DEWAR CREEK PROJECT - 1971

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By: Fred Chow
April,1972

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DEWAR CREEK PROJECT - 1971

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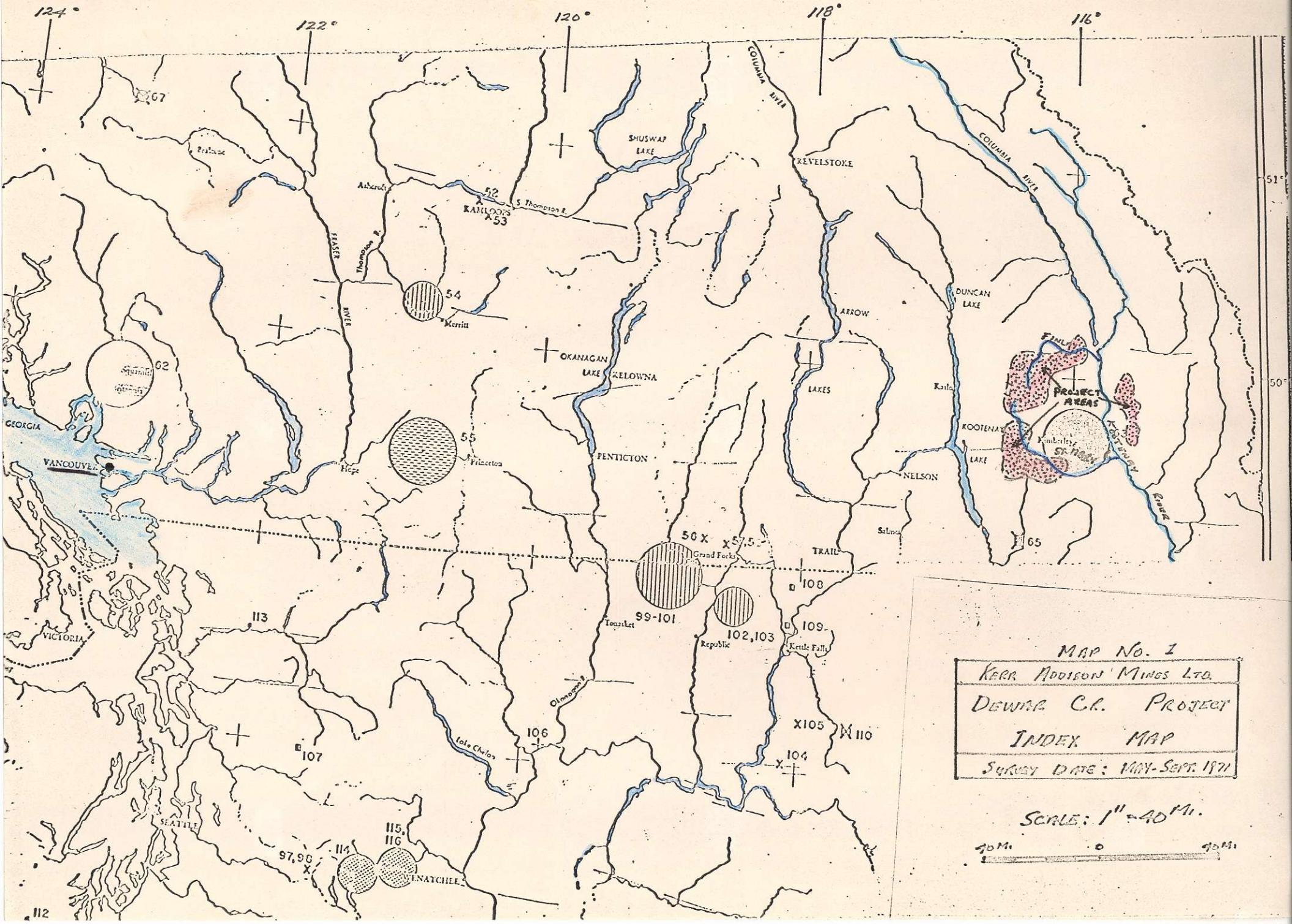
Tapes	Aeromagnetic Survey Tapes		



MAP NO. 1

KERR ADDISON MINES LTD.

