COMINCO LTD.

EXPLORATION NTS 92H/2W

WESTERN DISTRICT May 29, 1980

ASSESSMENT REPORT OF LINECUTTING AND GEOLOGICAL AND SOIL GEOCHEMICAL SURVEYS

ON THE RED STAR PROPERTY

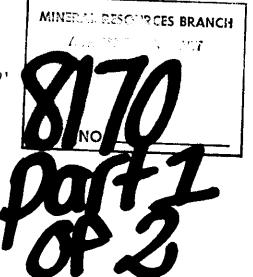
(Red Star Claim and Anaconda and Red Star Reverted Crown Grants)

Similkameen-Paysaten River Area, Similkameen M.D., B.C.

(work performed May 1-9 and May 12-16, 1980)

LATITUDE: 49⁰09'

REPORTED BY:



LONGITUDE: 120°35'

M.J. CASSELMAN

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AND SOIL GEOCHEMICAL SURVEYS

ON THE RED STAR PROPERTY

(Red Star Claim and Anaconda and Red Star

Reverted Crown Grants)

SUMMARY

The Red Star property is situated on the west margin of the Quesnel Trough Structural Province, 34 km SSW of Princeton, in Triassic and Tertiary rocks. The property comprises the Red Star claim and the Anaconda and Red Star reverted crown grants. The Red Star claim was staked in June 1979 and the Anaconda and Red Star reverted crown grants were optioned in May 1980. The southern two-thirds of the property has been mapped on a scale of 1:5,000 and soil sampled, with the soil samples analyzed for Cu, Zn and Pb.

The southern two-thirds of the property covers Triassic, Nicola Group metavolcanics of the calc-alkaline andesite to rhyolite association and their related chemical and clastic metasediments. These volcanic and sedimentary units have been intruded locally by andesite dykes interpreted to be subvolcanic equivalents of the Nicola Group andesite volcanics. The northern one-third of the property covers Tertiary, Princeton Group basalt-andesite flows and pyroclastics. The Nicola Group rocks occur as a north-south striking, west dipping, monoclinal sequence that has been metamorphosed to the mid-upper greenschist facies. The Princeton Group rocks are flat lying and unconformably overlie the Nicola Group rocks. No attempt was made to subdivide or describe the Princeton Group rocks as they were not considered to be economically important.

The property is being investigated for rhyolite associated stratiform massive sulphide deposits. The most significant mineralization located to date occurs in the Main Zone which is situated on the Red Star and Anaconda reverted crown grants. The mineralization in this zone is hosted by strongly sheared intercalated dacite and rhyolite and minor andesite pyroclastics and their are related chemical and clastic sediments. These rocks have been variably hydrothermally leached, silicified and pyritized. The best mineralization observed in the Main Zone during the mapping was minor disseminated sphalerite and chalcopyrite. Significant concentrations of sphalerite, chalcopyrite, silver and gold mineralization have been reported in the Main Zone in the old underground workings, in trenches and diamond drilling, but were not observed.

The package of rocks which hosts the Main Zone mineralization strikes north and south into areas covered by overburden. It is felt that stratiform base metal bearing massive sulphide concentrations may exist along strike or down dip from the Main Zone and the present geological geochemical and geophysical surveys were designed to test these possibilities.

The soil sampling program conducted over the southern two-thirds of the property collected 725 samples which were analyzed for Cu, Zn and Pb. One large, and three smaller Zn anomalies and two large, weak, Cu anomalies were defined. The large Zn anomaly and one of the Cu anomalies are roughly coincident and correspond with the projection of the mineralized stratigraphic package.

IP, VLF and Mag surveys have been conducted over the southern two-thirds of the property. The results of these surveys are covered in a separate report.

INTRODUCTION

This report describes the results of geological mapping and geochemical soil sampling surveys on the Red Star property. The work was conducted during the periods of May 1-9 and 12-16, 1980, by M. Morrison and B. Ames and supervised by M.J. Casselman. Data is presented at a scale of 1:5,000.

LOCATION AND ACCESS

The Red Star property comprises the Red Star claim and the Anaconda and Red Star reverted crown grants. It is situated 34 km SSW of Princeton on the north side of the Hope-Princeton Highway in the area just SW of the intersection of the Pasayten and Similkameen Rivers. The property is roughly bounded by Bell Creek on the west and Crowley Creek on the east. The property is readily accessible from the Hope-Princeton highway and by a network of gravel roads extending from this highway.

TOPOGRAPHY AND VEGETATION

The Red Star property lies between 1000 and 1450 meters above sea level on a south facing slope with the greatest elevation occuring at the north end of the property. Most of the property is "parklike" and covered by spruce, pine and fir trees. Outcrop constitutes about 5% of the map area.

