2146

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GEOLOGICAL - GEOCHEMICAL - GEOPHYSICAL REPORT

RAND GROUP

Rand Fraction (L 14666) & Adj. Mineral Claims

(49° 117° SE)

Erie Creek, 10 miles northwest of Salmo

NELSON MINING DIVISION, B.C.

82F/6W

CALMARK EXPLORATIONS LIMITED

between May 12 - August 30, 1969

W.S. Read, B.Sc., P.Eng.

November 29, 1969

WAYLAND S. READ, B.SC., P.ENG.

AREA CODE 604—TELEPHONE 922-1347 *Consulting Geologist* 860 YOUNETTE DRIVE, WEST VANCOUVER, B.C., CANADA

November 29, 1969

The Board of Directors,
Calmark Explorations Limited,
#411 - 409 Granville Street,
Vancouver 2, B.C.

Gentlemen:

At your request I have prepared a report on your Rand Group of Claims northwest of Salmo, B.C., with a compilation of this past summer's work.

Yours very truly,

W. S. Read

W.S. Read, P.Eng.

wsr/h:

GEOLOGICAL - GEOCHEMICAL - GEOPHYSICAL REPORT

on

RAND GROUP

Rand Fraction (L 14666) and Adjoining Mineral Claims
(49° 117° SE)

Erie Creek, 10 miles northwest of Salmo

NELSON MINING DIVISION, B. C.

for

CALMARK EXPLORATIONS LIMITED

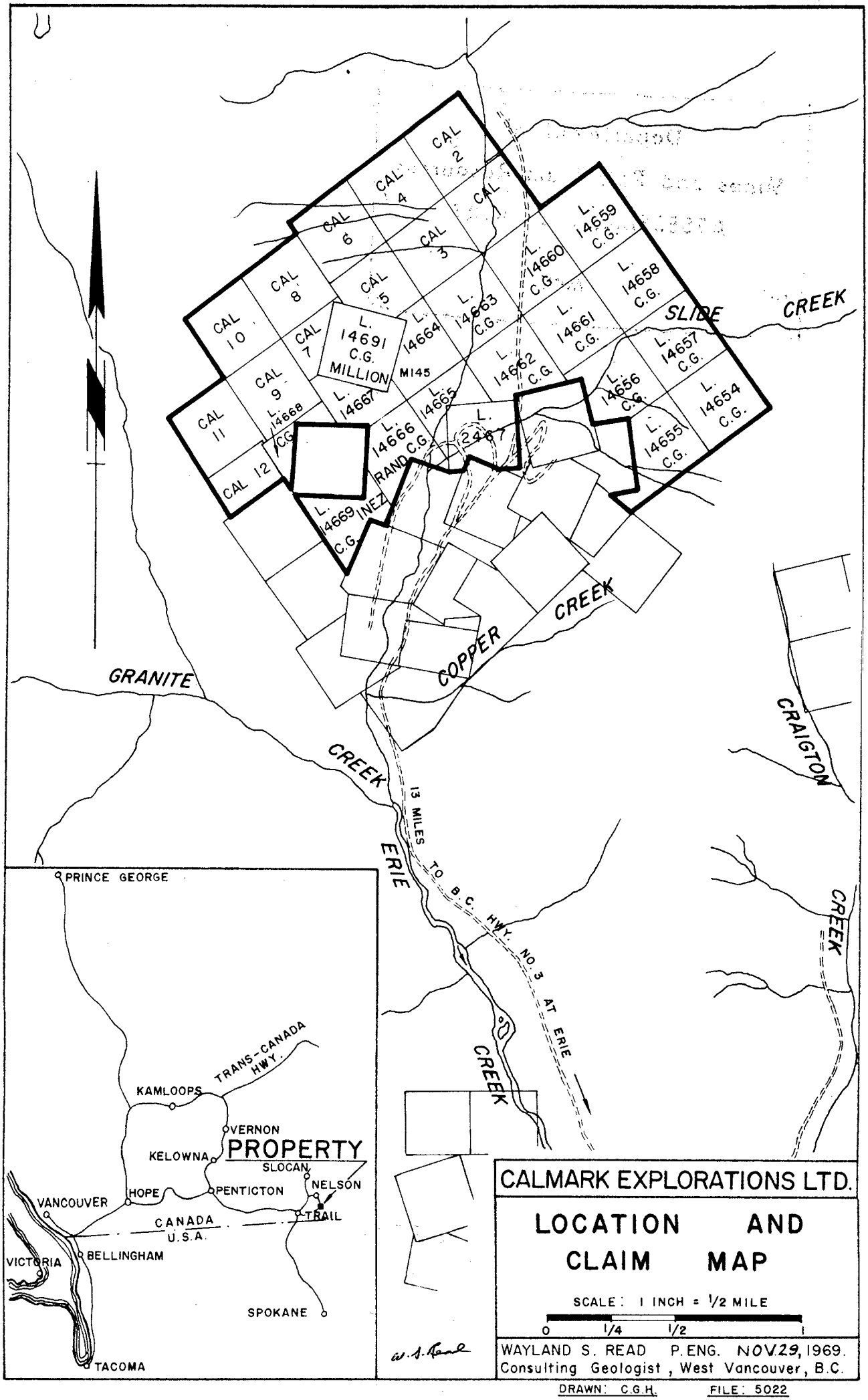
by

W. S. Read, B. Sc., P. Eng.,
860 Younette Drive,
West Vancouver, B. C.

November 29, 1969

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS:



