

1914

REPORT ON
GEOLOGICAL & GEOCHEMICAL STUDIES
MERC. NO. 1 GROUP
(MERC 1 - MERC 17 INCLUSIVE)
OF L. J. LEIER
EAST OF
CARABINE CREEK, BRITISH COLUMBIA
(50° 120° NW)
FOR
SAVANNA CREEK GAS & OIL LIMITED

L. G. Morrison, P.Eng.

June 19, 1969

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PREFACE

On May 29, 1969 the writer commenced a program of geological and geochemical studies for Savanna Creek Gas and Oil Limited on Mr. L. J. Leier's "Merc" and "L.A." claims east of Carabine Creek in the Kamloops Mining Division of British Columbia. The proposed program will entail about eight weeks of work.

To satisfy immediate assessment work requirements, work was initially concentrated on the Merc No. 1 Group comprising Merc 1 to Merc 17 inclusive.

Upon completion of the entire program, all data from the following report will be incorporated into a complete and comprehensive report on the property.

Department of	
Mines and Petroleum Resources	
ASSESSMENT REPORT	
NO. 1914	MAP

GEOLOGICAL AND GEOCHEMICAL STUDIES
MERC. 1 - MERC. 17 INCLUSIVE
EAST OF CARABINE CREEK, BRITISH COLUMBIA

SUMMARY AND CONCLUSIONS

On a bench plateau east of Carabine Creek, cinnabar occurs within and marginal to brecciated shear zones in or closely associated with felsic rocks which intrude dark volcanics. The breccia bands and most other linear structural features in the area strike NNW and dip about 60° ENE.

The breccia matrix to which most of the observed cinnabar is confined consists mainly of dolomite with lesser amounts of quartz and calcite. Disseminated pyrite is common marginal to the breccia bands and in the quartz component of the breccia matrix.

About 550 soil samples taken on a rectangular grid in early June 1969 were tested for mercury with a Lemaire detector. Good correlation was obtained between changes in background values and variations in bedrock lithology. Significant geochemical anomalies were located on Merc 2, Merc 4 and Merc 17. Of these three anomalies the one on Merc 17 is regarded as most promising. It is 700 feet long, is geologically very favourably located and is on relatively flat, high ground where local effects of recent surface erosion should be minimal.

It was concluded that in areas of low relief and minimal colluvial cover the techniques of sampling and soil testing employed on the Merc No. 1 Group are an effective and economical means of gathering useful information, and that the survey should be extended to cover suitable areas in the adjoining L.A. and Merc No. 3 groups.

It was further concluded that the anomalous area on Merc 17 should be tested by trenching and/or drilling.

LOCATION AND MEANS OF ACCESS

The Merc and L.A. claims are situated on the west slope of Hardie Hill above the valley of Carabine Creek at latitude 50°51'N, longitude 120°44'W. The geographic centre of the property is about 25 miles northeast of Kamloops and four miles north of the Canadian National Railway siding at Copper Creek.

From a point on the Trans Canada Highway about one mile west of Savona, the centre of the property is easily accessible via 21 miles of improved dirt road and two miles of logging trails.

PHYSICAL FEATURES OF THE AREA

The claim group lies on a rolling bench plateau at an average elevation of about 3000 feet above sea level. At the west edge of the group, the ground drops away sharply at an average slope of about 30° to the Carabine Creek valley about 800 feet below. To the east, there is a precipitous rise of 1500 feet to the southeasterly trending ridge line of Hardie Mountain.

Major drainage, ridge lines and escarpments in the area all trend southeasterly.

The Merc No. 1 group has not been recently logged, and it is well forested with spruce to more than three feet at the butt, jackpine, poplar and a little larch.

There is no permanent flowing water on or near the property. Kamloops Lake is three miles south of and 2000 feet below the south end of the group. Red Lake, a fairly large but shallow lake is about two miles north of Merc 17.

HISTORY AND OWNERSHIP

Mercury was discovered on what is now the Merc 17 claim in about 1895, and was investigated by several small adits and shallow trenches. Several claims in the area were Crown-granted, but they lapsed in about 1939, and the

ground was re-located. Some bulldozer trenching was done during World War II. This work was unsuccessful and the claims lapsed. Interest in the area revived in about 1957. Most of the area has been more or less continuously staked, and sporadic trenching and shallow drilling has been done by various parties since that time.