DEWAR C.R. PROJECT

INDEX MAP

SURVEY DATE: MAY-SEPT. 1971

SCALE: 1" = 40 Mi.

40 Mi. 0 40 Mi.

I SUMMARY AND CONCLUSIONS

The south central part of the Purcell Mountains, in south-eastern British Columbia, was selected as an exploration project in 1971. This area was chosen because it contained one of the largest areas of Pre-Cambrian Aldridge sedimentary formations which have proved favourable for large lead-zinc-silver sulphide replacement ore bodies. The area exhibits regional and local folding and faulting which is often closely associated with mineral concentration and emplacement. Easy access and amenability to aeromagnetic surveys were the other factors which favoured the choice of the project area.

Approximately 460 square miles were covered by reconnaissance mapping, silt and soil sampling, prospecting, and by an airborne magnetometer survey. This area is bounded by latitudes 49^{o} 30' to 50^{o} 14' and between longitudes 115^{o} 55' to 116^{o} 30'. An additional 50 square mile belt of Aldridge rocks in the western foothills of the Rocky Mountains was flown with the airborne magnetometer but was not followed up by a ground survey.

Sullivan type replacement sulphides were not found, nor outcrops of this expected, as the area has been prospected continuously through the years. Minor occurrenoes of chalcopyrite, galena, and probably sphalerite are commonly associated with diorite sills. Magnetic and geochemical surveys were the main methods used in the search for hidden deposits. The Elsec Magnetometer was found to be too susceptible to magnetic noise and too vulnerable to high magnetic contrasts when adjusted to detect very low amplitude magnetic anomalies. Geochemistry provided an excellent means for mineral tracing and a fair method for evaluation.

Float and geochemical prospecting led to a bedded quartz-lead outcrop and mineralized float area, located 6.5 miles SE of Doctor Creek mouth in the Finlay Creek E½ map area. Six mineral claims (Doc Group) were staked around the showing and within the 100 ppm Pb zone which show values up to 3000 ppm Pb.

Four mineral claims (Mc Group) were staked on a quartz breccia, massive sulphide shear which contains pyrrhotite, sphalerite, chalcopyrite, and galena. The claims are located 3.2 miles NW of Greenland Creek mouth. Preliminary geochemical and magnetic work have not given favourable results.

Eighty-four mineral claims (Nine Lake Group), adjoining the east side of the Mc Group, were staked to cover the anomalous (500-1000 ppm) zinc drainages of the Greenland Creek system. Sullivan type Pb-Zn mineralization is a possibility, although contact type Zn-Cu deposits could cause similar anomalies. Reconnaissance soil sampling and prospecting have not pinpointed any promising targets as yet.

Geochemical prospecting indicated two other areas with two to five times background values in one or more elements. One of these covers an area 2 miles by 5 miles north of Doctor Peak, which includes the Doc Claims. Values in decreasing importance are Pb, Cu and Zn. The second area includes the drainages of Redding and Meacham Creek in the St. Mary Lake region. Values in decreasing importance are Pb, Zn and Cu. The cause of all the geochemical highs are not known, but they could result from an increase in minor mineral occurrences associated with quartz veinlets in Moyie diorite sills.

The aeromagnetic survey conducted in the Skookumchuk - Cranbrook E½ map areas outlined two anomalies. No ground work was conducted within this area in the 1971 field season. Suspected cause of these anomalies is local concentration of magnetite in Moyie diorite sills.

RECOMMENDATIONS

It is recommended that further work be performed on the Doc, Mc, and Nine Lake Group of claims to assess the value of the ground. A combined soil, magnetic, and electromagnetic survey is proposed for the Mc Nos. 1-4 and Nine Lake Nos. 1-4, 7-12, 25-28, 29-38, 41-44, 49-52, 58-72 (total 147) mineral claims.

