	26	< 1
42	20	< 1
44	18	< 1
46	18	< 1
48	16	< 1
L210N 50E	24	< 1
L210N 2W	20	< 1
4	36	< 1
6	21	< 1
8	30	< 1
10	18	< 1
12	20	< 1
14	16	< 1
16	24	< 1
18	24	< 1
20	20	< 1
22	24	< 1
24	24	< 1
26	21	< 1
28	26	< 1
30	20	< 1
32	20	< 1
34	16	< 1
36	24	< 1
38	26	< 1
40	13	< 1
L210N42W	18	< 1
L220N 2E	18	< 1
4	34	< 1
6	18	< 1
8	28	< 1
10	22	< 1
L220N12E	80	< 1
Std.	58	16

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18301
INVOICE NO. 7533
DATE RECEIVED July 18/72
DATE ANALYSED July 24/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B.C.

ATTN: Mr.P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L220N 14E	62	< 1
16	13	< 1
18	20	< 1
20	28	< 1
22	21	< 1
24	14	< 1
26	13	< 1
28	30	< 1
30	14	< 1
32	21	< 1
34	14	< 1
36	14	< 1
No sample		
40	20	< 1
42	22	< 1
44	21	< 1
46	21	< 1
L220N 48E	38	< 1
L220N 2W	28	< 1
4	33	< 1
6	78	< 1
8	18	< 1
10	14	< 1
12	20	< 1
14	18	< 1
16	26	< 1
18	44	< 1
20	52	< 1
22	12	< 1
24	10	< 1
26	18	< 1
28	13	< 1
30	12	< 1
32	18	< 1
34	12	< 1
36	21	< 1
38	14	< 1
40	28	< 1
L220N 42W	14	< 1
L230N 2E	24	< 1
Std.	56	16

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18302
INVOICE NO. 7533
DATE RECEIVED July 18/72
DATE ANALYSED July 24/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B.C.

ATTN: Mr.P. Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L230N 4E	50	< 1
6	13	< 1
8	20	< 1
10	22	< 1
12	16	< 1
14	80	< 1
16	22	< 1
18	14	< 1
20	40	< 1
22	33	< 1
24	131	< 1
26	42	< 1
28	20	< 1
30	16	< 1
32	21	< 1
34	20	< 1
38	18	< 1
40	21	< 1
42	24	< 1
L230N 43E	26	< 1
L230N 2W	24	< 1
4	33	< 1
6	78	< 1
8	134	< 1
10	424	< 1
12	206	< 1
14	50	< 1
16	16	< 1
18	22	< 1
20	26	< 1
22	14	< 1
24	36	< 1
26	31	< 1
28	16	< 1
30	18	< 1
32	20	< 1
34	22	< 1
36	24	< 1
38	13	< 1
L230N 40W	10	< 1
Std.	58	16

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18303
INVOICE NO. 7533
DATE RECEIVED July 18/72
DATE ANALYSED July 24/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B.C.

ATTN: Mr. P. Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L240N 2W	24	< 1
4	34	< 1
6	50	< 1
8	168	< 1
10	38	< 1
12	56	< 1
14	131	< 1
16	24	< 1
18	21	< 1
20	34	< 1
22	20	< 1
24	33	< 1
26	30	< 1
28	21	< 1
30	38	< 1
32	40	< 1
34	16	< 1
36	14	< 1
38	20	< 1
L240N 40W	22	< 1
L240N 2E	28	1
4	22	< 1
6	20	< 1
8	70	< 1
10	21	< 1
12	26	< 1
14	33	< 1
18	50	< 1
22	20	< 1
24	38	< 1
26	136	< 1
28	20	< 1
30	76	< 1
32	18	< 1
34	20	< 1
36	16	< 1
38	80	< 1
40	88	< 1
L240N 42E	22	< 1
L260N 2E	22	< 1
Std.	56	17

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by

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212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18304
INVOICE NO. 7533
DATE RECEIVED July 18/72
DATE ANALYSED July 24/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B.C.