The claims included in the Merc No. 1 Group were staked by J. Bradcoe in June 1966 and sold to L. J. Leier of Calgary. By virtue of an agreement dated August 30, 1968 the property was optioned to Jason Oils Limited which in turn transferred the agreement to Savanna Creek Gas and Oil Limited of Calgary.

SURVEY PROCEDURE

Locations were established from baselines cut more or less parallel to the major ridges and escarpments and from chained picket lines cut perpendicular to the baselines. Picket lines were spaced at intervals of 400 feet or 200 feet depending upon the degree of geochemical detail desired for specific areas.

Outcrops adjacent to the cut lines were mapped in conjunction with the geochemical soil sampling. Outcrops in the mapped area are scarce, and an attempt was made to define approximate geological contacts on the basis of rock fragments in the soil samples and the distribution of surface float.

Soil samples were collected at 100 foot stations along the picket lines. Samples were normally taken from the "B" horizon. However, at stations where the soil profile was incomplete it was sometimes necessary to sample the "A₂" or "C" horizon. It is believed that occasional sampling off of the preferred horizon did not seriously distort the results of the survey.

Samples were air dried in kraft envelopes and sieved to recover the minus 40 fraction. Mercury determinations were made in the field by the writer and by D. A. Rees using a Johnson-Williams Model S1 Lemaire detector. This instrument operates on the principle of atomic absorption utilizing the 2537 Angstrom line for mercury.

Analytical procedure was as follows:

Samples of approximately one gram were measured volumetrically and heated in a closed steel bulb by a propane torch. Vapour, including mercury, was withdrawn from the bulb with a 0.2 liter hand pump. During withdrawal, the vapour was passed through a glass-fiber filter to remove particulate matter and through a steel coil at red heat to reduce organic interference. The vapour was then pumped into the detector and the mercury content in micrograms per liter was recorded.

Samples containing mercury in concentrations such that the mercury content in vapour from a one gram sample was beyond the range of the detector were tested in a measured quantity of 0.25 gram.

Each sample was run in duplicate. If results varied by less than 0.2 micrograms per liter in the 0.5 to 2.0 microgram per liter range or by less than 10% above 2.0 they were averaged. If discrepancies were beyond these arbitrary limits, a third sample was tested. If the third result corresponded to one of the first readings, the erratic value was discarded; if all three readings were in disagreement they were averaged. It was found necessary to run about 25% of the samples in triplicate.

It was observed that prolonged heating of the samples resulted in high, erratic analyses, probably due to interference from the slow breakdown of an unidentified sulphur and/or organic compound which grossly increased the apparent vapour concentrations. Field experimentation established an optimum heating and withdrawal time of about 20 seconds at which point the steel bulb was beginning to glow red.

Mercury concentration in each sample was calculated as follows:

$$\frac{\text{Reading in micrograms/liter} \times 0.2 \times 100}{\text{Sample size in grams}} = \text{parts per 100 million Hg}$$

GEOLOGY

Lower Tertiary Rocks

The oldest and most abundant rock unit on the Merc No. 1 group is a suite of volcanic rocks believed to be of lower Tertiary age. This group comprises: black, aphanitic to very fine grained equigranular basalt; dark green to purple finely to coarsely porphyritic basalt containing from 10% to 50% grey, subhedral to euhedral 1mm to 1cm feldspar laths in an aphanitic matrix; greenish to brownish grey aphanitic to porphyritic andesite; pale brownish grey to nearly white porphyry containing about 5% white, subhedral to euhedral feldspar and from 1% to 5% subhedral to euhedral biotite plates in an aphanitic matrix; and dark greenish grey, medium to very coarse grained agglomerate containing mostly light coloured porphyritic fragments.

Some black to dark brown, fine grained allotriomorphic to finely porphyritic, dense and massive material observed sporadically throughout the area may be of intrusive origin, but relationships are unclear due to the lack of outcrops, and this rock has been included in the volcanic group for mapping purposes.

Felsite

On and adjacent to Merc 17, the dominant rock types are tan, pink, light grey and reddish brown aphanitic to very fine grained felsites. Varieties include aplite, very fine grained alaskite and fine grained feldspar porphyry. The latter facies is the most abundant. It commonly contains 5% to 10% white subhedral 1mm to 3mm feldspar phenocrysts which are partially resorbed and kaolinized.