CALMARK EXPLORATIONS LTD.

LOCATION AND CLAIM MAP

SCALE: 1 INCH = 1/2 MILE

0 1/4 1/2 1

WAYLAND S. READ P.ENG. NOV.29, 1969.
Consulting Geologist, West Vancouver, B.C.

DRAWN: C.G.H. FILE: 5022

LOCATION

The Rand Group of 30 mineral claims, held in part by location, mineral lease and option, is located in the Nelson Mining Division, British Columbia, Canada on map sheet 82F/6W of the National Topographic System. The approximate coordinates are 49° 19.5' north latitude and 117° 24' west longitude. The elevation of the claims group is between 3,600 feet and 6,000 feet above mean sea level.

The claims lie on both the east and west side of south flowing Erie Creek about 10 air miles northwest of Salmo, B.C., 13 air miles southwest of Nelson, B.C., and contain several hundred feet of underground workings on two levels.

ACCESS

Salmo, B.C., is located 26 miles by road east of Trail and 26 road miles south of Nelson, B.C., or about 450 miles by road east of Vancouver. Air service to the area is provided by an airport at Castlegar with daily scheduled flights to and from Vancouver. The nearest smelter is located at Trail.

The road has good grades and is passable by truck to about one-quarter mile north of the Slide Creek crossing. Using some care, cars could be taken to the camp site at Slide Creek. Logging trucks were hauling from the Granite Creek area to the highway.

A good campsite was available on the Grand Union claim and water was piped from Slide Creek by gravity flow. There was sufficient water from Slide Creek for domestic use through the dryest part of the summer.

Normal supplies and mine labour were available locally.

CLAIMS HELD BY COMPANY

We have been advised by the company solicitor that the company holds the following 30 mineral claims and fractions:

Claim Name and Number	C.G. Lot Number	Mineral Lease Number	Record Number	Tag Number	Record Date
Cal 1 - 12			411376-87	601521 - 31, 34	Feb. 24, 1969
Rand Fr.	14666				
Inez	14669				
Laura	14668				
Million	14691				
Dolly	14664	M 145			
Eva Fr.	14665	"			
Rhodes Fr.	14667	"			
Grand Union	2467	M 166			
Mike	14654	M 169			
Risk Fr.	14655	"			
Peggy Fr.	14656	"			
Leslie	14657	"			
Lee	14658	"			
Pitt	14659	"			
Winnie	14660	"			
Lucy	14661	"			
Gus Fr.	14662	"			
Dale	14663	"			

The group contains a total of 30 claims.

HISTORY

The history of the immediate area of the claims group is recorded in the annual reports of the Minister of Mines, B. C., from 1899 to 1959 and has been an important gold producer. The Rand and Inez veins were discovered comparatively late, being first mentioned by Cockfield in 1936 and by name in 1939. Their production record is not available, being grouped with the now adjoining Second Relief vein system but the development footage was kept separate. The mine was closed in 1941 during the Second World War.

In 1919 a forest fire burned over the area and destroyed the mill of the Relief Mining Company. Prospecting was much easier after the fire and geological mapping in the immediate vicinity of the mine found the Second Relief vein to be one of six possible veins apparently parallel in dip and strike on the east side of Erie Creek. No work was done between 1919 and 1927.

The 1927 Minister of Mines report states that in regard to ore immediately available - there is a considerable quantity of tailings in the creek bed below the mill, estimated at several thousand tons of recoverable material which remains from the tailings accumulated during former operations and which it is considered possible to re-treat owing to the low recovery previously made - a recovery of 80 to 90 percent is looked for. In 1928 the company did not own many of the adjoining claims.

1929 - Second Relief Mining Company Limited was amalgamated with the Arlington Mining Company to form the Relief-Arlington Mines Limited.

1933 - Records of performance from July 15th, 1933, when the mill was first put into commission, up to the end of November 1933 are as follows :

> 3,034 tons treated, the heads assaying 0.56 oz. gold per ton and the tails 0.10 oz. gold per ton.

1934 - The Premier Gold Mining Company Limited secured control.