ATTN: Mr. P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
L260N 4E	52	< 1
6	14	< 1
8	118	< 1
9	26	< 1
12	28	< 1
14	28	< 1
20	20	< 1
22	16	< 1
24	8	< 1
25	13	< 1
28	16	< 1
30	16	< 1
32	13	< 1
34	16	< 1
36	42	< 1
38	38	< 1
L260N 40E	26	< 1
B 100 142	46	< 1
144	26	< 1
146	28	< 1
148	16	< 1
150	21	< 1
160	34	< 1
162N	48	< 1
164	22	< 1
166	26	< 1
168	54	2
170	12	< 1
172	26	< 1
174	14	< 1
176	31	< 1
178	18	< 1
180	16	< 1
182	22	< 1
184	21	2
186	13	< 1
188	12	< 1
190	10	< 1
192	26	< 1
B100 194N	14	< 1
Std.	56	16

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18305
INVOICE NO. 7533
DATE RECEIVED July 18/72
DATE ANALYSED July 24/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B.C.

ATTN: Mr. P.Conley

SAMPLE NO.:	PPM Copper	PPM Molybdenum
B100 196N	10	< 1
198	16	< 1
200	18	< 1
202	18	< 1
204	20	< 1
206	13	< 1
208	12	5
B100 210N	112	3

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18349
INVOICE NO. 7571
DATE RECEIVED July24/72
DATE ANALYSED July 26/72

TO: Hecla Mining Co. of can. Ltd., ;
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN:

SAMPLE NO.:	PPM Copper	PPM Molybdenum
260N 2W	22	< 1
4	63	< 1
6	22	< 1
8	18	4
10	13	< 1
12	20	2
14	24	< 1
16	21	< 1
18	20	< 1
20	21	< 1
22	21	< 1
24	18	< 1
26	13	< 1
28	28	< 1
30	12	< 1
32	14	< 1
34	14	< 1
36	14	< 1
39	12	< 1
260N 40W	24	< 1
270N 2E	31	< 1
4	13	< 1
6	28	< 1
8	12	< 1
10	16	< 1
12	28	< 1
14	21	< 1
16	18	< 1
18	13	< 1
20	20	< 1
22	16	< 1
26+50	10	< 1
30	12	< 1
32	21	< 1
34	20	< 1
36	26	< 1
38	20	< 1
270N 40E	16	< 1
270N 2W	22	< 1
Std. #24	54	17

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by B. Kwaites

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CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18350

INVOICE NO. 7571

DATE RECEIVED July 24/72

DATE ANALYSED July 26/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN:

SAMPLE NO.:	PPM Copper	PPM Molybdenum
270N 4W	20	< 1
6	28	< 1
8	41	< 1
10	22	< 1
12	14	< 1
14	16	1
16	18	< 1
18	21	< 1
20	13	< 1
22	36	< 1
24	16	< 1
26	21	< 1
28	12	< 1
30	13	1
32	13	< 1
34	42	< 1
36	14	< 1
38	12	< 1
40	12	< 1
270N 42W	20	< 1
280N 2E	13	1
4	21	< 1
6	13	< 1
8	16	< 1
10	20	< 1
12	92	< 1
14	56	< 1
18	34	< 1
19	28	< 1
26	16	< 1
28	20	< 1
30	12	< 1
32	14	< 1
34	16	< 1
36	14	< 1
38	34	< 1
280N 40E	14	< 1
280N 2W	38	< 1
4	26	< 1
280N 6W	18	< 1
Std. #24	54	16

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by B. K. Swaites

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CANADA
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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18351
INVOICE NO. 7571
DATE RECEIVED July 24/72
DATE ANALYSED July 26/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN:

SAMPLE NO.:	PPM Copper	PPM Molybdenum
280N 8W ✓	14 ✓	< 1 ✓
10 ✓	13	< 1
12 ✓	21	< 1
14 ✓	51	< 1
16 ✓	16	< 1
18 ✓	13	< 1
20 ✓	13	< 1
22 ✓	20	< 1
24 ✓	10	< 1
26 ✓	20	< 1
28 ✓	31	< 1
30 ✓	28	< 1
32 ✓	22	< 1
34 ✓	16	< 1
36 ✓	21	< 1
38 ✓	16	< 1
40 ✓	46	< 1
280N 41W ✓	24 ✓	< 1 ✓
290N 2E ✓	21 ✓	< 1 ✓
4 ✓	28	< 1
6 ✓	28	< 1
8 ✓	22	< 1
10 ✓	20	1
12 ✓	21	< 1
14 ✓	82	< 1
16 ✓	34	< 1
18 ✓	20	< 1
20 ✓	21	< 1
24 ✓	26	< 1
26 ✓	22	< 1
34 ✓	20	< 1
36 ✓	16	< 1
38 ✓	16	< 1
290N 39E ✓	24 ✓	< 1 ✓
~~290N 4W ✓~~	~~20 ✓~~	~~< 1 ✓~~
6 ✓	14	< 1
8 ✓	16	< 1
10 ✓	10	< 1
12 ✓	22	< 1
~~290N 14W ✓~~	~~22 ✓~~	~~< 1 ✓~~
STd. #24	58	17

