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REPORT TO
EXEL EXPLORATIONS LTD. (N.P.L.)
VANCOUVER, B. C.

on

MAGNETIC SURVEYS
OF ITS
FHK AND JUA CLAIM GROUPS

by

SHERWIN F. KELLY, P. ENG.
GEOPHYSICIST AND GEOLOGIST

July 16, 1973

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 4512 MAP

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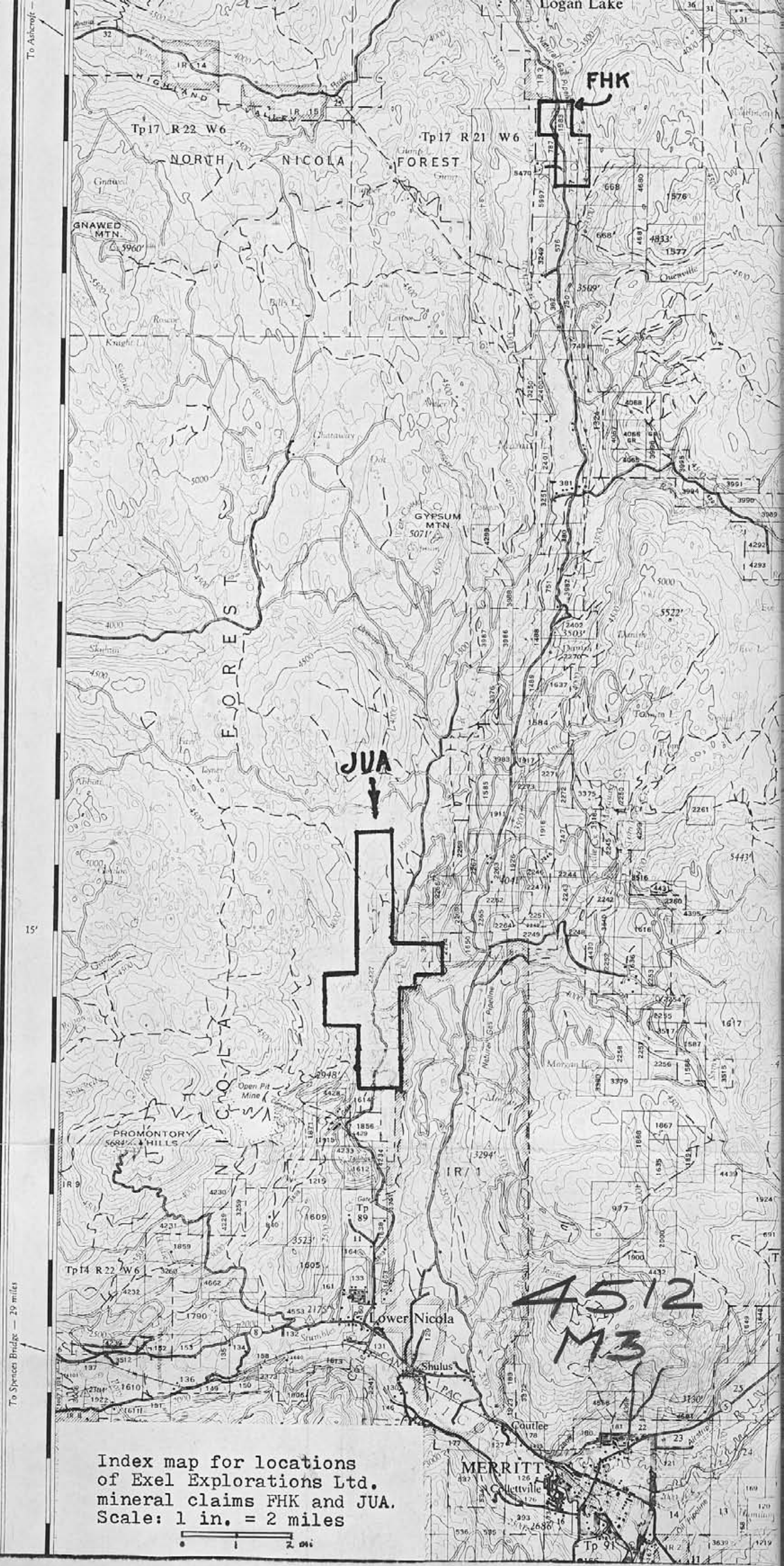
REPORT ON MAGNETIC
SURVEYS OF THE
FAK AND JUA
CLAIM GROUPS