PREVIOUS WORK

The Red Star property has undergone various stages of exploration since the early 1900's. Initial work (dates unknown) consisted of trenching and driving 3 adits (250, 480 and 1090 feet; Minister of Mines 1902, 1927, 1938 and GSC Memoir 243). The adits are now caved and inaccessible. In 1964-65, 40 tons of material was shipped from the property to the Tacoma smelter (Minister of Mines, 1969). During the period 1966-1970, Spenho Mines Ltd. mapped and trenched the property and conducted magnetometer, EM and soil geochemical surveys and diamond drilled 5 holes. Results of this work are reported in assessment reports 878 and 2807.

CLAIMS

The Red Star property comprises the Red Star claim (18 units) and the Anaconda and Red Star reverted crown grants. The Red Star claim, which encloses the two reverted crown grants, is 100% owned by Cominco Ltd. The reverted crown grants are optioned from Carl Wabnegger and Maurice Parsons of Keremeos, B.C.

GEOLOGY

The Red Star property is located on the west side of the Quesnel Trough Structural Province in Triassic, Nicola Group and Tertiary, Princeton Group rocks. The property was mapped at a scale of 1:5,000. Mapping control was provided by a north-south oriented grid system.

The southern two-thirds of the property comprises a north striking and west dipping monoclinal sequence of Nicola Group metavolcanic and related chemical and clastic sediments. These rocks have been locally cut by andesite dykes interpreted to represent the subvolcanic equivalent of the Nicola Group andesite volcanics. The Nicola Group metavolcanics include primarly andesite, dacite and rhyolite pyroclastics flows and tuffites. The Nicola Group metasediments consist of argillites, carbonaceous argillites, cherty argillites and tuffaceous argillites.

The Tertiary, Princeton Group rocks, which covered the northern one-third of the property, are flat lying and unconformably overlie the Nicola Group rocks. No attempt was made to map or describe the Princeton Group rocks as they were not considered to be economically important.

The rock types were defined primarily on the basis of field observations with colour index and quartz-eye phenocryst concentrations being the most useful compositional indicators. The Nicola Group rocks have been divided into 9 units. Each unit comprises one dominant rock type, but commonly several minor rock types occur intercalated within it.

The only mineralization located during the mapping consists of minor desseminated sphalerite and chalcopyrite and occurs in the old trenches and dumps exposed in the Main Zone. The rocks in this zone comprise primarily rhyolite, dacite and andesite pyroclastics which have been highly-sheared and variably hydrothermally leached, silicified, and pyritized. However, significant concentrations of sphalerite-chalcopyrite-silver-gold mineralization have been reportedly exposed in the Main Zone by the previous trenching and underground workings and by diamond drilling. This mineralization was not observed. The mineralized and altered stratigraphy exposed in the Main Zone and its north-south extensions is being investigated as a possible host for rhyolite associated stratiform base metal bearing massive sulphide deposits.

STRATIGRAPHY

NICOLA GROUP

Unit 1 - Andesite Flows

This unit was only observed in one outcrop. It is an andesite flow that is dark green, massive, fine to medium grained and contains 10-15% feldspar phenocrysts and 15-25% pyroxene crystals.

Unit 2 - Andesite Pyroclastics

This unit comprises dominantly andesite lapilli tuff and tuff phases with minor intercalated dacite lapilli tuff and tuff horizons. Argillaceous andesite tuffites and argillites occur as thin horizons in the andesites on the west side of the unit.

The andesite pyroclastics are mid to occasionally dark green, weakly to moderately foliated, medium grained and contain 15-25% pyroxene grains (variably altered to chlorite and minor biotite and sericite) and 10-30% feldspar phenocrysts. The argillaceous andesite tuffites are distinguished from the andesite pyroclastics by the presence of 5-15% disseminated and/or banded biotite.

The dacite pyroclastics are light green, moderately sheared, medium grained and contain 1-3% quartz-eyes, 10-25% feldspar phenocrysts, 3-10% biotite and/or biotite-chlorite-(sericite) clots and 3-10% tiny disseminated chlorite grains.

The argillites are grey to grey-black, moderately sheared and fine grained (1-3% pyrite). They are locally carbonaceous to graphitic and/or cherty.

Unit 3 - Argillite, Tuffaceous Argillite

This unit comprises primarily intercalated argillites and tuffaceous argillites although locally thin andesite tuff horizons were noted. Contorted and boudinaged quartz veins (5 to 30 cm thick) are common throughout this unit, especially in the argillite phases.

The argillites are similiar to those discussed in Unit 2. The tuffaceous argillites are greenish-black, weakly sheared and slightly coarser grained than the argillites. Locally they contain minor feldspar and/or pyroxene grains.

The andesite tuffs are dark green, moderately foliated and fine grained (resemble chloritic schists).

Unit 4 - Andesite Pyroclastics

This unit comprises primarily andesite lapilli tuffs and tuffs, although locally, andesite tuffite horizons and, expecially on the west side of the unit, dacite and occasionally rhyolite lapilli tuff and tuff horizons, were noted. Locally the rhyolite, dacite and andesite pyroclastics are intermixed rather than as distinct horizons.