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CANADA
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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18352
INVOICE NO. 7571
DATE RECEIVED July 24/72
DATE ANALYSED July 26/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver B. C.

ATTN:

SAMPLE NO.:		PPM Copper	PPM Molybdenum
290N	16W	28	< 1
	18	21	< 1
	20	13	< 1
	22	20	< 1
	24	24	< 1
	26	21	< 1
	28	16	< 1
	30	13	< 1
	32	13	< 1
	34	34	< 1
	36	16	< 1
	38	18	< 1
290N	40W	13	< 1
300N	2E	18	< 1
	4	14	< 1
	6	20	< 1
	8	24	< 1
	12	13	< 1
	14	22	< 1
	16	12	< 1
	18	13	< 1
	20	22	< 1
	22	18	< 1
	24	20	< 1
	26	34	< 1
	28	14	< 1
	30	14	< 1
	32	20	< 1
	34	28	< 1
	36	14	< 1
	38	14	< 1
300N	40E	18	< 1
300N	2W	16	< 1
	4	28	< 1
	6	34	< 1
	8	20	< 1
	10	16	< 1
	12	14	< 1
	14	16	< 1
300N	16W	13	< 1
Std. #24		56	16

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18353
INVOICE NO. 7571
DATE RECEIVED July 24/72
DATE ANALYSED July 27/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN:

SAMPLE NO.:	PPM Copper	PPM Molybdenum
300N 18W ✓	12✓	< 1✓
20✓	14	< 1
22✓	21	< 1
24✓	26	< 1
26✓	10	< 1
28✓	13	< 1
30✓	18	< 1
32✓	13	< 1
34✓	26	< 1
36✓	13	< 1
38✓	14	< 1
300N 40W ✓	58✓	< 1✓
310N 2E ✓	21	< 1
4✓	16	< 1
6✓	14	< 1
8✓	21	< 1
10✓	22	< 1
12✓	26	< 1
14✓	13	< 1
16✓	14	< 1
18✓	22	< 1
20✓	41	< 1
22✓	13	< 1
24✓	24	< 1
26✓	18	< 1
28✓	13	< 1
30✓	22	< 1
32✓	21	< 1
34✓	16	< 1
36✓	26	< 1
310N 37E✓	22✓	< 1✓
310N 2W✓	14✓	< 1✓
4✓	21	< 1
6✓	34	< 1
8✓	14	< 1
10✓	12	< 1
12✓	26	< 1
14✓	10	< 1
16✓	13	< 1
310N 18W✓	18✓	< 1✓
Std. #24	56	16

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18354
INVOICE NO. 7571
DATE RECEIVED July 24/72
DATE ANALYSED July 27/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN:

SAMPLE NO.:		PPM Copper	PPM Molybdenum
310N	20W ✓	12 ✓	< 1 ✓
	22 ✓	18	< 1
	24 ✓	22	< 1
	26 ✓	26	< 1
	28 ✓	16	< 1
	30 ✓	14	< 1
310N	31W ✓	44 ✓	< 1 ✓
320N	2E ✓	24 ✓	< 1 ✓
	4 ✓	34	< 1
	6 ✓	14	< 1
	8 ✓	14	< 1
	10 ✓	10	< 1
	12 ✓	14	< 1
	14 ✓	21	< 1
	16 ✓	13	< 1
	18 ✓	26	< 1
	20 ✓	22	< 1
	22 ✓	7	< 1
	24 ✓	38	< 1
	26 ✓	28	< 1
	28 ✓	24	< 1
	30 ✓	20	< 1
	32 ✓	21	< 1
320N	33E	16 ✓	< 1 ✓
320N	2W ✓	14 ✓	< 1 ✓
	4 ✓	22	< 1
	6 ✓	10	< 1
	8 ✓	14	< 1
	10 ✓	16	< 1
	12 ✓	13	< 1
	14 ✓	7	< 1
	16 ✓	10	< 1
	18 ✓	12	< 1
	20 ✓	30	< 1
	22 ✓	14	< 1
	24 ✓	158	< 1
	26 ✓	12	< 1
320N	28W ✓	30 ✓	< 1 ✓
330N	2E ✓	18 ✓	< 1 ✓
330N	4E ✓	14 ✓	< 1 ✓
Std. #24		54	16