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Index map for locations of Exel Explorations Ltd. mineral claims FHK and JUA. Scale: 1 in. = 2 miles



REPORT TO
EXEL EXPLORATIONS LTD.
CONCERNING MAGNETIC SURVEYS
ON THE JUA AND FHK
MINERAL CLAIM GROUPS

by

SHERWIN F. KELLY, P. ENG.
GEOPHYSICIST AND GEOLOGIST

INTRODUCTION

Magnetic surveys were conducted in March and April, 1973, on the FHK #1 to #10 claim group and on the JUA #1 to #28 and #39 to #52 claim group, in the Nicola Mining Division. The FHK claims lie along the Mamit Lake road about two miles south of the turn-offs, west to Highland Valley and east to Logan Lake. The JUA group lies on the Aberdeen Road, six miles north of Lower Nicola, where that road turns north off the Spences Bridge highway. Elevations are between 3,000 ft. and 3,500 ft.

The present report describes the surveys and offers possible interpretations of the results. The readings are depicted on two maps, in envelopes bound in back of this report. These maps show the lay-out of the grid lines, the claim lines, the individual readings and the contouring of the values. The maps were prepared by the contract geophysical company, Donegal Development Co. Ltd. which did the field work. The operations of that company are controlled by Seamus Young, who consulted with me on the conduct of the survey.

The work covered in this present report was filed in satisfaction of assessment requirements, in the office of the Sub-mining Recorder in Vancouver, on June 1, 1978.

LOCATION AND ACCESS

The two groups of claims under discussion, are located in the valley of Guichon Creek, a south-flowing tributary of the Nicola River, which it joins at Lower Nicola. Both groups are accessible by road. The general area of the claims is depicted on the west half of the Merritt topographic map sheet, 92 I/3E. The FHK group is at longitude $120^{\circ} 49'$ west and latitude $50^{\circ} 27'$ north. The JUA claims are at longitude $120^{\circ} 53'$ west and latitude $50^{\circ} 14'$ north.

The FHK claims are reached from Merritt by following the Spences Bridge road west from town about three miles and then turning north on the Mamit Lake road for some twenty miles. This road runs through the claim block for five claim lengths, to within a couple of miles of the turn-off west to Highland Valley and east to Logan Lake townsite.

The JUA claims may be reached by following the Spences Bridge road west from Merritt some six miles to Lower Nicola. There the Aberdeen Road turns off to the north. It is followed for about four miles to Craigmont Mine, where the pavement ends. Where the paved road swings west to the Craigmont Mine gates, a dirt road, the Aberdeen road, continues north, uphill on the right. Two miles along this road, it enters the JUA claims.

SITE OF WORK

The magnetic surveys being reported on, were conducted on grid lines turned off from north-south base lines. On the FHK claims, the base line closely followed the highway and the grid lines turned off from it covered parts of the ten FHK claims. The north portion of the location line, for FHK claims #1 to #4, had originally followed the highway. Recent reconstruction of the road, however, had evidently resulted in destruction of the posts, because Seamus Young was able to find only the initial posts for FHK #1 and #2. At the south boundary of FHK

#3 and #4, the location line was jogged one claim east, according to the affidavit by the staker, Frank Wong. The base line was jogged only 400 ft. east, however, and at line 40S, in order to follow the road. As a result, lines 32S, 36S and 40S west of the base line, which extend 1,500 ft. west of the base line, also extend 1,500 ft. west of the property boundary. Continuing south of the jog, lines 44S to 72 S, all extend 1,100 ft. each, west of the property boundary. All told, the total length of line supposedly off the property is 13,300 ft., or 2.5 miles. This is but 21% of the 12 mile total of grid lines. It therefore corresponds to only \$380 out of the total work performance of \$1800 on these claims. In consequence, the \$1000 claimed for assessment work is unaffected, even if this assumption is correct.

According to Seamus Young, however, he believes that his base line follows the original location line. According to his information and belief, the location line did follow the road, but the highway reconstruction has destroyed the posts and obliterated the line. He was unable to find any posts in the position of the purported location line for FHK numbers 5 to 10. On his map of these claims, the claim lines are shown on the assumption that the original location line followed the highway, and the measurements made were within the claim boundaries.