1936 - The first mention of what was later to be known as the Rand vein appears in Cockfield 1936 :

> "On the opposite side of Erie Creek, westerly from the Second Relief workings, a vein has been traced continously for about 800 feet by a series of open cuts. It strikes north 70 degrees east and dips 75 degrees northwest, and ranges from 1 to 3 feet wide."

1937 - The newly discovered vein, on the north side of the gulch, has been opened by drifting over a length of several hundred feet. 103 men were employed in September (66 underground, 36 on the surface, and 11 in the mill).

1938 - Mine and mill operated continuously throughout the year, an average of 100 men being employed with 50 underground. On the showings to the west of the creek 1,406 feet of trenching was done by hand and 4,290 feet of stripping was done

by bulldozer, as well as 1,689 feet of drifting, 176 feet of crosscutting, and 766 feet of diamond drilling. A private townsite, on which about twenty dwellings were built last year, is located about a mile below the mine.

1939 - First mention of Inez and Rand veins by name. Across Erie Creek 1,015 feet of drifting, 260 feet of crosscutting, 66 feet of sinking, and 257 feet of surface trenching was done on the Inez vein, and 137 feet of crosscutting and 137 feet of raising on the Rand vein - all work on these veins appears to have been exploration and development with the majority of production from the Second Relief vein system where the main shaft was put down to the 11th level.

1940 - Mine and mill operated continuously throughout the year, employing 134 men, with 87 underground. The ore from the mine is hand-sorted, about 40 percent being rejected before treatment in the mill. A total of 31,333 tons of ore milled, and the bullion yielded 10,604 oz. of gold and 3,556 oz. of silver.

Across Erie Creek, 462 feet of drifting, 24 feet of crosscutting, and 70 feet of raising was done on the Rand vein.

1941 - Mine and mill operated continuously until June 15th, 1941, employing an average of 94 men, with 52 working underground. It was then closed down as ore reserves for an operation of that size had become exhausted. Development included 162 feet of drifting, 15 feet of crosscutting, 60 feet of raising, and 59 feet of sinking on the Inez and Rand veins.

1942 - The company paid $90,000 in dividends for a total of $245,000.

1945 - Three men shipped 242 tons of ore to Trail which yielded 375 oz. of gold and 165 oz. of silver.

1946 - Three to four men shipped 206 tons from the Second Relief, which yielded 140 oz. of gold and 222 oz. silver.

1959 - A. Burgess shipped 14 tons containing 4 oz. gold and 4 oz. silver.

LINE CUTTING

A base line was established across the central and eastern part of the property. Since the Crown Granted mineral claims and mineral leases were located by legal survey many years ago, it was felt that they would be useful in relating present work with work done in the past.

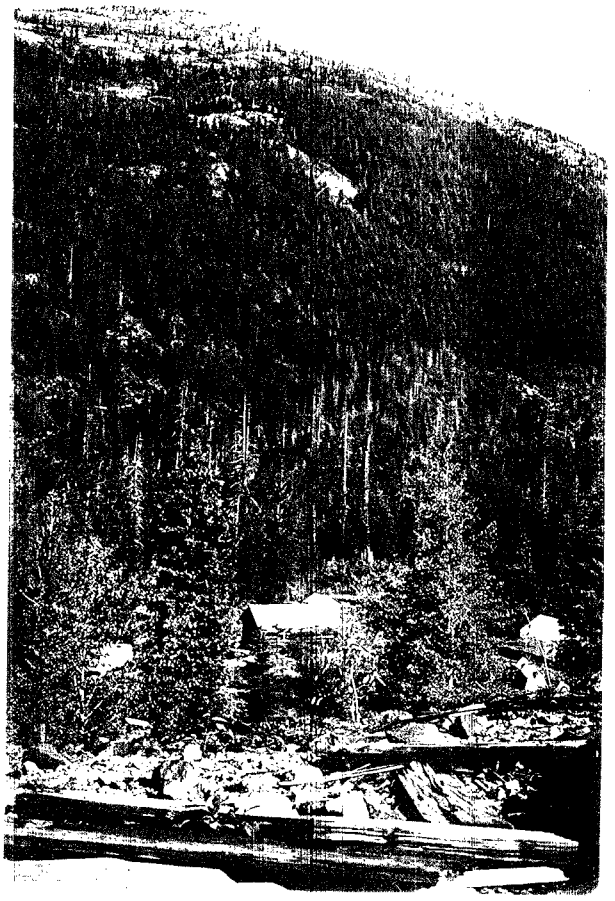
A transit baseline was started at the approximate location of the common corner between the Dolly (L 14664), Eva Fraction (L 14665), Rand Fraction (L 14666) and Rhodes Fraction (L 14667) and driven at N 54° 36' E and S 54° 36' W. Although completely grown in, this line was originally a boundary line between several surveyed claims and the iron pins from the legal survey were located and tied in to the baseline. From this starting point the baseline was driven 6,000 feet northeast and 3,600 feet southwest for a total distance of 9,600 feet or 1.82 miles.