The felsite is commonly silicified and pyritized. The pyrite contributes to a distinctive tan to yellowish brown, soft weathered surface.

The felsite is almost certainly all intrusive into the dark lower Tertiary volcanic rocks. The aplite facies definitely intrudes them and also shows local cross-cutting relationships with other facies of the felsite unit.

Diorite

Near the south end of the group, there is a small stock of brownish grey, fine grained hypidiomorphic sandy-weathering diorite. This rock contains more than two-thirds light grey plagioclase, \pm 5% accessory magnetite and a few grains of quartz. The balance consists of finely divided, chloritized mafic minerals including a little identifiable biotite.

Kamloops Volcanics

The main body of Hardie Mountain is entirely underlain by Cenozoic flows with minor tuff interbeds. The flows are brownish grey, reddish brown, dark purplish to greyish brown or black. They probably range in composition from latite (?) or dacite (?) to basalt with basalt comprising more than two-thirds of the total. They are commonly aphanitic and highly vesicular to scoriaceous. Vesicles are ovoid to tubular and tubular vesicles are as long as 10cm.

On Merc 5 and Merc 7 the basalt is amygdaloidal with irregularly shaped to ovoid amygdules of grey to greenish blue chalcedony.

Structure

Shears, major joints, mineralized veins, and alignments of phenocrysts in flows almost all strike north to N20°W and dip about 60° to the east. There are minor steeply dipping joints more or less perpendicular to the major attitude.

MINERALIZATION

There are nine cinnabar showings on Merc 17 or within five hundred feet of its boundaries. All but one of them are in turn-of-the-century pits, all are in felsite and all are related to shears striking N10°E to N40°W and dipping 55° to 75°E. All are associated with silicification and pyritization of the wall rocks.

Strongly leached more or less vertical bands to four feet wide strike about N80°E in both felsite and included dark volcanic rock. Pyrite remnants are common in these bands, but no cinnabar was noted in association with them.

Felsite in proximity to the cinnabar occurrences commonly contains intergranular blebs of colourless secondary quartz flecked with finely divided pyrite.

No mineralization was seen on any claim in the Merc No. 1 Group other than Merc 17. The three most noteworthy showings on Merc 17 are briefly described as follows:

91N, 40E: (cf. Figure 3, Appendix)

Three brecciated shears with a matrix of white calcite and tan dolomite cut pink aplite across a width of six feet. Their average attitude is 010°/75°E. The combined width of the three breccia veins is about 1.5 feet. The breccia matrix contains finely disseminated pyrite and cinnabar and hairlike lenses of cinnabar and quartz.

This shear zone outcrops at intervals for about 200 feet up dip and north along strike.

92N, 41E:

A brecciated band six to eighteen inches wide strikes 140°/60°NE in light grey to mauve aplite. A dolomite matrix contains abundant finely disseminated cinnabar and there are thin cinnabar encrustations on the slickensided walls of the shear.

93N, 43E:

A series of strong joints and tight shears with attitudes of north to N20°W/55°NE cuts pinkish grey, fine grained feldspar porphyry. There is an inclusion of dark volcanic rock on the footwall of the sheared zone. Within the zone there is one 18 to 24 inches wide breccia band with a matrix of dolomite.

Cinnabar is disseminated in the breccia band, in the wall rock, and along small, calcite-coated fractures. A four foot channel sample from just above

the footwall assayed 0.27% Hg. The entire zone averaged 0.13% Hg across a width of 12.6 feet.

GEOCHEMICAL SURVEY RESULTS

The geochemical studies indicated a marked increase in mercury content in soils overlying the felsite intrusion. This was predictable since all known cinnabar occurrences in the Carabine Creek-Hardie Mountain area are either within or closely associated with felsite. Background mercury values in parts per 100 million averaged 6 over fresh and unaltered Kamloops volcanic rocks, 15 over the lower Tertiary sequence of volcanic and intrusive (?) rocks and 30 over felsite.

Soil geochemistry proved to be ineffective near the base of Hardie Mountain where background mercury values indicate that the soil is developed from piedmont colluvium composed largely of Kamloops volcanic rocks.