The andesite pyroclastics, although variable in composition, are generally darker coloured and finer grained than the andesite pyroclastics discussed in Unit 2. They are dark to occasionally mid green, weakly to moderately foliated, fine to occasionally medium grained and contain 10-25% pyroxene grains and usually 1-10% feldspar phenocrysts. Locally andesite tuffite horizons were noted and distinguished by the presence of 5-15% biotite.

The dacite pyroclastics are similar to those discussed in Unit 2 except that they contain 1-5% opalescent blue quartz-eyes.

The rhyolite pyroclastics are white, weakly to moderately foliated, fine grained, and contain 2-10% quartz-eyes (often blue), 5-10% feldspar phenocrysts and 1-5% disseminated biotite (locally chloritized).

Unit 5 - Mineral Horizon

This unit comprises mainly unaltered and altered rhyolite and dacite pyroclastics and tuffites with variable proportions of unaltered and altered andesite pyroclastics and tuffites. The proportion and spatial distribution of the various rock types in the package is difficult to ascertain due to limited outcrop.

The rhyolite pyroclastics comprise both lapilli tuff and tuff phases. They are similiar to those discussed in Unit 4. Locally cherty rhyolite tuffite and rhyolite tuffite horizons occur intercalated within the rhyolite pyroclastics. The cherty rhyolite tuffites are distinguished by the presence of disseminated and thinly bedded chert horizons and the rhyolite tuffites are characterized by the presence of 5-10% biotite.

The dacite pyroclastics are mainly lapilli tuffs and tuffs. They are similiar to the dacite pyroclastics discussed in Unit 2. Locally minor dacite tuffites occur in the dacite pyroclastics and are distinguished by the presence of 5-10% biotite.

The andesite pyroclastics are mainly tuffs. They are similiar to the andesite pyroclastics discussed in Unit 4, except that they are usually finer grained and often more distinctly bedded. Locally andesite tuffite horizons occur in the andesite pyroclastics and are distinguished by the presence of biotite(5-15%).

The hydrothermally altered rocks comprise 50% of the unit and dominate toward the west side. They have been moderately to intensely leached, silicified, sericitized and pyritized, usually to a degree where the progenitor rock type is rarely recognizable. Only the andesite pyroclastic parent rock is recognizable due to its chlorite content(dark green-now a quartz-sericite-chlorite schist). The moderately altered rocks are light green to white, strongly foliated, fine-medium grained, moderately silicified, leached and sericitized and contain 3-10% pyrite. The intensely altered rocks are white, strongly foliated(quartz-sericite schist), to massive "sponge like" rocks comprising mainly quartz and pyrite grains(10-20% pyrite). They have been intensely silicified, leached and sericitized. Various sized, highly deformed and boudinaged quartz veins 2 to 30 cm thick commonly occur within the altered rocks. These veins formed pre or during early metamorphism. They often contain pods of pyrite and/or chalcopyrite and sphalerite.

Unit 6 - Hangingwall

This unit comprises variable proportions of rhyolite tuffs and tuffites and cherty rhyolite tuffites with minor intercalated dacite and andesite tuffs and tuffites and thin carbonaceous argillaceous horizons. Only the argillite horizons have been distinguished in the mapping. They range from 15 to 50 cm in thickness and are locally carbonaceous to tuffaceous. The argillites are grey to grey-black, weakly to moderately foliated, fine grained and contain 1-5% pyrite. The carbonaceous argillites are black and locally graphitic(1-5% pyrite). The tuffaceous argillites are grey, weakly to moderately foliated and fine to medium grained (1-3% pyrite). Feldspar phenocrysts and locally quartz-eyes can be distinguished in this unit and represent a tuffaceous component probably derived from a rhyolite source rock. The rhyolite, dacite and andesite tuffs and tuffites are similiar to those discussed in Unit 5.

Unit 7 - Andesite Pyroclastics and Flows

This unit comprises primarily andesite lapilli tuffs, tuffs and flows with minor intercalated dacite lapilli tuff and tuff and rhyolite tuff and tuffite horizons. The andesite pyroclastics are similiar to those discussed in Unit 4. It is difficult to distinguish the andesite flows from the andesite tuff horizons except that the tuffs are commonly more sheared and somewhat compositionally banded(bedding). Locally actinolite rich andesites were noted and also epidote veins and spots, especially toward the west side of the unit. The dacite pyroclastics are similiar to those discussed in Unit 2 and the rhyolite tuff is similiar to the rhyolite pyroclastics duscussed in Unit 4. The rhyolite tuffites are distinguished by the presence of 5-10% disseminated and banded biotite.