On the Doc Group a program of prospecting, mapping and grid soil sampling is proposed for the claims and adjoining ground.

The high geochemical zone surrounding the Doc Group claims to Doctor Peak should be explored if encouraging results should be obtained on the Doc Claim area.

The moderately high geochemical area within the Redding and Meacham Creek area could be held in reserve for future consideration of a small scale exploration program.

During the 1972 season, field personnel can check the two aeromagnetic anomalies located on Lewis Creek and near Mt. Nye on the Skookumchuk - Cranbrook map area boundary.

II INTRODUCTION

The mineral potential of the Kimberley area, in south-eastern British Columbia, was a topic of discussion in 1969. Mr. J. C. Lund's December, 1969, memorandum on "Exploration Possibilities in the Kimberley Area" expressed favourable aspects for the area. The Dewar Creek Project was launched in 1971, mainly in the search for Sullivan-type orebodies, plus other economic minerals which might be found in the Aldridge Formation.

The ground prospected lies within a belt 8-12 miles wide by 56 miles long, encompassing the St. Mary River, Finlay Creek, and Skookumchuk Creek drainage area. This is bounded by latitudes 49° 30' to 50° 14' and between longitudes 115° 55' to 116° 30' within the St. Mary Lake, Dewar Creek, Finlay Creek, and Canol Flats W$\frac{1}{2}$ map areas.

Exploration was confined mainly to the Pre-Cambrian sedimentary units of the Aldridge Formation and the Lower Cambrian intrusive sills of the Moyie diorites. These rocks occupy the crest and east-west flanks of a regional anticline, and form a semi-circular shape open to the east.

The exploration team consisted of 11 men: a party chief and assistant, one 2-man prospecting team, two 2-man student crews, a camp cook, a helicopter pilot, plus an aircraft engineer.

A base camp, of four tent frames, was built at Mile 25 on the St. Mary Lake Road, alongside White Creek just north of the mouth of Dewar Creek.

The field work commenced on May 26 and was completed on September 14, 1971.

III GENERAL CHARACTER OF THE DISTRICTS

(1) Drainage

The southern half of the prospecting area is drained by the St. Mary River system, consisting of Dewar Creek and White Creek, which flow southerly; Redding Creek, Meacham Creek, and Hellroaring Creek, which flow northeasterly, all emptying into St. Mary River which continues its course eastward to the Kootenay River. All these tributaries flow in narrow valleys and canyons, and minor streams plunge down their steep-sided slopes. The lower half of the St. Mary River is a meandering, well-braided stream.

The northern half of the exploration area is drained by two river systems: principally the Finlay Creek system with its northerly and easterly flowing tributaries such as, Granite, Morigeau, Frying Pan, Doctor, and a few more unnamed creeks; plus Skookumchuk Creek, which drains the southern border of the area. Generally, the main streams and their tributaries flow in narrow valleys and have cut deeply into the rocks and glacial deposits. Both Finlay and Skookumchuk Creek flow eastward, show much white water on their way to the Kootenay River.

(2) Topography

The St. Mary River drainage area is composed of sharp ridges and peaks separated by deeply incised valleys. The region is rugged and difficult to climb or traverse. Bold mountains change to low, rounded hills on the eastern flank at the edge of the Rocky Mountain Trench. Lower half of the St. Mary River valley shows a flat floor joining steep sides.

The Finlay and Skookumchuk Creek area is just as mountainous as the St. Mary River area, though the ridges and tops are rounded. Travel is much easier than in the latter terrain. The lower part of Finlay Creek valley occupies a flat, broad plain of glacial and/or old lake bed deposits.

In both areas the peaks rise to 8,000-9,000' above sea level. Valley floors rise from 3100' to 4300' in the southern area, and from 3500' to 5500' in the northern part. St. Mary River area has the greatest relief. The mountains and ridges are irregular land masses without distinctive features as landmarks for navigation.