Three significant mercury anomalies were located in the Merc No. 1 Group. Of these, the most interesting is on Merc 17 centred at about 97N, 43E in an area of very little topographic relief. Mercury counts of three times background or higher were recorded in an area approximately 700 feet long and 100 to 200 feet wide. Counts of more than 15 times background were recorded from three sample points within this area. This is much higher than results obtained in the immediate vicinity of any surface exposure of cinnabar on the claim.

The Merc 17 anomaly is on strike and up dip from the main showing at 93N, 43E and is only slightly off strike from the showings at 91N, 40E and 92N, 41E.

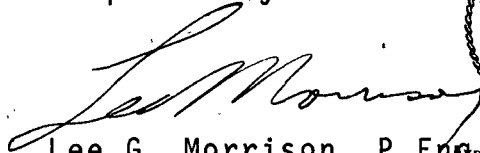
At the south edge of Merc 2 and on Merc 4 there are moderate anomalies centred around 37N, 35E and 20N, 45E in areas believed to be underlain by lower Tertiary dark volcanic rocks. Both are within 2,000 feet of a prominent diorite exposure and it is possible that there are hidden felsite intrusions related to this diorite. Mercury counts of from 3 to 10 times local background were obtained within these two anomalous areas.

RECOMMENDATIONS

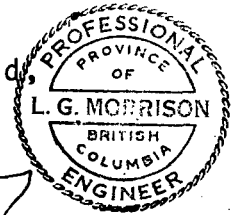
It is recommended:

- (1) That the geochemical survey be extended to cover all of the gently rolling plateau areas on the property;
- (2) That the anomalies centred around 37N, 35E and 20N, 45E be confirmed and delineated in detail by sampling the "C" zone at 50 foot intervals on lines spaced 200 feet apart;
- (3) That the geologically conformable strong anomaly on Merc 17 be tested either by strip trenching or by diamond drilling. A recommendation in detail concerning this work will be deferred until the proposed geochemical survey program recommended above has been completed. At that time it will be possible to recommend the most expedient and economical method for testing this anomaly together with any others which may be found.

Respectfully submitted,



Lee G. Morrison, P. Eng. Expiry Date: Feb. 28, 1970
Consulting Mining Geologist



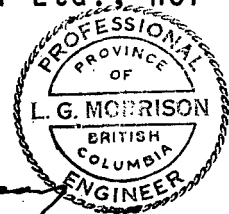
CERTIFICATE OF QUALIFICATIONS

I, LEE G. MORRISON, of the City of Calgary in the Province of Alberta,

HEREBY CERTIFY:

- (1) THAT, I am a licenced Professional Engineer in the Province of British Columbia;
- (2) THAT, I am a graduate of the University of Saskatchewan with the degrees of Bachelor of Arts (1956) and Bachelor of Science in Geological Engineering (1957);
- (3) THAT, I am a Consulting Mining Geologist residing at 1608 - 49th Avenue S.W., Calgary 7, Alberta;
- (4) THAT, I have practiced my profession for more than twelve years;
- (5) THAT, the geological information in this report is based upon my personal observations in the field; that geochemical sampling was conducted on the Merc No. 1 Group under my personal supervision and that sample analyses were made by me or under my supervision;
- (6) THAT, I have no direct or indirect interest in the Merc Group or in Savanna Creek Gas and Oil Ltd., nor do I expect to receive any.

Lee G. Morrison



Lee G. Morrison, P. Eng. Expiry Date: Feb. 28, 1970

A STATEMENT OF COSTS
 FOR GEOCHEMICAL AND GEOLOGICAL INVESTIGATIONS
 ON MERC NO. 1 TO NO. 17 INCLUSIVE
 AT CARABINE CREEK IN THE KAMLOOPS MINING DIVISION
 FOR SAVANNA CREEK GAS AND OIL LTD.
 BY LEE G. MORRISON
 CONSULTING MINING GEOLOGIST
 MAY 29, 1969 TO JUNE 19, 1969

LEE G. MORRISON CHARGES

Field Survey Crew

L.G. Morrison, Geological Engineer	5 days @ \$150.00*	\$ 750.00
L.D. Barrett, Surveyor	12 days @ \$ 45.00*	540.00
D. Rees, Assistant	10 days @ \$ 35.00	350.00
C. Tuson, Assistant	2 days @ \$ 22.50	45.00
R. Deneault, Line-cutter	5 days @ \$ 22.00	110.00
F. Deneault, Line-cutter	5 days @ \$ 22.00	<u>110.00</u>
Total		\$1,905.00

* Includes contractor's overhead, mobilization costs and field maintenance.