Picket crosslines were turned off at 400 foot intervals and driven a total of 21.88 miles as shown on the accompanying maps. The lines have stations marked every 100 feet with slope corrections made between stations so that all distances measured are horizontal measure.

Total lengths:

Baseline	1.82 miles
Picket cross lines	21.88 "
Total	23.70 miles

The undergrowth was thicker than indicated from first examinations, making control lines necessary for detailed work and line cutting more difficult than expected.



Looking Northwest across Erie Creek campsite.

Part of Campsite - looking west - Number 1 Portal dump on Rand Vein and Stripping Inez Vein in background. Number 2 Portal and dump behind trees.

GEOLOGY

The grid lines were used as control for mapping outcrop areas. Field mapping was to a scale of 1 inch equals 100 feet and reduced to 1 inch equals 300 feet to correspond to the property plan, the geochemical-magnetometer survey plan and to bring the large area of coverage on to one map sheet.

The area was examined in some detail by Cockfield (1936) and while there are more recent reports (Little 1960), none has been found that covers this specific area in such detail. At the time of Cockfield's examination, work was in progress and much more data and workings available for inspection. The preliminary mapping this summer has endeavoured to add to the detail of this work and to divide Cockfield's unit #1 (rusty weathering greenstone, slate, tuff and argillite) into the volcanic member and interbedded or interformational argillites, slates, andesites and minor tuffs. With limited outcrop, it was not possible to show the full picture of how the units lie in the eastern corner of the property north of Hemlock Creek. However, more of the favourable volcanics were found than were previously known to exist. Cockfield had found no definite contact between his two units and could not distinguish between the greenstones of the two units underground. Slates and argillite have had an important influence on ore deposition and it was considered important to outline the area in which they occur. This has been done to the limit of presently known outcrops. It may be necessary to make a further concentrated search for additional

outcrops in key areas, as the scattered outcrops suggest that bands of slate, argillite and tuff are intermixed with bands of andesites.

Greenstone bodies from which specimens were selected by Cockfield for petrographic study are fine grained, greyish green rocks, showing no crystals with a hand lens. Under the microscope they were found to consist of crystals of feldspar, or of hornblende and feldspar, in a very fine grained and altered groundmass. Where determined the feldspar is andesine. The hornblende has been mostly altered to chlorite. Such rocks may be called hornblende andesites.

These rocks are invaded by a large body of granitic rocks of the Nelson batholith. The intrusives are light grey and medium to coarse grained granodiorite. The contact in the claims area is almost completely overburden covered, but from outcrops in close proximity it would appear to be an irregular contact with several embayments along the strike.

The legend of rock units has been broken down as follows. The numbers relate to Eagle Verithin pencil colours for consistency in map preparation.

- Nelson granodiorite (757) - with minor variations from quartz diorite to monzonite, medium to coarse-grained, greyish-white in colour. Augite is abundant, hornblende and biotite minor. Sphere and magnetite occur as accessories in all varieties.

- Volcanic members of the Rossland-Beaver Mountain Group (739) consisting mainly of very hard, dense coloured andesites, and darker andesitic porphyries, augite and feldspar being the most prominent phenocrysts. Minor volcanic breccia.

- Interbedded or interformational argillites, slates, andesites and minor tuffs (742 1/2). Argillites are soft, finely laminated greyish coloured rocks, slates being somewhat harder and darker in colour. Andesite members are fine-grained, rarely porphyritic.

Pre-Mineral Dykes:

- Diorite porphyry (740) with subhedral, white blocky phenocrysts of feldspar in a fine-grained dioritic groundmass of feldspar and mafics.

Post Mineral Dykes:

- Biotite lamprophyre (747) fine grained, dark grey groundmass.

- Andesite to basaltic dykes (734 1/2) with phenocrysts of either feldspar or augite in fine grained dark green groundmass. Vesicules and/or amygdules prominent in groundmass.

- Feldspar porphyry or granite porphyry (738 1/2) with conspicuous sperulitic phenocrysts of orthoclase in a medium grey-green coloured groundmass of mainly feldspar and quartz, with minor biotite.

quartz vein containing about 10% pyrite dipping 69° - 70° northwest. It is on the hangwall of a banded, hard, light buff rhyolitic dyke approximately 3 feet wide, that has a strong fault paralleling the footwall. The Inez vein where exposed by the crosscut and drift 136 feet southwest is also associated with a light buff dyke. The vein strike projections also indicate that it is the same vein. This vein will also be intersected by the fault that cut off the Rand vein, about 8 feet along strike from the northeast wall of the crosscut.