In any event, as noted below under "Interpretation", there is a slight distinction in the contour patterns east and west of the base line. The detection of this change in pattern could not have been made, nor tentatively ascribed a significance, if the grid lines possibly extending off the property to the west of the base line, had not been utilized for magnetic observations.

On the JUA claims, the base line followed the location line extending south from the initial post for JUA #7 and #8 to the initial post for JUA #1 and #2, at line 00 and thence straight south to line 60S. This base line lies close to, but not actually along the Aberdeen Road. The claims included in the grid were JUA

#1 to #6, #23 to #28, #39 to #52 (south portion only of #6 and #29).

Maps showing the grid lines, claim lines, readings, etc. are in the envelope bound in back of this report.

INSTRUMENT USED AND PROCEDURES

The magnetometer used in this survey was an M700 Flux Gate Magnetometer manufactured by McPhar Geophysics Ltd. of Don Mills, Ontario, bearing the serial #70107. The scales representing 3,000 gammas and 10,000 gammas for full scale deflections, were utilized in this survey.

To set base values at each grid line intersection with the base line, three consecutive traverses were made along the base line when commencing the survey on a given grid. From inspection of the results, a base value was assigned to each base line station at the intersection with a grid line. Thus, on checking in at the base line during the grid traverses, the diurnal correction could be apportioned to those readings taken between two such check-ins. Grid lines, spaced 400 ft. apart were turned off east and west from both base lines. Readings were taken at 100 ft. intervals along each grid line. The values plotted on the maps are the values obtained after applying the diurnal correction to each reading.

TIME OF SURVEY AND PERSONNEL INVOLVED

The survey on the FHK claims was conducted between March 13 and March 21, 1973. The survey on the JUA claims was carried out from March 22 to April 13, 1973.

The personnel involved in the field work consisted of Seamus Young, proprietor of Donegal Developments Ltd., of Vancouver, B. C., assisted by Phillip Renout, also of Vancouver, B. C.

FHK GROUP

Results

The maximum magnetic relief on these ten claims, 3,225 gammas, is from a low of 875 gammas to a high of 4,100 gammas. The predominant relief is more nearly 1,300 gammas, and lies between 1,200 and 2,500 gammas. Two quite high readings (4,100 and 2,750 gammas) lie directly over a pipeline and may be caused by it (lines 448 and 723).

Two high contours and a low one lie west of the pipe line, however, on lines 368, 288 and 208. They may be too distant from the line to be influenced by it, except possibly the 2625 gamma reading 50 ft. from the pipe, on line 288. These contours emphasize the linearity of the contour lines east of the base line, whereas those west of it are more irregular and random.

There is also a contrast in the range of readings on the two sides of the base line. To the west the predominant range is roughly from 1,200 gammas to 1,400 gammas. The relief is therefore about 200 gammas. East of the dividing line, however, the predominant range is roughly between 1,400 gammas and 2,000 gammas, for a relief in the neighbourhood of 600 gammas.

Interpretation

This FHK claim group lies in the Guichon Valley with Guichon Creek flowing southerly through portions of the claim block. Guichon Valley occupies the contact zone between the Guichon batholith to the west and the invaded Nicola volcanics to the east. The actual contact is concealed beneath a deep fill of glacial and stream deposits. Such igneous intrusive contacts with invaded volcanics and sediments, can be of potential interest as possible zones of mineral deposition. Hence, the defining of such a zone can materially assist in guiding an exploration program. Because of

the deep fill of clastic material, advantage needs to be taken of every geophysical aid possible to guide a drilling campaign.

As noted above, there is a slight distinction between the magnetic patterns evident on either side of the base line. The linear pattern which shows to the east may be ascribed to Nicola volcanics. The strike of the uptilted beds of volcanics is generally northerly, so the magnetic effects of strata of more magnetic and of less magnetic effect, could be expected to show in patterns of highs and lows with a northerly trend. Cognizance must nevertheless be taken of possible influences of the pipe line in exaggerating this pattern. It would be well to extend lines 32S to 72S, eastwards 1100 to 1500 ft., to verify the pattern. This would also complete the coverage of FHK claims #6, #8 and #10, if the pertinent location line was actually jogged east a full claim length, as discussed above.