Operational Costs

Jeep rental - 14 days @ \$15.00	\$210.00	
Board and room of line-cutters		
10 man days @ \$7.00	<u>70.00</u>	
	\$280.00	280.00

Sample Analysis, Interpretation and Report

L.G. Morrison - 4 days @ \$150.00	600.00
D. Rees - 5 days @ \$ 35.00	<u>175.00</u>
TOTAL EXPENSES	\$2,960.00

PERSONNEL EMPLOYED ON MERC NO. 1 SURVEY

Field Crew:

L. G. Morrison
1608 - 49th Avenue S.W.
Calgary 7, Alberta
May 29 - June 1, 1969
June 6, 1969

L. D. Barrett
2608 - 36th Street S.W.
Calgary 4, Alberta
May 29 - June 11, 1969

David A. Rees
8048 - 24th Street S.E.
Calgary, Alberta
May 29 - June 7, 1969

C. Tuson
Copper Creek, B.C.
June 4 - June 5, 1969

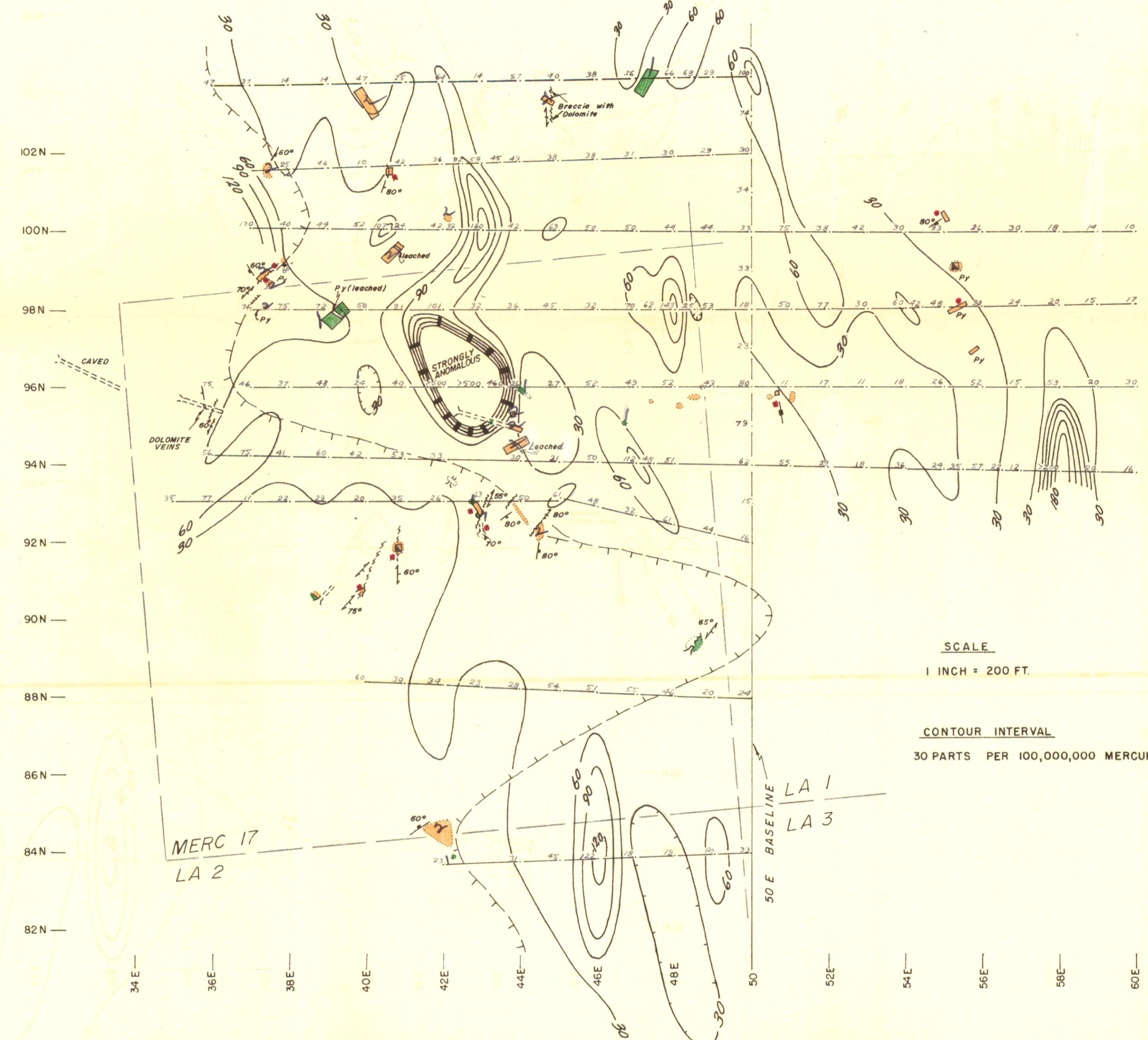
Robert Deneault
Deadman Creek I.R.
Savona, B.C.
June 3 - June 7, 1969