The Rand vein near where cut-off by the fault assayed from chip sample number 6794 across 2.5 feet - gold 0.42 oz/ton and silver 0.3 oz/ton. The extension of the veins northeast of the fault is overburden covered on surface and has not been located. This extension is toward the area of projected vein intersection and is an important target. The waste dumps from 2 portal and the heavy overburden of the Erie Creek valley complicate the search.

Two tunnels designated as number 3 and 7 were found south of the baseline near crossline 12 + 00 W. The number 3 portal is about 65 feet at S 50° E from the baseline station 12 + 00 W. and about 60 feet lower in elevation. The number 7 portal found later is on the same shear lower in elevation. The shear zone strikes N 82° W and dips north at angles varying from 76° to 84°. The workings are on the Cliff Crown Grant about 100 feet from the northwest boundary of the Rand Fr. (L 14666).

The shear zone varies from two narrow stringers with a

- Feldspar porphyry, granite porphyry (735) less sperulitic, having a lighter beige coloured groundmass.

- Coarse grained quartz-eye porphyry or feldspar porphyry (743) with greyish rounded phenocrysts of quartz, and anhedral phenocrysts of feldspar.

The Inez vein was traced on surface by means of outcrops and sloughed trenches for over 2,100 feet southwest from the number 2 tunnel. This was about 300 feet to southwest of the last crossline 20 + 00 west.

The Rand vein was traced underground from the number 2 to the number 1 tunnel and on surface from the number 1 tunnel to beyond the 20 + 00 W. crossline, a total horizontal distance of about 1,900 feet. They were not traced farther southwest because of lack of mapping control.

About 1,325 feet of the underground working on the Rand and Inez veins, number 2 portal (rail el. 3,607.82' from old section) were geologically mapped at a scale of 1 inch = 20 feet. This area corresponds to the tunnel outline dashed in on the 300 scale Geological Plan #2. The mapping shows the veins are converging to the northeast and may be less than 15 feet apart at the portal crosscut. The Rand vein has been cut off at the portal crosscut by a strong fault containing 3 - 5 inches of gouge and crushed wallrock. The strike of the fault is N 68° E and dips from 69° to 80° to the northwest. What is considered to be the Inez vein at the portal crosscut is a 3 - 5 inch

horse of country rock between to a section in number 3 tunnel where a 1.3 foot wide section contained white vein quartz with heavy pyrite. A 1.3 foot channel-chip sample was cut across the better section of the vein about 3 feet inside the tunnel which returned the following results:

Sample No.	Au oz/T.	Value per ton @ $35. per oz.	Ag oz/T.	As %
16201	3.40	$119.00	0.8	0.12

This sample represents a small volume but does indicate the high values that may be found where the quartz veins contain pyrite. The extensions of this zone are overburden covered and untested.

Thirteen tunnels, trenches and shafts in addition to those found on the Rand and Inez vein systems were located on nine separate mineral occurrences unknown at the start of the program. Preliminary samples gave consistent but low values in gold. Molybdenite was found associated with some quartz veining in the granite. Several high grade specimens were found but overall grade would be low. No physical follow-up work was done on any of the new showings in order to complete the overall coverage of the grid area.

UNDERGROUND WORK

The portal of the Number 2 level on the Rand Fraction (rail elevation 3,607.82' from old section) previously caved, was mucked out with a front end loader, three timber sets were installed and fully lagged. The cave-in at the junction of the portal crosscut with the Rand vein drift was mucked out and 150 feet of ditching, to the Inez crosscut and some additional ditching on the Rand drift southwest of the Inez crosscut, gave adequate drainage to the workings.

It is now possible to go to the face of the drift on the Inez vein number 2 level. No attempt was made to remove the cave-in blocking the Rand drift about 60 feet southwest of the second Rand-Inez crosscut or about 355 feet southwest of the portal crosscut. It was not possible to estimate the size of this cave-in and the work was postponed until more surface work was completed.

About 1,325 feet of the underground workings were resurveyed and geologically mapped to a scale of 1 inch equals 20 feet.

MAGNETOMETER SURVEY

Type of Magnetometer:

A Sharpe MF. 1 fluxgate magnetometer, serial number 803331, was used for this survey. This is a hand held instrument requiring only coarse levelling and is not significantly affected by orientation.

The magnetometer measures the vertical component of the earth's magnetic field to 5 gammas on the lowest scale range. The full scale ranges vary progressively from a minimum of plus or minus 1, 000 gammas to a maximum of plus or minus 100, 000 gammas. The values can be read directly from the scale.

Temperature compensations have been built into the instrument and the only necessary correction to the readings is for the diurnal variation. The variation in each survey loop is assumed to be linear and is determined by subtracting the initial and final readings. The correction added to each reading in the loop is the product of the total diurnal variation of the loop and the ratio of time elapsed up to the time of the reading over the total time elapsed for the loop.