(3) Climate and Vegetation

A mixed weather condition prevails over most of the project area. Approximately west of longitude 116° 07' the weather is rather erratic with sudden rain and/or snow storms occurring during the day, up until the end of June and starting again at the end of August. Temperatures range from +24° to +65° during this period. July and August are the best months for prospecting: minor precipitation, low stream levels, spotty snow accumulation, and warm to hot temperatures (though cooling to freezing point at night often).

The valley floors and mountain slopes are thickly forested with spruce, fir, cedar, and tamarack. Timber line is at 7500' elevation. Much of the lower areas have been logged and/or burned. Undergrowth, second growth, and deadfall are thick and make travel in the bush difficult.

East of longitude 116° 07', the climate changes abruptly to B. C. interior "Dry Belt" conditions. Temperatures exceed +100° and rainfall is practically nil in the summer months. The mountains are densely covered with conifers and the lower slopes and flat lands show partial growths of pine and tamarack.

IV TRANSPORTATION AND COMMUNICATION

Highway No. 95A, immediately east of the project area, joins the two major east-west trans-provincial highway systems. Cranbrook, B. C., located about 40 miles SE of base camp, is served by Canadian Pacific Railway, Pacific Western Airlines, buses and truck lines. Access to the project area is by public and private roads running east-west up the three main river systems. In addition, old logging roads branch into other valleys, and most are partly usable.

"Single Side Band" radio-telephone at base camp was linked by two channels (6790 and 4573 KC) to B. C. Tel. in Vancouver, and one channel (4490 KC) to Okanagan Helicopter base at Cranbrook, B. C. Communication is fair to good.

V EXPLORATION PROCEDURE

A combined program of magnetic anomaly evaluation, prospecting, and geochemistry was employed.

The project was divided into four target areas; the most favourable horizon (Lower) of the Aldridge Formation was selected first for exploration. Additional ground encompassing the remaining Middle and Upper Aldridge Formation was later included in the project.

After the major camp construction was completed, two teams were flown into fly camps while the third party worked from base oamp using motor vehicle transportation.

The airborne Elsec magnetometer survey commenced immediately; firstly on trial runs over known rock formations, secondly on test flights over the Sullivan ore body, then onto flight lines of the proposed survey. Selected targets were investigated immediately by the nearest field crew. Others were examined during the normal coverage of the prospect area.

The exploration program was mainly one of traversing the drainage areas of favourable rocks. Routine procedures included prospecting, float tracing, magnetic anomaly and rock outcrop examination, plus geochemical sampling, spot-testing, and also tracing of geochemical "highs". Silt samples were collected from all drainages at 1500' intervals along the stream to within one mile of their source when possible. Soil samples were collected in areas devoid of drainages. Samples were tested for total heavy metals in the field and then shipped once or twice weekly to Vancouver Geochemical Laboratories Ltd., in North Vancouver, B. C., for total extraction analyses on Cu, Zn, Pb and other elements noted in the field.

Mapping and plotting in the field was done on acetate film overlain on 1" = 1/2 mile (approx.) scale air photographs, and on 1" = 1/2 mile scale or 1" = 50,000 scale topographical maps when photos were not available. The data were transferred to 1" = 1/2 mile scale enlargements of 1" = 50,000 scale topographical maps.

VI AIRBORNE MAGNETOMETER SURVEY AND ANOMALY EVALUATION

An Elsec magnetometer, with head-on-boom rigging, was flown on a G3B2 Bell Helicopter at a mean height of 350' above terrain. The survey was conducted during June 5 - 20 and on August 16, flying approximately 2500 line miles in 65 hours, and averaging 4.3 hours per flying day.