West of the base line, the contour pattern is more irregular and random, and the range is lower, as previously noted. This sort of pattern is more or less typical of igneous intrusives in which the distribution of slight concentrations of magnetite are likely to be random and irregular. The pattern of magnetic contours could not have been made evident in this area if the lines 32S to 72S had not extended west of what is possibly the boundary of claims FHK #5, #7 and #9, on the assumption that the location line was actually jogged a full claim length east, as previously mentioned.

The location of this grid, in an area beneath which the batholith-Nicola contact must lie, creates a strong supposition that the distinction between the rather weak magnetic patterns really does roughly indicate the contact position.

Further magnetic work, plus electrical and/or electromagnetic surveys should be conducted on these claims before launching a drilling program. This exploration would be to define the contact zone and to test for mineralization which might be associated with that zone.

JUA GROUP

Results

The maximum magnetic relief observed on the approximately 25 JUA claims covered, amounts to 1,690 gammas. This is between a low of 1,050 gammas and a high of 2,740 gammas. The predominant range is somewhat less, however, usually about 800 gammas, between lows of around 1600 gammas and highs of roughly 2400 gammas. The relief is most pronounced in the south-east quadrant of the grid.

In general, the contours have a random distribution and irregular outlines. To this general statement there are, however, a few exceptions. A large and prominent high, enclosed in a 2000 gamma contour, lies east of the base line and extends from line 16S to line 56S. Roughly oval in shape, it measures 4000 feet north and south by 2600 ft. east and west. Within it, highs of 2400 and 2500 gammas and over, are common. In the northwest quadrant there are some linear highs of over 2000 gammas, with a N-S trend, interspersed with a few weak, irregular lows.

The lows in the magnetic relief vary in clarity. Some are well marked by distinct contours, but a few are somewhat diffuse and not so clear, as in the area east of the base line on lines 4N, 8N and 12N (8E to 16E on 4N; BL to 11E on 8N; and 2E to 7E on 12N).

The more clearly defined lows of some continuity, fall into two systems; one is about N-S and the other trends 20° to 30° west of north. A prominent one which indents the broad magnetic high area in the southeast quadrant, extends from 23E on line 60S, west of north through 19E on line 44S, to 12E on line 32S (indistinct on line 36S) for a length of over 2800 ft. After an interruption, what appears to be a continuation of this trend resumes at 6E on line 12S and carries on to 1W on line 4N, a length of over 1600 ft. There is an easterly displacement of about 250 ft. between lines 4N and 8N, with the trend resuming on the latter line between the base line and 1E. From there, it continues west of north to 10W on line 36N, for a distance of over 2800 ft.

There is no continuation of the trend of this linear low on the next line, line 40N, the north boundary of the survey grid. There is, however, quite a distinctive low of 1500 gammas at 15W and 16W on line 40N. It lies between highs to the east and west. This might be a displacement westerly of 400 to 500 ft. of the long linear low, or maybe is the start of a new linear. In any event, it is a sharp and well marked low.

A north-south linear low apparently intersects the long linear described above. It commences with a deep indentation of the big high at 5E on line 32S and continues 3200 ft. northerly to 1E on line 00. It then undergoes an easterly displacement of 300 ft. to resume its northerly course from 4E on line 8N to 4E on line 28N, for a distance of 2000 ft. The displacement is in the same location as that of the long, west-of-north linear low and is in the area of an indistinct low just east of the base line, on lines 4N and 8N.

There are some parallel, but less persistent linear lows evident, especially near the east grid boundary and crossing the southern portion of the base line. The latter runs from 2E on line 36S to 1W on line 20S. It also indents the high on the latter's west margin.

Tangent to the east margin of the high, a low runs from 24E on line 20S to 24E on line 8S. Another extends from 22E and 23E on line 8N to 20E on line 28N. It does not continue onto line 32N, but there is a distinctive low on that line at 22E which might be a displaced continuation, or the start of another linear.

There are other highs and lows, some extending across two lines and thus exhibiting an incipient linearity, usually about N-S. Many are confined to a single line and thus present an essentially random distribution.