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CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18355
INVOICE NO. 7571
DATE RECEIVED July 24/72
DATE ANALYSED July 27/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver 2 B. C.

ATTN:

SAMPLE NO.:		PPM Copper	PPM Molybdenum
330N	6E	13	< 1
	8	21	< 1
	10	20	< 1
	12	18	< 1
	14	16	< 1
	16	21	< 1
	18	30	< 1
	20	16	< 1
	22	30	< 1
	24	20	< 1
	26	30	< 1
	28	41	< 1
	30	38	< 1
	32	24	< 1
330N	34E	26	< 1
B100	272N	31	< 1
	274	22	< 1
	276	22	< 1
	278	21	< 1
	280	20	< 1
	282	20	3
	284	14	1
	286	16	< 1
	288	18	< 1
	290	18	< 1
	292	24	< 1
	294	13	< 1
	296	21	< 1
	298	20	< 1
	300	22	< 1
	302	26	< 1
	304	16	< 1
	306	21	< 1
	308	14	< 1
	310	14	< 1
	320	44	< 1
	322	20	< 1
	324	16	< 1
	326	20	< 1
B100	328N	44	< 1
Std. #24		58	16

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by B. L. Swaites

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18356
INVOICE NO. 7571
DATE RECEIVED July 24/72
DATE ANALYSED July 27/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN:

SAMPLE NO.:		PPM Copper	PPM Molybdenum
B100	330N ✓	21 ✓	< 1 ✓
B100	312N ✓	31	< 1
B100	314N ✓	26	< 1
B100	316N ✓	26	< 1
B100	318N ✓	26 ✓	< 1 ✓

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ASSOCIATION

Certified by P. E. Gwalter

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CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18524
INVOICE NO. 7650
DATE RECEIVED July 31/72
DATE ANALYSED Aug. 2/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN: Mr. P. Conley "Shaft Creek"

SAMPLE NO.:	PPM Copper	PPM Molybdenum
215N 00	88	< 1
2W	48	< 1
4	44	< 1
6	300	< 1
8	40	< 1
10	16	< 1
12	18	< 1
14	21	< 1
16	20	< 1
18	16	< 1
20	13	< 1
22	16	< 1
24	16	< 1
26	16	< 1
28	16	< 1
30	14	< 1
32	18	< 1
34	16	< 1
36	14	< 1
38	14	< 1
40	16	< 1
42	18	< 1
44	10	< 1
46	16	< 1
48	13	< 1
50	16	< 1
215N 52W	38	< 1
225N 00	20	< 1
2W	68	< 1
4	16	< 1
6	26	< 1
8	28	< 1
10	22	< 1
12	8	< 1
14	18	< 1
16	14	< 1
18	12	< 1
20	18	< 1
22	13	< 1
225N 24W	13	< 1
Std. #24	54	16

CTA MEMBER CANADIAN TESTING ASSOCIATION

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NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18525

INVOICE NO. 7650

DATE RECEIVED July 31/72

DATE ANALYSED Aug. 2/72

TO: Hecla Mining Co. of Can. Ltd.,
Board of Trade Tower,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver B. C.