Another magnetic survey was conducted outside the project area. It was flown over a NW - SE belt of Aldridge rocks in the Rocky Mountains, between Lussier River and Wild Horse River, within the Skookumchuk (82G/13E½) and Cranbrook (82G/12E½) map areas. The magnetic survey covered 320 line miles in 10 flying hours. It was only 75% completed due to equipment failure. No follow-up work was done. The survey was conducted between August 17 - 19, mainly as additional area for prospecting and to utilize the uncommitted contract hours of the helicopter.

Flight lines were flown at 500-foot contour intervals. Contours above 7500' elevation are difficult to follow.

The magnetic intensity was recorded at 1250 gammas full chart. Lower scale readings are preferred and tried but the magnetometer did not function properly under lower settings.

Test flights over the Sullivan orebody detected a small change in magnetic response but not enough to evaluate. (See flight charts on Line Nos. 1, 1A, 4 A and B) Aeromagnetic tests over the Stemwinder deposit is slightly better, though its evaluation is difficult for want of the exact location of the pyrrhotite-sulphide mass and the diorite

sill (see flight charts on Lines 3, 3A and 10). Aside from this, the 500-gamma full scale surveys were inconsistent over the same flight lines.

In summary, the Elsec magnetometer was not successful in outlining an anomaly over the Sullivan orebody, and the detection of a 25-100 gamma rise over the zone would be difficult to evaluate under unknown circumstances. The failure to pick up a recognizable anomaly may be due to the following circumstances:

(a) Pyrrhotite mass far below surface (700-800'), magnetic relief 25-35 gammas on 1250-gamma full chart scale (calculated value 50-100 gammas).

(b) Near surface ore reserve small.

(c) Elsec magnetometer did not function properly on 500 gamma full chart setting; and

(d) Magnetic intensity of pyrrhotite lower than estimated. Furthermore, the magnetometer did not maintain a consistent magnetic datum from line to line when flown on contour.

1. St. Mary Lake Area (82F/9)

(a) St. Mary Lake E½ Area

A belt of magnetic anomalies ranging from 200 to 600 gammas trends southwesterly along the St. Mary Fault. Of the six steep-gradient anomalies investigated, only No. 3 (49°35' Lat./116° 03' Long.) showed magnetic mineral in place. Magnetite was found to occur as disseminations in Moyie diorite sills, as thin plates along their contact with the sediments, and also as fracture fillings up to 3/4 inches thick within the Aldridge quartzites. Magnetic anomalies Nos. 1 and 6, located on the ground within the Aldridge Formation by hand magnetometer,

were attributed to concentrations of magnetite within the Moyie diorite sills from float in the area. Anomaly No. 4, near the headwaters of Pudding Burn Creek, is covered by overburden and is believed to be caused by magnetite similar to Anomaly No. 3. Anomalies Nos. 2 and 5 are located south of St. Mary Fault, in quartzite and argillites of the Creston Formation. No evidence of magnetic minerals was found. The cause of the magnetic anomalies may be similar to others along the main fault concentration of magnetite filled fractures.

Odd occurrences of chalcopyrite, sometimes with galena and sphalerite, were found within the magnetic anomalies, though usually associated with rock contacts and quartz veinlets. The spotty mineralized occurrences were verified by geochemical follow-up work.

The 50-100 gamma magnetic highs also have a NE - SW trend which represents the regional geology only and does not accurately define the underlying rock formations.

(b) St. Mary Lake W½ Area

This region features small scattered magnetic anomalies and low (50-100 gammas), broad magnetic highs which follow the topographical contours. The former was found in many instances to be concentrations of magnetite within a partial section of the Moyie diorite sills. The low, broad magnetic highs were attributed to pyrrhotite disseminated within beds of the Aldridge Formation, although the mineral is not commonly seen.

Chalcopyrite in quartz veinlets is a common occurrence in the diorite sills, though not of significant value, and not always associated with magnetic minerals.

No relationship between geochemical and magnetic values was established.