Interpretation

The large expanse of high magnetic values, in the southeast quadrant of the JUA claim group grid, is susceptible to several interpretations. Some may be discounted as unlikely, but a few alternatives remain which are unresolvable without additional investigation.

Magnetic detritus may have been carried in the glacial drift, derived from distant, magnetic bedrock, and dropped in this area as the ice melted. It would demonstrate its presence by producing magnetic highs which would be likely to occur, however, in streaks and pockets, not uniformly distributed over a very large area. The location of the high is on glacial and glacio-lacustrine deposits, but it shows no resemblance to the channel-type of distribution to be expected under such circumstances. It is therefore highly unlikely that this large oval of increased magnetic values is related to overburden constitution.

Shallower overburden, bringing bedrock closer to the surface, is another possible cause for this magnetic high. This could result from a depression in the drift cover, or from a dome of bedrock rising above the surrounding level of bedrock surface. If the latter were the case, it would be reasonable to assume such a feature to be due to a local compositional difference from surrounding formations, endowing it with greater resistance to erosion.

The most probable explanation of this magnetic high is a compositional difference in the bedrock of this area. These claims lie over an easterly-protruding bulge of the Guichon batholith, presumably of the Border or Hybrid phase. This early phase of the intrusive is characterised by a more basic composition than later phases, due to its engulfing and digesting the invaded Nicola volcanics. Hence, compositional variations may be expected. They could range from undigested remnants (roof pendants) of Nicola volcanics to merely a

modified (more basic and hence more magnetic) composition over a specific area.

A roof pendant of Nicola volcanics could offer favorable zones for mineralization, where the remnant volcanics are in contact with the igneous intrusive. Such a roof pendant of volcanics could be expected to be somewhat more magnetic than the invading igneous body, as here the volcanics are generally the more basic rocks.

Another compositional difference could result from the intrusion into the Border phase in this vicinity, of a plug of a later phase of the batholith. This appears unlikely to produce a magnetic high, however, as the later phases tend to be more acidic (less basic) than the Border or Hybrid phase, and hence to be less, not more magnetic than it.

On balance, the magnetic high in the southeast quadrant of the grid is likely to be due to a local compositional difference in the Border phase of the Guichen batholith.

The more nearly linear highs in the northwest quadrant could be due to engulfed bands of Nicola volcanics. Also, they could be caused by a "layering" effect in the cooling, plastic magma. This results from the drag of the cooling magma as it moves through the colder, invaded rocks. Under proper conditions of temperature and pressure, material from the solid wall rocks could be partially digested in the magma and dragged along in layers, as the latter moves slowly through the enclosing formations.

An alternative explanation would be to account for these highs by ascribing them to ridges in the bedrock, projecting upward into the glacial overburden and reaching close to the ground surface. This is unlikely, however, as a diamond drill hole at 15W on line 40N, in a slight gully at the base of a slope, spotted on a magnetic low, encountered bedrock under shallow overburden, at only 30 ft. depth. Compositional differences remain the most likely cause for the lows and highs in this area, plus structural features such as faults and shear zones which might cause lows.

The long linear lows described in the section on "Results" can most logically be ascribed to faults, fracture zones and shear zones. These features frequently result in magnetic lows, due to the breaking up of rock and the resulting random re-orientation of the fragments. Even weakly magnetic minerals assume a parallelism with the earth's magnetic field, as they crystallize in the cooling magma. This orientation can be partially destroyed by later fracturing and movement in the rock mass. The resulting random orientation of even weakly magnetic fragments, reduces the over-all magnetic effect in the sheared and fractured zone.

The indentations on the large magnetic high, created by some of the linear lows, re-enforce the supposition that both the high and the lows, find their origins in the bedrock composition and structure. There are no evident surficial features to account for them.

The map "Structure of the Guichon Creek Batholith", Fig. 7 in "Geology and Geochronology of the Guichon Creek Batholith" by K. E. Northcote (Bulletin #56 of the B. C. Department of Mines and Petroleum Resources, Victoria, B. C., 1969) shows two principal directions for shear planes in an area a mile or so west of this claim group. These directions are northerly and west of north. This tends to confirm the deduction, drawn from the nearly straight, linear alignments of these two sets of persistent magnetic lows, that they are in fact to be correlated with fracture zones or shear planes, in the underlying Guichon batholith intrusive.