Frank Deneault
Deadman Creek I.R.
Savona, B.C.
June 3 - June 7, 1969

Sample Analysis, Interpretation & Report

L. G. Morrison
June 10 - 11, 1969
June 18 - 19, 1969

David A. Rees
June 8 - 12, 1969



SCALE
1 INCH = 200 FT.

CONTOUR INTERVAL
30 PARTS PER 100,000,000 MERCURY

- LEGEND**
- 2 FELSITE: Grey and redish brown, tan weathering aphanitic to finely porphyritic. Dark volcanic inclusions common.
 - 1 LOWER TERTIARY ROCKS: Grey, black, green and purple aphanitic to coarsely porphyritic andesite, basalt and pyroclastic rocks. Probably includes some basic intrusive material.
 - CINNABAR OCCURENCE.
 - Py 5-10% DISSEMINATED PYRITE
 - FAULT OR SHEAR ZONE (Observed, inferred.)
 - SHEARING (Inclined, vertical)
 - JOINTING (Inclined, vertical)
 - OUTCROP
 - EDGE OF PLATEAU
 - TRENCH OR PIT
 - ADIT
 - SHAFT
 - PICKET LINE
 - 20. SOIL ANALYSIS FOR MERCURY IN PARTS PER 100,000,000
 - CLAIM BOUNDARY

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. **1914** MAP **#3**

1914

GEOLOGICAL AND GEOCHEMICAL PLAN
"B" GRID
MERC NO. 1 GROUP
CARABINE CREEK
KAMLOOPS MINING DIVISION
TO ACCOMPANY REPORT BY LEE MORRISON
P. ENG. DATED JUNE 19, 1969

Lee Morrison



- LEGEND**
- 70 E — 5 KAMLOOPS VOLCANICS: Black to reddish brown, highly vesicular. Mostly basalt. Flow breccia common.
 - 2 DIORITE: Grey to brownish grey, fine grained equigranular, sandy weathering. Probably a facies of the Copper Creek intrusive.
 - 1 LOWER TERTIARY ROCKS: Light grey to jet black andesite and basalt. Some acid volcanic and basic to ultrabasic intrusive rock.
 - GEOLOGICAL CONTACT: Inferred
 - /// SHEARING (inclined, vertical)
 - /// JOINTING (inclined, vertical)
 - OUTCROP
 - PICKET LINE
 - CLAIM BOUNDARY
 - 20. SOIL ANALYSIS FOR MERCURY IN PARTS PER 100,000,000