A linear magnetic feature, ranging from 25-150 gammas, trends northward from the junction of Dewar and White Creek. One pit was located at the anomaly centre which exposes blobs of magnetite within quartzy lenses in altered argillite. An adjacent pit showed spotty scheelite mineralization in quartz and no magnetite. Other skarn minerals were absent and intrusive contacts were not noted. The magnetic feature likely represents a shear or fault zone accompanied by magnetite. The showings are staked by a local prospector.

2. Dewar Creek Area (82F/16)

(a) Aldridge Formation

One magnetic anomaly (No. 7) was detected in the Aldridge Formation on the east side of Dewar Creek at 49° 46' latitude. It is attributed to magnetite in a diorite sill. The anomaly is narrow and follows the trace of the sill. Sulphides were not found and geochemical values are low.

(b) Creston Formation

The Creston Formation, on the flanks of the Aldridge south of the White Creek Batholith, showed two 1000-plus gamma anomalies and a number of 100-300 gamma anomalies. Anomaly No. 8 (1000 gamma) and anomaly No. 9 (1200 gamma) both on the north side of Dewar Creek at 49° 47.6' Lat. and 49° 48.5' Lat., respectively, were checked by traverses across the southern end of the anomalies only. No significant magnetic minerals nor anomalous geochemical values were found. Magnetite in

argillaceous and/or dolomitic quartzites is believed to be the cause of No. 8 anomaly. Magnetite in Moyie diorite sill is likely the cause of No. 9 anomaly. Anomaly No. 10 (200 gamma) on the west side of White Creek at 49° 46' Lat. was not explained by ground examination. Magnetite plus pyrrhotite (rusty zones) in Creston argillites is probably the cause of the anomaly. Geochemical values are low. Several small anomalies (No. 11) located near the lower part of Morris Creek (49° 45' Lat.) were found to be caused by magnetite in Moyie sills plus pyrrhotite and magnetite in quartz stringers within chloritic schist. The veins contain minor pyrite and chalcopyrite. A massive sulphide float containing pyrrhotite, sphalerite, and galena found nearby was traced one mile northward to the Great Dane Prospect. The mineralization occurs in quartz veins within argillaceous quartzites along the same sill structure mentioned above. The showings were not considered significant. Geochemical values near Morris Creek mouth gave 1.5 x Cu, Zn and 2 x Pb background readings. Moderate values obtained do not indicate an economic deposit. Additional silt and soil sampling did not enhance the prospect. A similar magnetic pattern occurs on the Bracebridge property located about 3 miles west of the Great Dane Prospect. Pb, Zn, Cu, Mo associated with pyrrhotite are reported to oocur in a N-S shear zone. The property is optioned to Dennison Mines.

A small isolated anomaly (No. 12) (325 gammas) occurs across Greenland Creek at 49° 59' Lat./116° 12' Long. No outcrops were noted. The area within a 2 to 3 mile radius is gaochemically anomalous in zinc with significant copper values. A large claim block (Nine Lake) was

staked to cover the geochemical anomaly. The airborne survey does not show any magnetic feature over the area.

In general, the background magnetic values are the same for both the Creston and Aldridge Formations. The former exhibits more occurrences of magnetic mineral concentration.

(c) White Creek Batholith and Fry Creek Batholith

The table below shows the magnetic value between the various phases of the White Creek Batholith versus the Aldridge Formation.

White Creek Intrusive	Unit No.	Gammas Above Aldridge	Gammas Below Aldridge	Gammas At Aldridge Contact Above Aldridge
Medium-grained quartz monzonite	14	100-200		No Aldridge contact
Leuco-quartz monzonite	12	0		No change
Porphyritic (microline) quartz monzonite	11	0 or 100-200		200-600
Hornblende - biotite granodiorite	10	0 or	slightly	No change
Biotite granodiorite	9	100-200		200-400

The Fry Creek Batholith (Unit 13), composed of leuco-quartz monzonite, shows a 100 to 200 gamma lower magnetic value than the Aldridge Formation.