ATTN: Mr. P. Conley

"Shaft Creek"

SAMPLE NO.:		PPM Copper	PPM Molybdenum
225N	26W	13	< 1
	28	10	< 1
	30	7	< 1
	32	41	< 1
	34	13	< 1
	35	8	< 1
	36	18	< 1
	38	8	< 1
	40	7	< 1
	42	10	< 1
	44	13	< 1
	46	12	< 1
	48	21	< 1
	50	12	< 1
	52	13	< 1
	54	13	< 1
225N	55W	18	< 1
235N	00	33	< 1
	2W	484	< 1
	4	86	< 1
	6	82	1
	8	28	1
	10	30	< 1
	12	62	< 1
	14	36	< 1
	16	34	< 1
	18	26	< 1
	20	50	< 1
	22	20	< 1
	24	12	< 1
	26	230	< 1
	28	28	< 1
	30	14	< 1
	32	14	< 1
	34	14	< 1
	36	41	< 1
	38	48	< 1
	42	56	< 1
235N	44W	106	< 1
Std. #24		54	16

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by B. L. Swaites

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NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18526
INVOICE NO. 7650
DATE RECEIVED July 31/72
DATE ANALYSED Aug. 2/72

TO: Hecla Mining Co. of Can. Ltd.,
2009 - 1177 W, Hastings St.,
Vancouver B, C.

ATTN: Mr. P. Conley "Shaft Creek"

SAMPLE NO.:	PPM Copper	PPM Molybdenum
235N 46W	46	< 1
48	68	< 1
50	60	< 1
52	44	< 1
54N	24	< 1
56W	18	< 1
235N 57W	22	< 1
245N 00	22	< 1
2W	46	< 1
4	26	< 1
6	31	< 1
8	14	< 1
10	24	< 1
12	58	< 1
14	38	< 1
16	30	< 1
18	16	< 1
20	68	< 1
22	42	< 1
24	100	< 1
26	26	< 1
28	26	5
30	13	< 1
32	33	< 1
34	26	< 1
36	14	< 1
38	12	< 1
40	24	< 1
42	12	< 1
44	20	< 1
46	20	< 1
48	33	< 1
50	24	1
52	24	< 1
54	14	< 1
245N 56W	24	< 1
255N 00	14	< 1
2W	21	< 1
4	33	< 1
255N 6W	60	< 1
Std. #24	52	16

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CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18527
INVOICE NO. 7650
DATE RECEIVED July 31/72
DATE ANALYSED Aug. 2/72

TO: Hecla Mining Co. of Can. Ltd.,
#2009 - 1177 W. Hastings St.,
Vancouver, B. C.

ATTN: Mr. P. Conley "Shaft Creek"

SAMPLE NO.:	PPM Copper	PPM Molybdenum
255N 8W	26	< 1
10	21	< 1
12	13	< 1
14	36	< 1
16	18	< 1
18	26	< 1
20	14	< 1
22	18	< 1
24	58	< 1
26	18	< 1
28	16	< 1
30	16	< 1
32	24	< 1
34	22	< 1
36	7	< 1
38	10	< 1
40	31	< 1
42	13	< 1
44	24	< 1
46	14	< 1
48	62	< 1
50	18	< 1
52	36	< 1
255N 54W	10	< 1
265N 00	14	< 1
2W	12	< 1
4	14	< 1
6	18	< 1
8	14	< 1
10	14	< 1
12	16	< 1
14	13	< 1
18	20	< 1
20	16	< 1
24	14	< 1
26	14	< 1
28	18	< 1
30	13	< 1
32	13	< 1
265N 34W	14	< 1
Std. #24	54	16

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by P. L. Swaites

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18528
INVOICE NO. 7650
DATE RECEIVED July 31/72
DATE ANALYSED Aug. 2/72

TO: Hecla Mining Co. of Can. Ltd.,
#2009 - 1177 W. Hastings St.,
Vancouver B. C.

ATTN: "Shaft Creek"

SAMPLE NO.:	PPM Copper	PPM Molybdenum
265N 36W	13	< 1
38	42	< 1
40	12	< 1
42	14	< 1
44	14	< 1
46	16	< 1
48	60	< 1
50	40	< 1
265N 51W	16	< 1
235N 40W	13	< 1
Std. #24	54	16

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by B. L. Swaites

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18852
INVOICE NO. 7932
DATE RECEIVED Aug. 17, 1972
DATE ANALYSED Aug. 23, 1972

TO: Hecla Mining Co. of Canada Ltd.,
#2009 1177 W. Hastings St.,
Vancouver, B.C.