Unit 8 - Mixed Dacite and Andesite Pyroclastics

This unit comprises intercalated and intermixed andesite and dacite pyroclastics and tuffites. The dacite pyroclastics are similiar to those discussed in Unit 2 except that they contain 2-10% opalescent quartz-eyes. The dacite tuffites are distinguished by the presence of 10-15% disseminated and/or banded biotite. The andesite pyroclastics are similiar to those discussed in Unit 4. Where these two units are intermixed they consist of 3-10% blue quartz eyes contained in a medium to dark green matrix.

Unit 9 - Rhyolite Pyroclastics

This unit comprises dominantly rhyolite lapilli tuff and tuff phases. The rhyolites are similar to those discussed in Unit 4. Locally rhyolite tuffites distinguished by the presence of 5-10% biotite were noted.

PRINCETON GROUP

Unit 10 - Basalt - Andesite Flows and Pyroclastics

No attempt was made to distinguish the various phases of the Princeton Group as this unit was not considered to be economically important.

STRUCTURE

The Nicola Group rocks on the Red Star property comprise part of a monoclinal package which generally strikes N-S and dips 45-650W. Locally small folds were observed in outcrops, but no indications of major folding were noted. Faulting is locally present, but no major faults were defined. The offset on the smaller faults is not known, but a north-south fault just south of the Main Zone is thought to have locally offset Unit 5. Primary textures, although often disrupted to various degrees by deformation, are generally recognizable in most outcrops except in parts of Unit 5, where the combination of a hydrothermal alteration and strong shearing have destroyed most textures. Primary textures most commonly observed include lithic fragements and porphyry textures and more rarely amygdules, vesicles, pillows and bedding planes. Bedding was most commonly observed in the argillite and tuff and tuffite phases. Foliation is indicated by stretched lithic fragments or aligned chlorite and/or sericite grains. In all cases the foliation parallels bedding. Foliation is generally fairly equally developed throughout the property with exceptions occuring locally on the west side of the property and in the altered phases of Unit 5, when it was more intensely developed. The locally increased areas of shearing on the west side of the property are thought to be related to the nearby Eagle Granodiorite. The intense shearing in the altered phases of Unit 5 is interpreted to relate to the fact that the rocks in this zone are both altered and contain sulphides which made them more susceptible to deformational stresses.

Although the rock units have been subjected to varying degrees of deformation, the metamorphic grade does not exceed the greenschist facies.

MINERALIZATION

The Red Star property is being evaluated for rhyolite associated stratiform massive sulphide mineralization. The only mineralization located during the mapping, occurs in what is now designated the Main Zone which extends N-S for 480 meters and is exposed in trenches and entrances to the caved The rocks in this zone include primarily unaltered and altered dacite and rhyolite and andesite pyroclastics (Unit 5). The mineralization observed in the Main Zone during mapping includes minor disseminated sphalerite and chalcopyrite and variable concentrations of pyrite (3-20%). Locally within this zone 3-40 cm thick, highly folded and boundinaged quartz veins with trace to local pods of chalcopyrite and sphalerite were noted. These veins developed pre or early metamorphism and are interpreted to represent silica remobilized during metamorphism. Previous underground development, trenching and diamond drilling in the Main Zone reportedly intersected much greater concentrations of sphaleritechalcopyrite-silver-gold mineralization than is presently observed. The 1938 Minister of Mines Bulletin reports a 3 meter chip sample from the underground workings which assayed 1.0% Cu and 1.0 oz/ton Ag and three grab samples from the dumps which assayed 0.06 oz/ton Au, 7.3 oz/ton Ag, 17.0% Cu, 4.0% Zn;/ 0.14 oz/ton Au, 5.7 oz/ton Ag, 19.0% Cu, 2.5% Zn;/ 0.04 oz/ton Au, 1.0 oz/ton Aq, 0.8% Cu, 18.0% Zn. In 1964-65, 40 tons of sorted material from the Main Zone grading 6.5% Cu, 8.1% Zn and 2.1 oz/ton Aq was shipped to the Tacoma smelter. In the late 1960's two diamond drill holes, 210 meters apart in the Main Zone returned 249 feet and 149 feet of 1.15% Zn and 0.65% Zn, respectively.

The mineralized stratigraphy (Unit 5) strikes both north and south from the Main Zone into areas largely covered by overburden. The only exposure along Unit 5 outside of the Main Zone is in a trench and an adit 200 and 310 meters, respectively, north (the trench intersected only the upper part of Unit 5 and the lower part of Unit 6 and the adit, as indicated by the samples from the dump, intersected at least parts of Unit 5). No base metals were observed in the trenches and it is not known if the adit intersected any mineralization. The quartz veins observed in the altered rocks of the Main Zone were also observed in the northern trench and adit. No outcrop was found south of the Main Zone on the property.

The sulphide mineralization and alteration observed in Unit 5 are interpreted to have developed in conjunction with submarine hotspring-fumarolic activity associated with the waning stages of the dacite-rhyolite volcanic activity and are genetically related to that activity.