3. Finlay Creek Area (82K/1)

(a) Finlay Creek W½ Area

The Aldridge rocks in the Finlay Creek map area show a low magnetic relief. Consequently, use of the crude setting (1250 gammas full chart) on the magnetometer may not be sensitive enough to detect subtle magnetic changes. The magnetic contour map shows a trend which always follows the topographical contour in areas of low magnetic relief.

Three anomalies were investigated. No. 11 is composed of two oval-shaped anomalies lying 0.4 miles apart, located east of Finlay Creek at 50° 03' Lat./116° 20' Long. The larger and higher magnetic (600 gamma) anomaly on the south was caused by disseminated magnetite in a diorite sill localized at its northern contact with chlorite schist. Like other altered Moyie sills in the area, the diorite shows chlorite and carbonate alteration. No sulphide mineralization was found. Soil samples taken at 300 foot intervals across the magnetic anomaly and rock formation gave a moderate, small geochemical anomaly across the diorite sill. Assay results are: 112 and 343 ppm Cu on two adjacent samples; 145, 120 and 278 ppm Zn and 25, 39, and 40 ppm Pb on three adjacent samples. These represent 4 to 14 x Cu background, 2.5 to 5 x Zn, and 1 to 1.5 x Pb background values. Additional silt and soil sampling downslope did not provide any significant values to warrant further work.

The 125 gamma anomaly on the north is credited to magnetite in argillite and chlorite schist, and probably in diorite sill as evidenced by float. No sulphide minerals were noted and geochemical results were low.

Anomaly No. 12 includes three small, isolated anomalies, 50 - 75 gammas, located on and just south of Finlay Creek at 116°17.5' Long. These anomalies were checked but not located on the ground. Most of the area below 5,000' elevation is covered by till and thick brush. Close soil sampling did not produce any geochemical anomaly. Diorite sills and float with patches of magnetite were found. Similar mineralization is likely the cause of the isolated magnetic anomalies.

Anomaly No. 13 is a narrow, lenticular, 70-100 gamma, E-W feature located north of Anomaly No. 12 and on the north side of Finlay Creek. The aeromagnetic high was not located on the ground but slightly magnetic, disseminated pyrrhotite was found in an altered diorite sill nearby. Minor chalcopyrite was also noted. The ES 180 magcrometer detected isolated magnetic high readings along the traverse where occasional outcrops of quartzite and argillite were noted. Soil sample (5) assays indicate Cu, Zn, Pb mineralization along a length of 2200 feet but not significant enough (60-188 Cu, 135-205 Zn, 27-85 Pb) to warrant further work.

(b) Finlay Creek E½ Area

Two magnetic anomalies were investigated. Anomaly No. 14 (300 gammas) located 1.6 miles N 10 W of Doctor Peak (50° 04' Lat./ 116° 13' Long.), was caused by magnetite with minor pyrrhotite in a diorite sill. Localized occurrences of the above minerals with spotty chalcopyrite mineralization were found in the sills at their contacts with quartzites and argillites. Significant Pb and Cu values and moderate Zn values were obtained in the soil and silt samples in the area towards the southeast. The geochemical results warrant further study.

Anomaly No. 15 (200 gammas) straddles Finlay Creek and lies 0.8 miles west of Doctor Creek mouth. Fine to coarse grained diorite outcrops along the banks of Finlay Creek for 1500 feet but the rocks are generally non-magnetic. Probable source is magnetite along the diorite-sedimentary rock contact. Geochemical results do not indicate any Cu, Zn or Pb mineralization.

4. Canal Flats Area (82J/4W½)

The Creston Formation showed a greater magnetic relief in the Canal Flats compared to the previous three map areas. Two magnetic anomalies were investigated. Anomaly No. 16 (150 gammas) is irregular in shape, 0.5 x 2 miles long, lying between Deer Creek and Finlay Creek (50° 08' Lat./115° 59.5' Long.) The area is covered by river or lake bottom sediments with many potholes containing evaporates. Surrounding rocks are quartzites and argillites of the Aldridge Formation, with the exception of Creston rocks on the east. A traverse across the centre failed to pick up the magnetic anomaly but was detected on both sides of Deer Creek where the anomaly crosses. The anomaly could be caused by several closely-spaced diorite sills or a remnant of Creston Formation which contains magnetite. Geochemical results do not indicate any Cu, Zn or Pb mineralization in the area. This anomaly can be easily re-checked as a road cuts across the SE end of the anomaly.