Personal communications from Messrs. Don McLeod, president, and Don Cochrane, P. Eng., consultant, of Sonic Ray Mines Ltd., concerning data derived from drilling on the nearby Sonic Ray claims, conveyed the information that magnetic lows were frequently found to be associated with fracture zones. The native copper encountered there in drilling, was more often in fracture zones, but on occasion was also found under magnetic highs as well as lows. Copper sulphids were encountered at depth. It seems probable, therefore, that not all fracture zones are marked by

magnetic lows, and/or that copper can also be disseminated in relatively unfractured rock.

In summary, the magnetic survey on a portion of the JUA claims, has indicated that there are probable compositional variations in the underlying quartz diorite bedrock of the Guichon batholith, and that the bedrock is evidently cut by strong fracture zones of generally northerly orientation.

Correlative evidence shows that fracture zones in this area are potential carriers of copper mineralization, as native copper and as sulphides at depth.

A tenable interpretation of the large magnetic high in the southeast quadrant, would ascribe it to the presence of a roof pendant of Nicola Volcanics in the Border phase quartz diorite of the Guichon batholith. The contacts of the igneous intrusive with this type of pendant could offer favorable situations for mineral deposition.

A vertical drill hole was spotted just east of the east edge of the west-of-north low, about 55 ft. north of 4 + 50W on line 28N. It penetrated 180 ft. of overburden and then entered the Border phase quartz diorite of the batholith. Well-fractured rock was encountered around 450 to 500 ft. and native copper occurred from that section to about 530 ft., with some sulphides coming in around 500 ft. The hole went to 875 ft.

A second hole, inclined steeply (about -76°) westerly, was collared on a magnetic low at 15W on line 40N. It penetrated 30 ft. of overburden and entered heavily fractured Guichon batholith Border phase quartz diorite. Native copper occurred between 100 ft. and 200 ft. depth in the core. The hole went to 286 ft.

The magnetic survey described in this report, detected a geological environment favorable for mineral deposition in this area. Drilling showed that copper can occur in that environment. Further investigation by more sophisticated techniques is warranted, to see if extensive deposits of requisite grade can be found. A thorough

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286
1161

survey by induced polarization should be undertaken next, to locate metallic mineralization and reveal more definite targets for drilling.

Respectfully submitted,

Sherwin F. Kelly

Sherwin F. Kelly, P. Eng.,
Geophysicist and Geologist

Merritt Mining Mart
P. O. Box 277
Merritt, B. C.

July 16, 1973

STATEMENT OF EXPENDITURES

The geophysical surveys herein reported, were conducted under my general supervision by Donegal Developments Ltd., of Vancouver, B. C., on a contract basis. The field work was carried out by Seamus Young, proprietor of Donegal Developments Ltd., assisted by Phillip Renout.

The magnetic survey of the FHK claims was made between March 13 and 21, 1973. That on the JUA claims was conducted between March 22 and April 13, 1973.

FHK GROUP

Laying out, chaining and flagging of grid lines and magnetometer survey of the grid; 12 miles of line at \$150 per mile \$1800

Laying

JUA GROUP

Laying out, chaining and flagging of grid lines and magnetometer survey of the grid; 27 miles of line at \$160 per mile \$4300

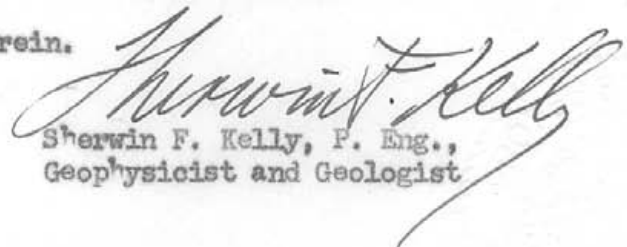
\$6100

Affidavits covering the above expenditures were filed with the Sub-Mining Recorder in Vancouver on June 1, 1973, by Seamus Young, agent for Exel Explorations Ltd., owner of the claims.

Out of the amount of \$1800 expended on the FHK group, only \$1000 was claimed, to apply one year's work on each of the 10 claims in that group.