GEOCHEMISTRY COMINCO LOL

The southern two-thirds of the property was covered by a soil sampling survey. The soil samples were collected from the B horizon at 25 meter intervals along lines spaced 100 meters apart. 725 soil samples were collected and analysed for Cu, Zn and Pb. Cumulative frequency diagrams suggest that the thresholds of anomaly for Cu, Zn and Pb are 40, 100 and 10, respectively.

One large and 3 smaller Zn anomalies and 2 large weak Cu anomalies were defined by the survey. The Zn anomalies range from 100 to 307 ppm and the Cu values range from 40 to 210. Only anomalies comprising more than one anomalous value have been contoured. Individual spot Cu/Zn highs are though to relate to mineralized boulders in the overburden. The one large Zn anomaly and the western Cu anomaly are roughly coincident and correspond with the projection of the Mineral Horizon (Unit 5). The eastern Cu anomaly enclosed the 3 smaller Zn anomalies and the east side of the large Zn anomaly and primarily overlies andesite pyroclastics, argillites and tuffaceous argillites of Units 3 and 4. The Pb values were not plotted as there was only one spot anomaly (11 ppm). The majority of the Pb values were $\checkmark 4$.

CONCLUSIONS

The Red Star property appears to have potential for hosting rhyolite associated massive sulphide deposits. The best potential exists in Unit 5 either down dip or along strike from the Main Zone. Areas underlain by Unit 5 and containing coincident Cu and/or Zn soil anomalies, or any significant IP anomalies are recommended for drilling.

Reported by: M.M.

M.J. Casselman

Project Geologist

Endorsed by: _

Senior Geologist

Approved for Release by:

District, Exploration

Distribution:

Minister of Mines Western District Files Vernon Files

MJC/sf

APPENDIX "A"

Geology - Murray Morrison - May 1-9 and 12-16, 1980 (14 days @ \$150/day) \$ Brian Ames - May 1-9 and 12-16, 1980 (14 days @ \$111/day)	2,100. 1,554.
Supervision - M.J. Casselman - May 1, 14, 27, 1980 (3 days @ \$179/day)	537 .
Report Writing and Drafting - M.J. Casselman (4 days @ \$179/day)	716.
Domicile - Accomodation and food at Gateway Lodge, Manning Park for Brian Ames at \$30/day for 14 days	420.
Transportation – Truck for 14 days plus gas	225.
Linecutting - Crosslines, 39.5 km at \$125/km	4,937.
Assays - 725 soil samples analysized fo Cu, Zn, Pb @ \$3.25/sample	2,356.
<u></u> \$	12,845.

APPENDIX "B"

COMINCO LTD.