ATTN: Mr. P. Conley

SAMPLE NO.:		ppm Copper	ppm Molybdenum	pH
L 149N	18W	80	2	6.5
	20	80	2	6.7
	21	126	1	5.0
	23	50	< 1	6.2
	25	92	1	6.4
	26	24	< 1	6.6
	27	24	10	6.6
	29	21	14	6.4
	30	21	24	6.8
	31	51	22	6.8
	32	44	10	6.8
L 149N	33W	30	11	6.8
L 150N	17W	183	2	5.9
	18	183	2	6.0
	19	189	1	6.6
	21	168	2	6.5
	23	66	1	6.2
	25	24	2	6.2
	27	42	3	7.0
	29	16	2	6.7
	31	58	17	6.8
L 150N	33W	189	3	7.0
L 151N	19W	40	3	6.4
	21	74	1	6.5
	23	320	4	6.7
	25	22	3	6.6
	26	20	10	6.8
	27	33	10	6.6
	29	58	4	6.9
	30	36	4	6.8
	31	18	6	6.4
	32	36	5	6.1
L 151N	33W	44	6	6.7
L 155N	17W	48	3	6.6
	18	104	<1	6.6
	19	116	<1	7.0
	21	36	1	6.3
	22	54	<1	6.7
	23	16	2	6.8
L 155N	24W	31	7	6.6
	Std	50	26	

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by .....

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

• CHEMISTS • GEOCHEMISTS • ANALYSTS • ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18853
INVOICE NO. 7932
DATE RECEIVED Aug. 17, 1972
DATE ANALYSED Aug. 23, 1972

TO: Hecla Mining Co. of Canada Ltd.,
#2009 1177 W. Hastings St.,
Vancouver, B.C.

ATTN: Mr. P. Conley

SAMPLE NO.:		ppm Copper	ppm Molybdenum	pH
L 155N	25W	20	2	7.1
	26	31	7	6.6
	27	28	11	6.3
	28	20	1	6.4
	29	56	1	6.7
	30	48	2	6.8
	31	52	2	6.6
	32	50	< 1	6.6
	33	21	1	5.6
L 155N	34W	18	< 1	6.6
L 156N	17W	46	5	6.0
L 157N	17W	18	3	6.0
L 158N	17W	36	3	6.0
L 159N	17W	20	2	5.4
	18	21	2	6.4
	20	46	11	6.1
	30	60	2	7.3
	32	24	2	6.8
	34	34	3	6.0
	36	16	2	6.4
L 159N	38W	22	2	7.0
L 160N	17W	38	11	5.6
	19	66	8	7.0
	21	46	< 1	6.6
	31	18	8	6.7
	33	18	7	6.5
	35	18	6	6.8
	37	28	3	6.0
L 160N	39W	16	0	6.7
L 161N	34W	12	4	6.6
L 163N	34W	10	1	5.4
L 165N	17W	18	2	5.9
	18	14	3	6.2
	19	14	1	6.6
	20	34	2	6.0
	21	74	1	6.4
	22	60	1	6.5
	23	20	1	6.5
	24	38	2	6.7
L 165N	25W	26	1	5.6
	Std	44	26	

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 18854
INVOICE NO. 7927
DATE RECEIVED August 17/72
DATE ANALYSED August 23/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings,
Vancouver, B.C.

ATTN:

SAMPLE NO.:	PPM Copper	PPM Molybdenum	pH
L165N 26W	20	4	6.6
27	13	4	5.4
28	56	4	6.8
29	18	3	6.6
30	22	1	6.7
31	21	1	6.6
32	12	< 1	6.8
33	18	2	5.6
L165N 34W	14	3	6.4
L167N 17W	14	1	6.2
L169N 17W	13	1	5.4

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Certified by Allen Armanini

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 19018
INVOICE NO. 8039
DATE RECEIVED
DATE ANALYSED August 30/72

TO: Hecla Mining Co. of Can. Ltd.,
Ste. 2009 - 1177 W. Hastings St.,
Vancouver, B.C.