Out of the expenditure of \$4300 on the JUA group, \$2800 was claimed to apply one year's work to each claim of JUA #1 to #28. The sum of \$1400 was also claimed, to apply one year's work to each of the claims, JUA #29 to #52. A total of \$4200 was therefore claimed, out of the \$4300 expended on that group.

I hereby certify that the above expenditures were duly and properly incurred for the work performed and reported on herein.


Sherwin F. Kelly, P. Eng.,
Geophysicist and Geologist

Merritt Mining Mart
Box 277
Merritt, B. C.
July 16, 1973

CERTIFICATE OF QUALIFICATIONS

I, Sherwin F. Kelly, P. Eng., residing at the Adelphi Hotel in Merritt, B. C., certify that:--

- (1) I am a registered Professional Engineer in the Province of British Columbia.
- (2) I received the degree of B. Sc. in Mining Engineering from the University of Kansas in 1917.
- (3) I pursued graduate work in geology and mineralogy at the Sorbonne, Ecole des Mines and Museum d'Histoire Naturelle in Paris and at the University of Kansas and the University of Toronto. I also taught those two subjects at the two latter universities. I received my training in geophysics from Prof. Conrad Schlumberger of the Ecole des Mines, in Paris.
- (4) I have practised as a geophysicist and geologist in Europe, North Africa, United States, Canada, Mexico, Central America, South America and the Caribbean, since 1920. Since 1935, my work has been principally as a consultant.
- (5) This report on magnetic surveys conducted on two groups of claims belonging to Exel Explorations Ltd., the F&K group of 10 claims and the JUA group of 42 claims, is based on field work carried out under my directions.

Respectfully submitted,

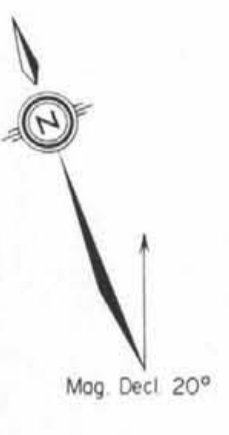


Sherwin F. Kelly, P. Eng.,
Geophysicist and Geologist

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Box 277
Merritt, B. C.