EXPLORATION

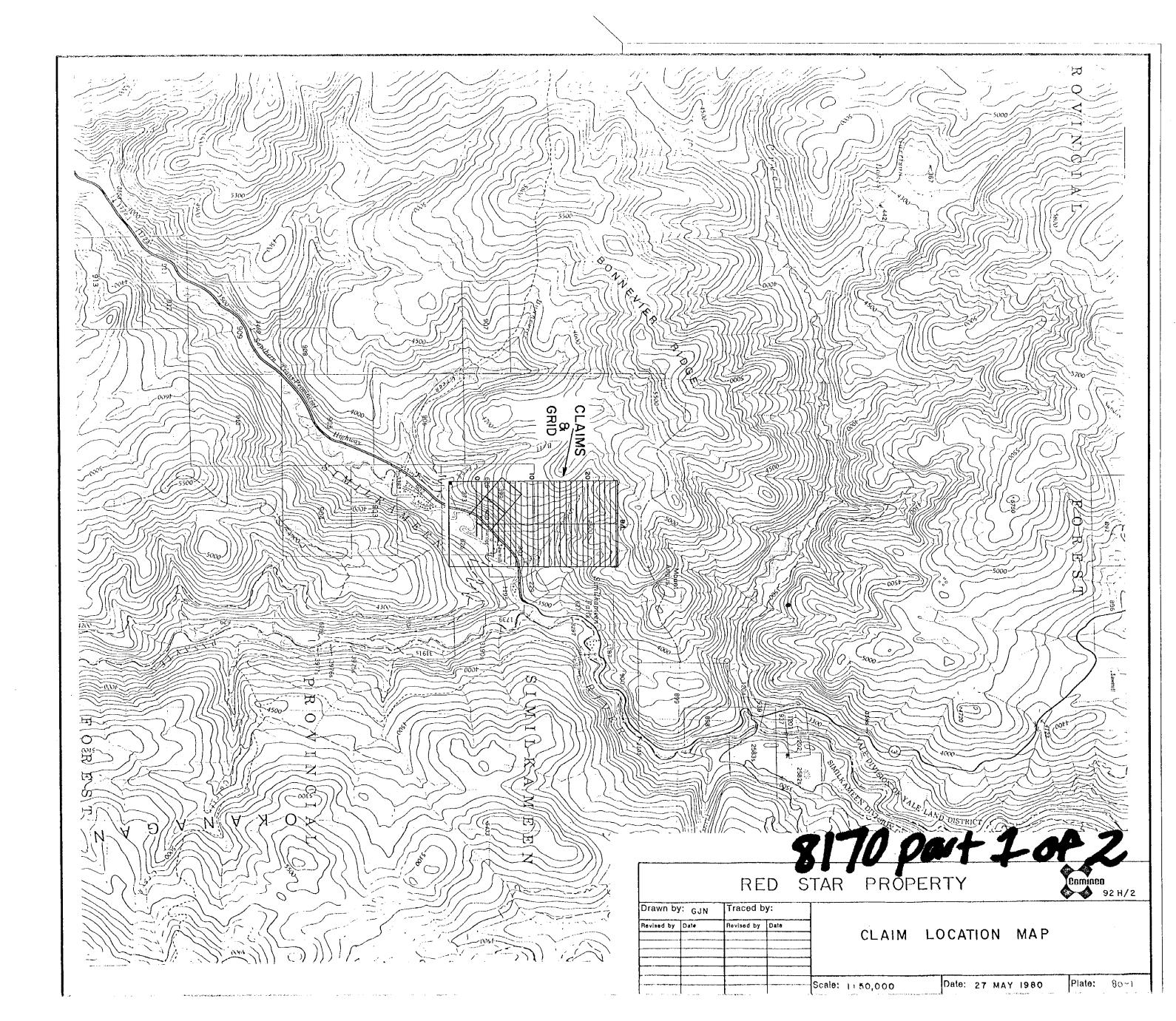
WESTERN DISTRICT

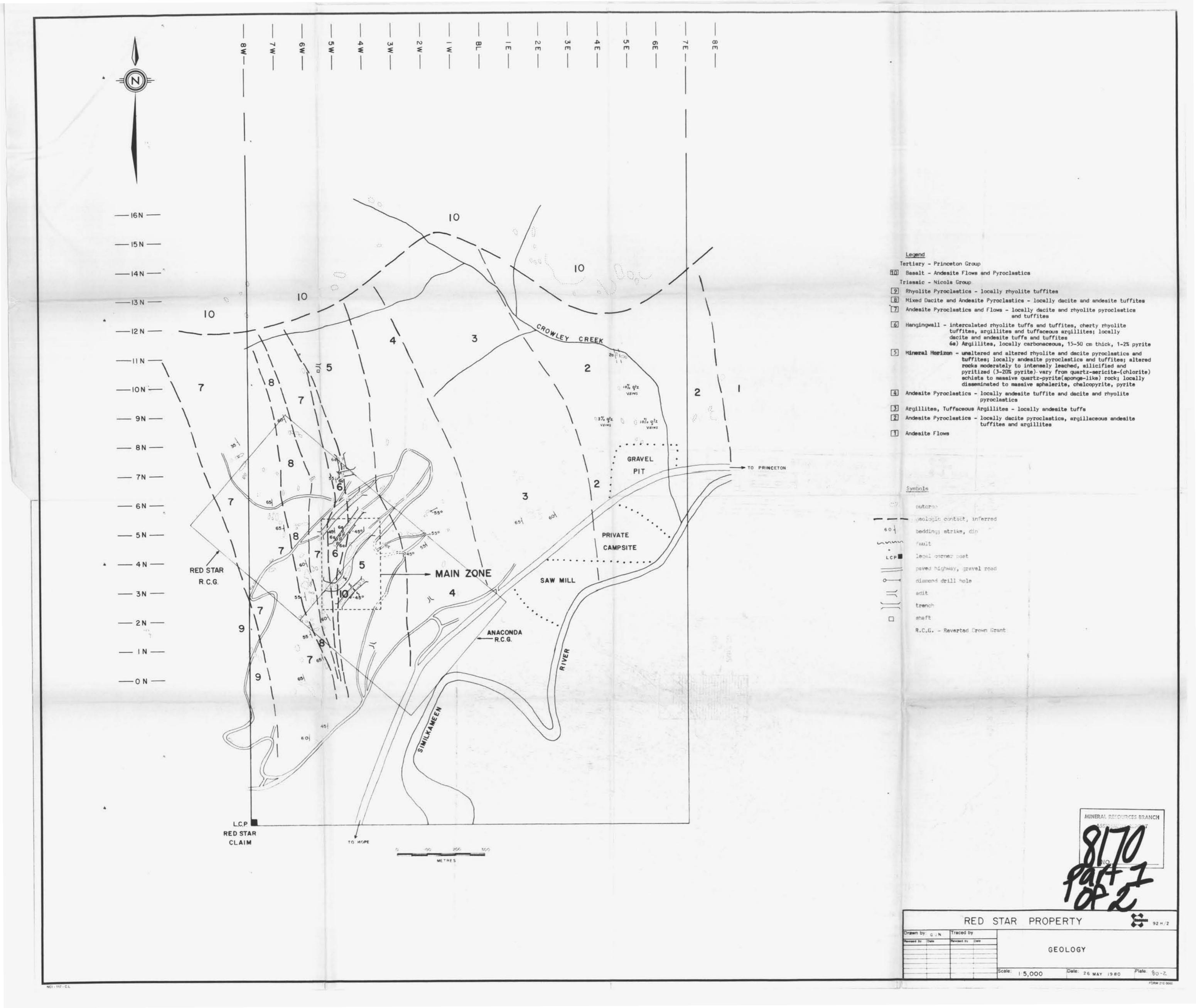
- I, MICHAEL J. CASSELMAN, OF THE CITY OF VERNON, BRITISH COLUMBIA, HEREBY CERTIFY:
- 1. THAT I AM A GEOLOGIST, RESIDING AT 8901 CHERRY LANE, VERNON, BRITISH COLUMBIA, WITH A BUSINESS ADDRESS AT 4405 28 STREET, VERNON, BRITISH COLUMBIA.
- THAT I GRADUATED WITH B.Sc. AND M.Sc. DEGREES IN GEOLOGY FROM THE UNIVERSITY OF BRITISH COLUMBIA IN 1969 AND CARLETON UNIVERSITY IN 1977.
- 3. THAT I HAVE PRACTISED GEOLOGY WITH COMINCO LTD. FROM 1969 TO PRESENT.