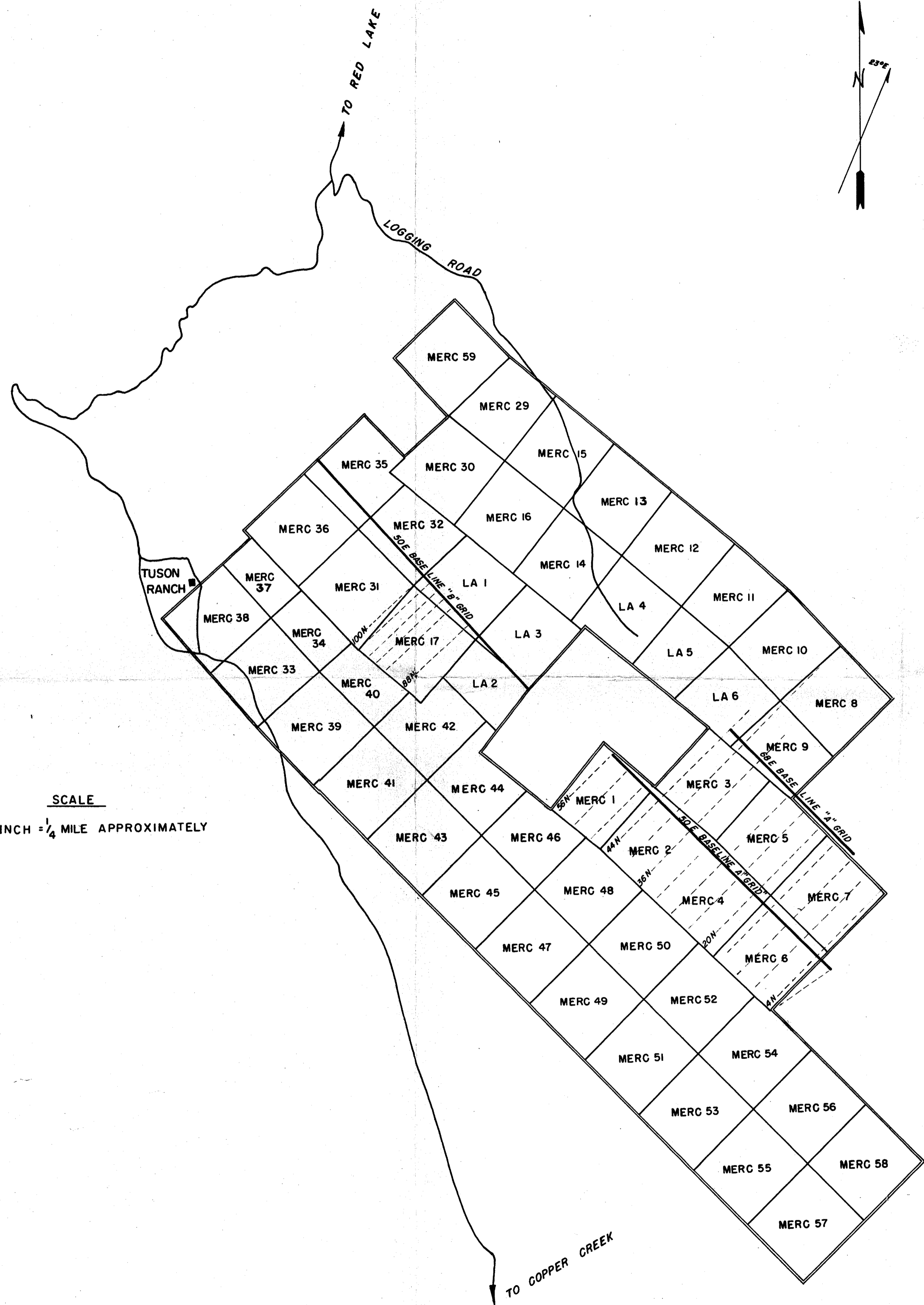
SCALE
1 INCH = 200 FT.