ATTN:

SAMPLE NO.:	PPM Copper	PPM Molybdenum
140N 24W	46	< 1
25	76	4
28	277	< 1
29	41	2
30	14	1
31	20	< 1
32	34	2
33	14	< 1
140N 34W	13	< 1
145N 24W	51	< 1
25	46	1
26	60	3
27	38	< 1
28	13	< 1
29	14	3
30	34	< 1
31	20	17
32	22	17
33	20	11
145N 34W	38	4
174N 1W	36	< 1
174N 2W	14	2
175N BL00	52	1
175N 1E	13	1
175N 1W	80	3
2	33	2
3	14	1
4	10	2
175N 5W	14	2
176N 1W	56	3
207N BL00	16✓	2✓
209N BL00	46✓	3✓
209N 1E	46✓	1✓
209N 2E	16✓	3✓
209N 1W	66✓	2✓
2	30✓	2✓
209N 3W	34✓	3✓
210N 1E	13✓	2✓
3A	16✓	5✓
210N 3EB	13✓	3✓
Std.	46	26

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by Hart Bichler

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CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 19019
INVOICE NO. 8010
DATE RECEIVED Aug. 23, 1972
DATE ANALYSED Aug. 28, 1972

TO: Hecla Mining Co. of Canada Ltd.,
#2009 1177 W. Hastings St.,
Vancouvrçr, B.C.

ATTN: Mr. P. Conley

SAMPLE NO.:		ppm Copper	ppm Molybdenum
210N	1W	46	1
211N	BL 00	34	5
	1E	14	7
	2	16	4
211N	3E	12	5
211N	1W	12	4
	2	10	1
211N	3W	16	2
213N	BL 00	24	8
214N	1W	30	1
	2	34	3
	3	12	3
	4	8	1
214N	5W	10	3
215N	1E	63	2
215N	2E	94	2
215N	1W	51	4
	3	63	2
	5	21	2
215N	7W	14	1
216N	1E	80	2
216N	2E	102	1
216N	2W	33	2
	4	64	4
	5	44	2
	6	18	1
216N	7W	18	2
229N	9W	18	2
	10	20	1
	11	12	1
229N	12W	22	2
230N	9W	178	1
	11	236	1
	15	30	1
	23A	38	2
	23B	8	< 1
	25	94	< 1
230N	35	562	< 1
	37	24	< 1
230N	41W	12	< 1
	Std	46	26

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by Glen Ammanini

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TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 19020
INVOICE NO. 8010
DATE RECEIVED Aug. 23, 1972
DATE ANALYSED Aug. 28, 1972

TO: Hecla Mining Co. of Canada Ltd.,
#2009 1177 W. Hastings St.,
Vancouver, B.C C

ATTN: Mr. P. Conley

SAMPLE NO.:		ppm Copper	ppm Molybdenum
230N	42W	18	<1
	44	20	<1
	45	248	1
	46	102	<1
230N	47W	51	<1
231N	10W	152	1
	11	114	2
	12	108	2
	22	21	<1
	23	120	1
	24	970	<1
	25	310	<1
	35	410	1
	36	90	<1
	37	242	<1
	44	146	1
	45	242	2
	46	300	3
231N	47W	54	1
232N	22W	24	<1
	23	262	<1
	24	1930	1
	25	34	2
	35	98	1
	36	700	1
	37	124	1
	44	467	1
	45	74	<1
	46	46	<1
232N	47W	42	<1
233N	22W	21	<1
	23	68	<1
	24	44	<1
233N	25W	114	<1
234N	22W	26	<1
	23	31	<1
	24	28	1
234N	25W	12	<1
235N	1E	72	<1
235N	2E	22	<1
Std		44	26

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by

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NORTH VANCOUVER, B.C.
CANADA
TELEPHONE: 985-0648

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 19021
INVOICE NO. 8010
DATE RECEIVED Aug. 23, 1972
DATE ANALYSED Aug. 28, 1972

TO: Hecla Mining Co. of Canada Ltd.,
#2009 1177 W. Hastings St.,
Vancouver, B.C.

ATTN: Mr. P. Conley

SAMPLE NO.:		ppm Copper	ppm Molybdenum
235N	3E	173	1
	4	12	< 1
235N	5E	18	2
245N	1E	224	1
	2	58	1
	3	24	2
	4	28	1
245N	5E	40	< 1
Standard		46	26

CTA MEMBER CANADIAN TESTING ASSOCIATION

Certified by Ellen Amanini