Field Procedures:

The instrument was set or zeroed for the area and station 0 + 20 E on the baseline given a value of 3, 000 gammas. The baseline was surveyed, corrections in the readings made for diurnal variation and the stations at the junction of the crosslines with the baseline were used as control points for each survey loop.

Readings were taken at every station on the baseline and every 100 feet on the crosslines. Where further detail to outline anomalous zones was needed, the station interval was closed to 50 feet or less. Diurnal variation was low and corrections were treated linearly in respect to elapsed time.

GEOCHEMICAL SURVEY

Soil samples were taken along the crosslines at 100 foot intervals. A mattock was used for digging the sample hole. When possible, the upper part of the "B" soil horizon was sampled.

The samples were collected in brown kraft soil sample bags arranged in line order and forwarded directly to the assayers, Warnock Hersey International Limited, Vancouver, as soon as each shipment lot was collected. The samples were dried by the assayers at room temperature and assayed for mercury with a Lemair S1 Detector.

The assay results were plotted on the base plan at a scale of 1 inch = 300 feet, colour coded and contoured within ranges as shown on the map.

DISCUSSION OF RESULTS

Magnetometer Survey:

The readings were plotted on a base map to a scale of 1 inch = 300 feet, which was used as a base map for all surveys. Readings were plotted as gammas relative to baseline station 0 + 20 E.

The hillsides have quite an extensive cover of light overburden covering rocks of the Rossland Beaver Mountain group, the Nelson Batholith and later dykes.

The Rand and Inez veins in some areas showed magnetic relief, particularly to the southwest. Tighter line spacing would be required since normal contouring is effected by structural features and contour lines may cross the true vein anomaly.

In general, several trends were evident. One trend was in an east-west direction, approximately paralleling the intrusive contact. A second trend is in a northerly direction paralleling Erie Creek, and the westerly dipping andesite dykes.

Mineralization often was found with the north west and north east trends. These were usually smaller in extent. A larger poorly defined area with several showings was found north of the baseline between lines 0 + 00 and 12 + 00 W. Other trends are to the east of the property and should be investigated to determine if they could represent extensions of the Second Relief vein systems.

Geochemical Survey:

The following concentration ranges for Mercury were selected after inspection and analysis of the data:

Range	Hg - ppb.
Background	0 - .33
Threshold	.33 - .75
Anomalous	.75 - 1.50
	+ 1.50

The mean average of all samples was 0.33 parts per billion of mercury.

Mercury has a gaseous dispersion pattern and its association in trace amounts with precious and base metal deposits has led to its use in geochemical exploration for these metals. Hawkes and Webb state that, in a porous medium that is not saturated with water, Hg vapour will move as a constituent of the air for a relatively great distance from the source. The shape of the resulting Hg anomalies depends on the geometry of the fractures and pore spaces that control the movement of air. Hg vapour, of course, cannot move through impermeable rocks or through permeable material that is saturated with water.

Anomalous readings were recorded on crossline 8 + 00 W, north of the baseline in an embayment in the intrusive, associated with shearing, weakly mineralized quartz veins and several old workings. With much overburden additional work will be required to determine the sources.

Further north on line 8 + 00 W. small anomalies were found in overburden that may be associated with the anomalies on 16 + 00 W and 20 + 00 W starting at about 3300 north. These anomalies are associated with disseminated magnetite in the granodiorite and with quartz veining.

The high readings on the baseline between 20 + 00 W and 24 + 00 W and crossline 16 + 00 W, 400 south may be associated with the favourable diorite porphyry although no veins were found from the limited exposures.

The anomalies on lines 20 + 00 E and 24 + 00 E are in areas of overburden cover. The two on line 24 + 00 E at 900 south and 1700 south are both associated with magnetic variations.

The geochemical and magnetometer anomalies, south on lines 32 + 00 E, 36 + 00 E and 40 + 00 E should be checked for extensions of the Second Relief vein systems.

SUMMARY AND CONCLUSIONS

The program during the past summer was instrumental in establishing 1.82 miles of baseline and 21.88 miles of crosslines over the central and eastern part of the property. The baseline was tied in to previously legally surveyed Crown Granted mineral claim corners and several other posts and claim corners were located to establish property boundaries.

Geological mapping outlined areas of outcrops and found 13 tunnels, trenches and shafts on nine separate mineral occurrences unknown at the start of the program. These are in addition to the extra workings found on the extension of the Rand and Inez veins.

The lines were covered with a magnetometer and geochemical survey which helped outline targets for further follow-up. The soil samples were assayed for mercury but the samples were retained and experimentation with other elements is recommended.

Underground work consisted of mucking out and retimbering the portal of the Rand number 2 tunnel, removing a cave-in at the junction of the portal crosscut and the Rand drift, and extensive ditching of small cave-ins to help drain the workings. About 1, 325 feet of the underground workings were resurveyed and geologically mapped to a scale of 1 inch equals 20 feet.