CONTOUR INTERVAL
15 PARTS PER 100,000,000 MERCURY

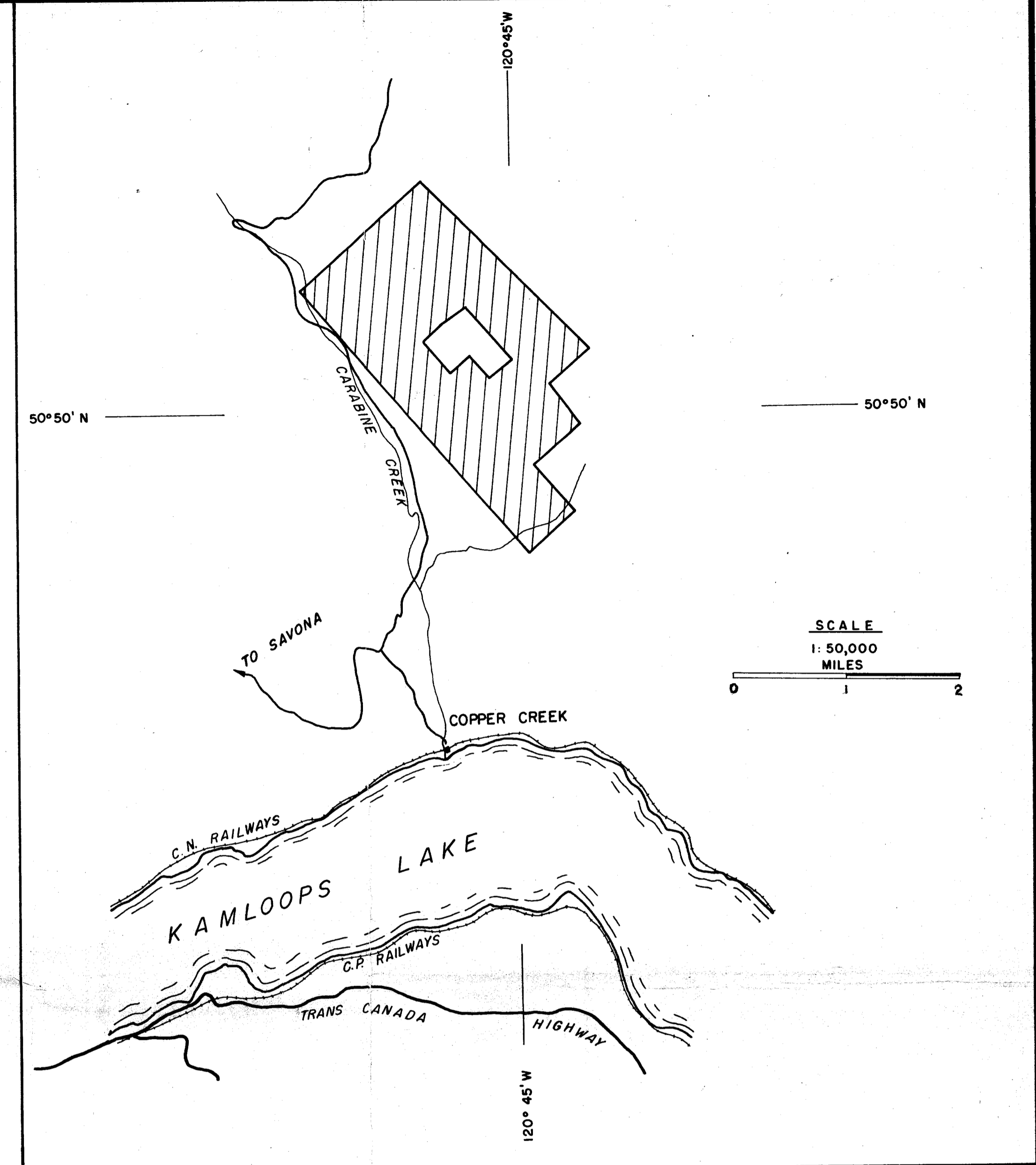
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 1914 MAP #2

1914

GEOLOGICAL AND GEOCHEMICAL PLAN
"A" GRID
MERC NO. 1 GROUP
CARABINE CREEK
KAMLOOPS MINING DIVISION
TO ACCOMPANY REPORT BY LEE MORRISON P. ENG.,
DATED JUNE 19, 1969



SCALE
1 INCH = 1/4 MILE APPROXIMATELY



— LEGEND —

- OUTER BOUNDARY OF PROPERTY (APPROX.)
- INTERNAL CLAIM BOUNDARY (APPROX.)
- BASELINE
- - - - - PICKET LINE

Department of
Mineral and Petroleum Resources
ASSESSMENT REPORT
NO. **1914** MAP #1

1914

LOCATION MAP
CARABINE CREEK MERCURY PROSPECT
(MERC AND L.A. GROUPS)
OF
L.J. LEIER
IN THE
KAMLOOPS MINING DIVISION
TO ACCOMPANY REPORT BY L.G. MORRISON P. ENG.
FOR SAVANNA CREEK GAS & OIL LTD. JUNE 19, 1969
L.G. Morrison