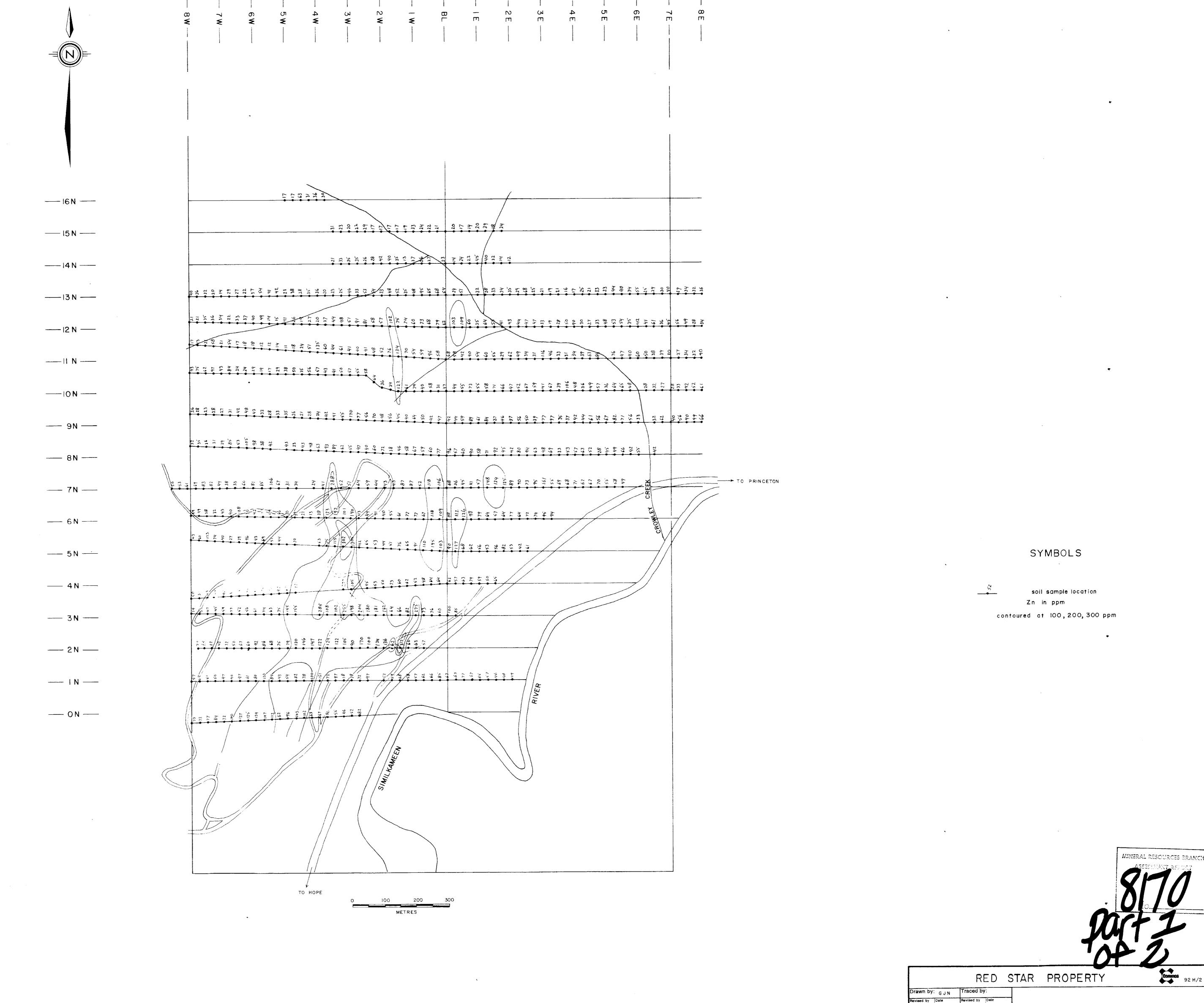
DATED THIS 29th day of May at Vernon, British Columbia.