From this data target areas can be picked for a continued program of extension of the work and a detailed follow-up.

PERSONAL

Contract field work between May 12 and August 30, 1969.

Wayland S. Read, P. Eng., Mining and Geological Consultant,
860 Younette Drive, West Vancouver,
B. C.

Brian K. Bowen - Party Chief - Fourth Year Geological Engineering, U. B. C. Four summers field experience, two of which in mineral exploration with Cominco Ltd., one with B. C. Land Surveyor.
#302 - 2070 Cornwall Street, Vancouver 9, B. C.

David P. M. Hadato - Senior Assistant, Fourth Year, U. B. C. Faculty of Science, majoring in Geology. Three summers field experience with Dr. Sinclair, U. B. C. Geology Project, Homestake Mining Company and Wayland S. Read Limited.
#207 - 1135 West 13th Avenue, Vancouver 9, B. C.

Fraser R. Phiri - Geological Assistant - Third Year, U. B. C. Faculty of Science, majoring in Geology.
#302 - 2070 Cornwall Street, Vancouver 9, B. C.

John Forlaw - Student Assistant and Cook.
Fruitvale, B. C.

L. M. Schram - Line Contractor,
R. R. #1, Keremeos, B. C.

Martin Schram - Line Contractor,
R. R. #1, Keremeos, B. C.

Lary Sostad - Line Contractor,
#818 - 510 West Hastings Street, Vancouver 2, B. C.

Terry Lowenberg - Line Contractor,
Fruitvale, B. C.

R. Bell	-	Line Contractor, Fruitvale, B. C.
Lino Muto	-	Bulldozer Contractor, Fruitvale, B. C.
Carl Anderson	-	Contract Miner, Salmo, B. C.
John Blondo	-	Contract Miner, Salmo, B. C.

BIBLIOGRAPHY

1. Annual Reports, Dept. of Mines, B.C., 1899-1959.

2. Cockfield, W.E. (1936) Lode Gold Deposits of Ymir - Nelson Area, British Columbia, Memoir 191, Geological Survey of Canada.

3. Little, H.W. (1960) Nelson Map Area, West Half, British Columbia, Memoir 308, Geological Survey of Canada.

4. Hawkes, H.E., and Webb, J.S. Geochemistry In Mineral Exploration, Harper & Row, Publishers Inc., New York.

5. Read, W.S., Preliminary Report Rand Group, March 15, 1969.

CERTIFICATE OF QUALIFICATIONS

I, Wayland Stuart Read, of 860 Younette Drive, West Vancouver, B. C., do hereby certify that:

1. I am a practising mining geologist and my address is 860 Younette Drive, West Vancouver, B. C.

2. I am a graduate in geology from Acadia University, Wolfville, Nova Scotia, and have been granted the degree of Bachelor of Science in Geology and have engaged in practising my profession for the past eleven years.

3. I am a member of the Association of Professional Engineers of British Columbia and the Yukon Territory, a Fellow of the Geological Association of Canada and a Junior Member of the Canadian Institute of Mining and Metallurgy.

4. I have no interest in the securities of Calmark Explorations Ltd., nor in the property held by them and discussed in this report.

5. This report is based on my work and work done under my direction during the past several months.

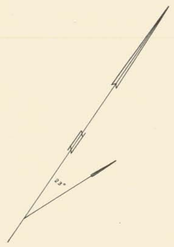
Respectfully submitted,

W. S. Read

Wayland S. Read, B. Sc., P. Eng.,
Consulting Geologist.

860 Younette Drive,
West Vancouver, B. C.

November 29, 1969.



BASE LINE N 54° 36' E

gammas Mercury (in parts per billion)
Hg. .33-.75
.75-1.50
1.50+

Magnetometer contours in gammas.
Instrument - Sharpe MF1 # 803331
Mercury by Lemair SI Detector.
Field data by : B Bowen, D Hadata, F Phiri, W.S Read.
Field work - May 12 - August 30, 1969

To accompany report by W. S. Read, P.Eng.,
November 29, 1969.

W S Read

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2146 MAP #4

2146

CALMARK EXPLORATIONS LTD.
49° 19.5' N. 117° 24' W.

RAND GROUP, ERIE CREEK, SALMO AREA, B.C.

GEOCHEMICAL AND MAGNETOMETER SURVEY

Scale in feet
0 150 300 600 1200

DRAWN BY: B.K.B/J.W.
DATE: AUGUST 8, 1969
REVISED Sept. 15, 1969
Nov. 29, 1969
No. 3

WAYLAND S. READ P.Eng., Consulting Geologist, West Vancouver, B.C.