July 16, 1973





Department of
Mines and Petroleum Resources
ANNUAL REPORT
NO. 4512 MAP #1

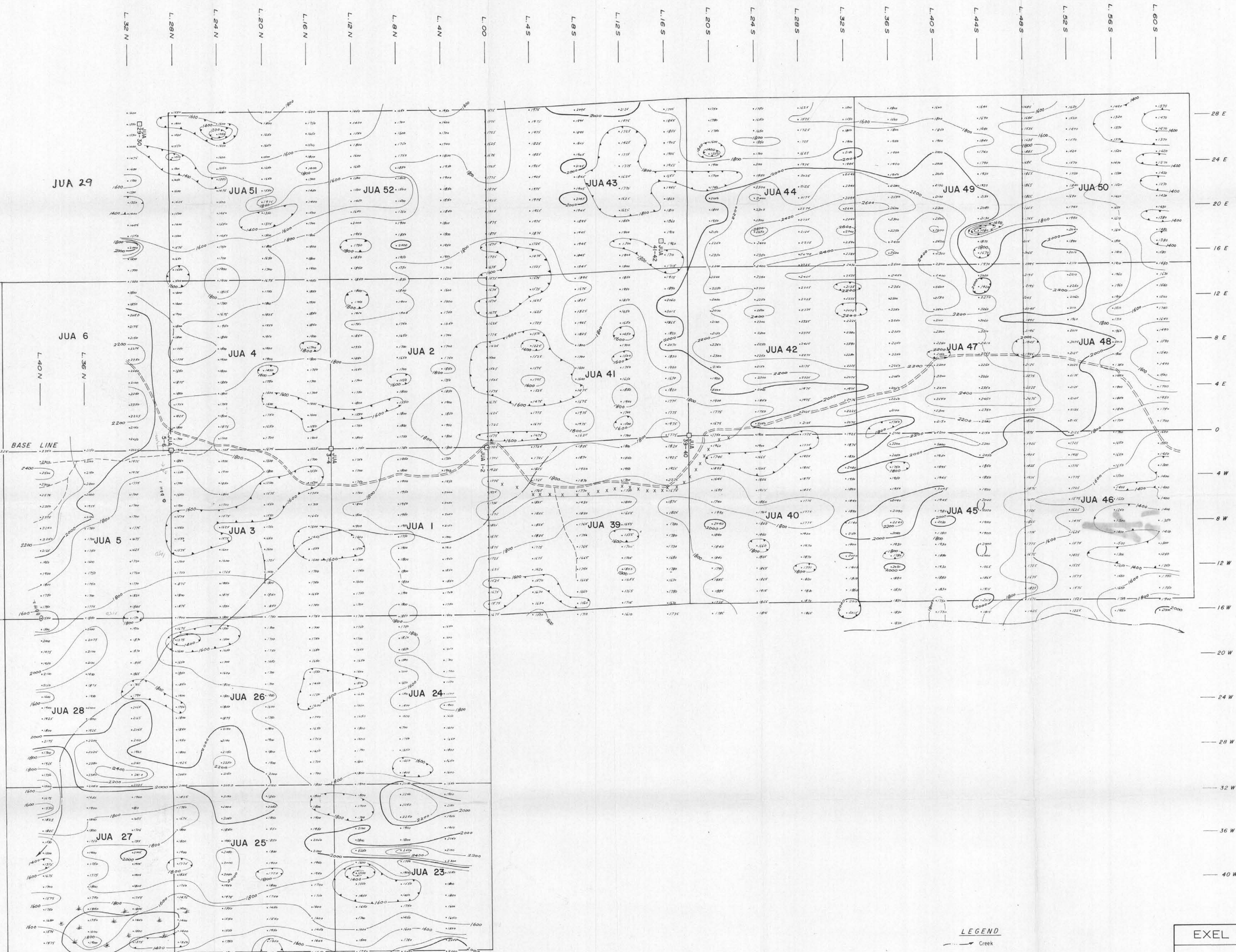
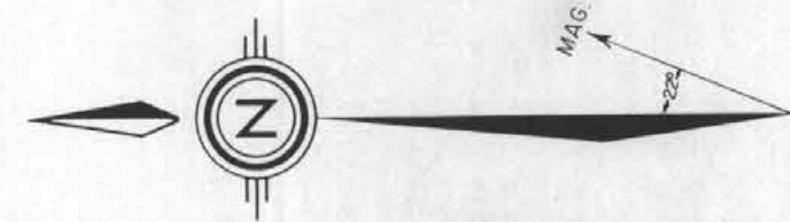
- LEGEND**
- Pipe Line
 - ≡ Swamp
 - ≡≡≡ Road
 - x x x x Wire Fence
 - Post position

NOTE: Contour interval 200 gammas

Fig. 1
MAP TO ACCOMPANY GEOPHYSICAL REPORT
BY SHERWIN F. KELLY, P. ENG.
ON THE F.H.K. AND JUA GROUPS OF
MINERAL CLAIMS NEAR MERRITT,
IN THE NICOLA MINING DIVISION, B. C.,
DATED JULY 16, 1973
Sherwin F. Kelly P. Eng.

4512-M1

EXEL EXPLORATIONS LTD.
F.H.K. CLAIM GROUP
MAGNETOMETER SURVEY
MERRITT AREA, NICOLA M. D., B.C.
SCALE IN FEET
400 200 0 200 400
DONEGAL DEVELOPMENTS LTD.



Department of
Mines and Petroleum Resources
AS-B-S-506-F REPORT
NO. 4512 MAP #2

Fig. 2
MAP TO ACCOMPANY GEOPHYSICAL REPORT
BY SHELDON P. KELLY, P. ENG.
ON THE FAK AND JUA GROUPS OF
MINERAL CLAIMS NEAR MERRITT,
IN THE NICOLA MINING DIVISION, B. C.,
DATE: JULY 16, 1970
Sheldon P. Kelly P. Eng.

LEGEND
Creek
All weather road
Dry weather road
Swamp
x x x x Wire fence
Post position
NOTE: Contour interval 200 gammas

EXEL EXPLORATIONS LTD.
JUA CLAIM GROUP
MAGNETOMETER SURVEY
MERRITT AREA, NICOLA M.D., B.C.
SCALE IN FEET
400 200 0 200 400 800 1200
DONEGAL DEVELOPMENTS LTD.
APRIL - 1975

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