STOMED

Michael J/Casselman, M.Sc.







RED STAR PROPERTY

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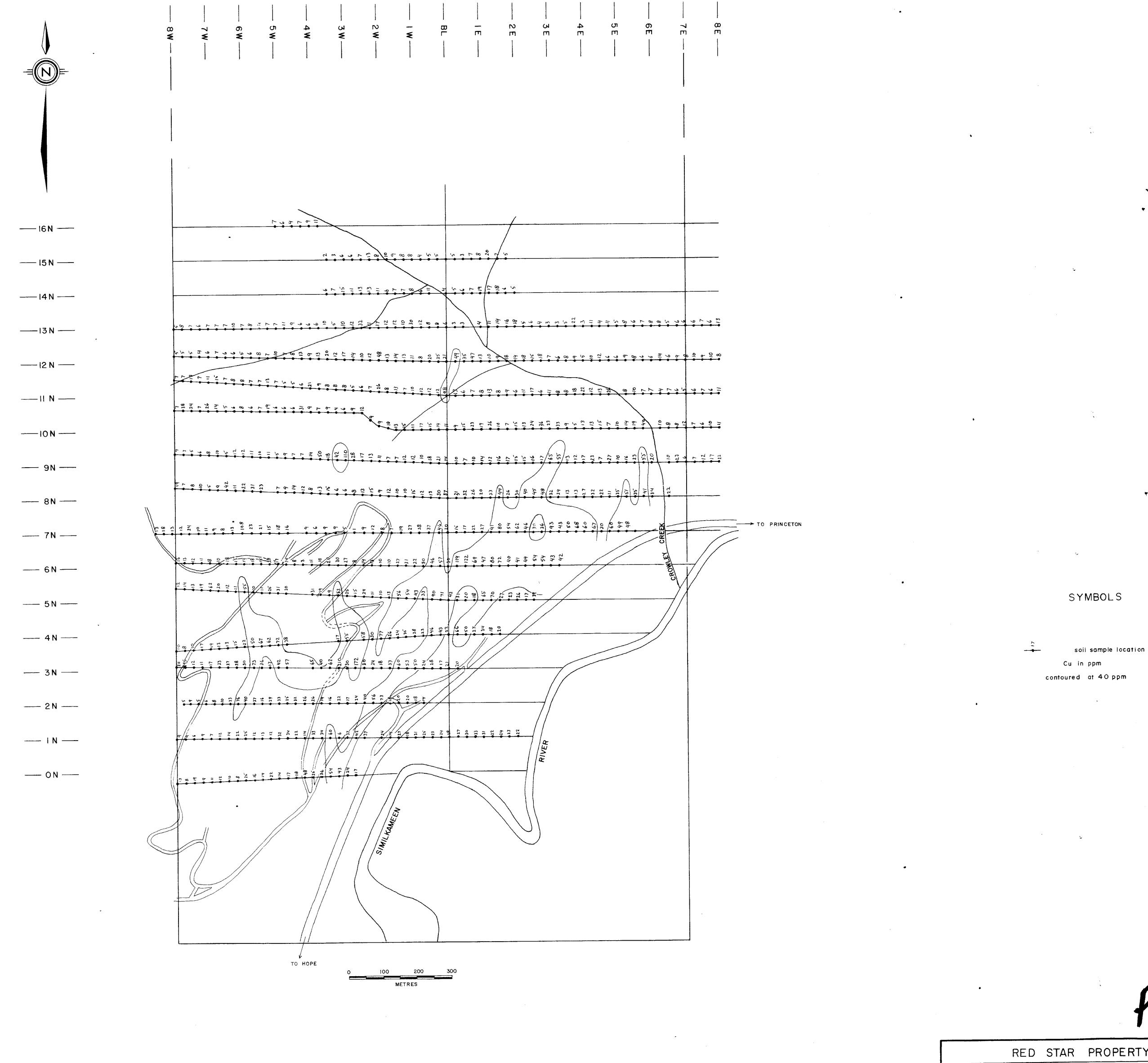
rised by Date

GEOCHEMISTRY

Scale: 1:5,000

Date: 26 MAY 1980

Plate: 90-3



RED STAR PROPERTY

Drawn by: GJN Traced by:

Revised by Date Revised by Date

GEOCHEMISTRY CU.

Scale: 1:5,000 Date: 26 MAY 1980 Plate: 80-4