CAL 8

CAL 6

CAL 4

CAL 2

CAL 5

CAL 3

CAL 1

CAL 7

MILLION M.C.
L 14691

LAURA
L 14668

RHODES FRACTION
L 14667

DOLLY
L 14664

DALE
L 14663

WINNIE
L 14660

PITT
14659

CLIFF
2915

EVA FRACTION
L 14665

AMOS
L 14670

RAND FRACTION
L 14666

GUS FRACTION
14662

LUCY
L 14661

LEE
L 14658

GRAND UNION
L 2467

INEZ FRACTION
L 14669

tailings pond

SLIDE CREEK

ANDY FRACTION
L 14671

ERIE CREEK

IDA D
L 2462

HEMLOCK CREEK

PEGGY FRACTION
L 14656

LESLIE
L 14657

BIG BUMP
L 2464

SECOND RELIEF
L 4207

CHIEF FRACTION
L 14672

STAR SHINE
L 2466

ARGENTEUIL
L 3326

APEX FRACTION
L 14675

WAFFER
L 2468

RISK FRACTION
L 14655

MIKE
L 14654

MARTHA WASHINGTON
L 5031

HAWKEYE
L 3327

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2146 MAP #2

Legend -
Skid or mining road
Stream
Stream (intermittent)
Turning point
Legal survey post found
Tunnel
Shaft
Shack or tent

2146

CALMARK EXPLORATIONS LTD.
49° 19.5' N. 117° 24' W

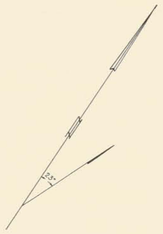
RAND GROUP, ERIE CREEK, SALMO AREA, B.C.

CLAIM PLAN

Scale in Feet
0 150 300 600 1200

DRAWN BY: B.K.B.
DATE: AUGUST 1, 1969
REVISED: NOVEMBER 29, 1969
No. 1

WAYLAND S. READ P.Eng., Consulting Geologist, West Vancouver, B.C.



LEGEND

Post Mineral Dikes

- Biotite lamprophyre, fine grained dark grey groundmass.
- Andesite to basaltic dikes, with phenocrysts of either feldspar or augite in fine grained dark green groundmass. Vesicles and/or amygdules prominent in groundmass.
- Feldspar porphyry, or granite porphyry, with conspicuous spherulitic phenocrysts of orthoclase in a medium grey green coloured groundmass of mainly feldspar and quartz, with minor biotite.
- Feldspar porphyry, granite porphyry, less spherulitic, having a lighter beige coloured groundmass.
- Coarse grained quartz-eye porphyry, of feldspar porphyry, with greyish rounded phenocrysts of quartz, and anhedral phenocrysts of feldspar.

Pre-Mineral Dikes

- Diorite porphyry, with subhedral white blocky phenocrysts of feldspar in a fine-grained dioritic groundmass of feldspar and mafics.

- Nelson granodiorite, with minor variations from quartz diorite to monzonite, medium to coarse grained, greyish white in color. Augite is abundant, hornblende and biotite minor. Sphene and magnetite occur as accessories in all varieties.
- Volcanic members of the Rossland-Beaver Mountain Group, consisting mainly of very hard, dense colored andesites and darker andesitic porphyries, augite and feldspar being the most prominent phenocrysts. Minor volcanic breccia.
- Interbedded or interformational argillites, slates, andesites and minor tuffs. Argillites are soft, finely laminated greyish colored rocks, slates being somewhat harder and darker in color. Andesite members are fine grained, rarely porphyritic.

Preliminary geology by B. Bowen, D. Hodats

- Quartz vein
- Sulphide mineralization
  - Cp: Chalcopyrite
  - Py: Pyrite
  - Mo: Molybdenite
  - Pyr: Pyrrhotite
  - AsPy: Arsenopyrite
- Accessory minerals associated with quartz veins and stringers
  - Ep: Epidote
  - Mg: Magnetite
- Au. - oz/ton
- Ag. - oz/ton
- Other elements as %

- Jointing
- Bedding
- Shearing
- Fault
- Contact
  - Observed (dip)
  - Extrapolated
  - Inferred
- Adit
- Shaft
- Trenching, open stope
- Survey station
- Rock Sample No.
- Property boundary (approximate) with observed posts - Legal Survey; - Crown Grants
  - Located mineral claim posts
- Cabin, tent, frame etc.

To accompany report by W. S. Read, P. Eng.
November 29, 1969

W. S. Read

2146

CALMARK EXPLORATIONS LTD.

49° 19.5' N. 117° 24' W.

RAND GROUP, ERIE CREEK, SALMO AREA, B.C.

GEOLOGY PLAN

Scale in feet
0 150 300 600 1200

DRAWN BY: B.B., D.H., J.W. REVISED

DATE: NOVEMBER 29, 1969

No. 2

WAYLAND S. READ P.Eng., Consulting Geologist, West Vancouver, B.C.