Anomaly No. 17 (300 gammas) occurs in the Creston Formation at 50° 12' Lat./115° 49' Longitude, near the boundary of the Aldridge Formation. Magnetite is the cause of the anomaly.

5. & 6. Skookumchuck (82G/13E½) & Cranbrook (82G/12E½) Areas

The magnetic background of the Aldridge Formation in this area is about 200 gammas higher than that of the Finlay Creek and about 300 gammas higher than the St. Mary River and Dewar Creek areas. Magnetic relief is low. A gentle magnetic increase occurs towards the SE corner of the Skookumchuck map area.

The Estella Zn, Pb, Ag deposit, located at 49° 46' Lat./ 115° 36.5' Long., consists of replacement veins and fissure-fillings in a region of complex folds. No magnetic minerals have been reported. The lenticular magnetic feature on each side of the mine is not as yet understood. The Kootenay King Zn, Pb, Ag, Cu deposit, located 3 miles south, is replacement ore localized in folds. No magnetic mineral is present. The magnetic coverage is incomplete.

Two anomalies are worthy of investigation, although mineral claims border both locations. Anomaly No. 18 (200 gammas) is an arcuate feature straddling Lewis Creek at 49° 48.5' Lat./115° 36.7' Long. Anomaly No. 19 (350 gammas), located on the west face of Mount Nye (49° 45.2' Lat./115° 37.2' Long.) has two limbs which are open towards the west. Magnetite in a Moyie diorite sill is the suspected cause of the anomaly. Both locations can be reached through old roads and trails.

VII DESCRIPTION OF AREAS TRAVERSED

(1) Regional Geology

The exploration area was confined to the Aldridge Formation of the Purcell Series. The Aldridge consists of Precambrian marine sedimentary units which are intruded by Moyie diorite sills. These form an arcuate belt 8 - 12 miles wide by 56 miles long, underlying the area from the east to west border of St. Mary Lake map area, north through Dewar Creek map area to Finlay Creek and eastward to the western boundary of the Canal Flats map area. This area extends around the St. Mary River and Finlay Creek drainage systems and is disrupted by the intrusion of the White Creek Batholith in the centre. The area straddles the crest and eastern flank of a major anticline. Therefore, successive formations of the Purcell Series outcrop outward. Exposure of the Creston, Kitchener-Siyeh, and upward into the Dutch Creek Formation ring the area and the normal stratigraphy is disrupted by major faults.

Moyie diorite intrusions are generally sill-like but locally they transect bedding usually at a low angle.

The Aldridge Formation contains the oldest rocks of the Purcell Series and is composed of quartzites and argillites totalling 15,800' thick. It is divided into three separate units: Lower, Middle and Upper Aldridge. The thickness of these rocks are about 4500', 10,000' and 1300' respectively from the Lower to Upper units.

The overlying Creston Formation ranges from 4100 - 6500 feet thick in the St. Mary Lake area to 10,000 feet thick in the Finlay Creek area.

(2) Lithology

The Aldridge units are not easily distinguished because their differences are based essentially on physical "make-up" of quartzite and argillite.

The Lower Division is characteristically very rusty weathering, very fine-grained, thin bedded, light-colored quartzite and argillaceous quartzite, plus minor argillite. Near the top is a zone of massive quartzite similar to the Middle Division. The bottom is often altered to quartz-mica schist or to phyllitic units near the batholith or diorite sills. The diagnostic features of the Lower Division are: very rusty weathering, thin-bedded quartzites with fine, dark laminations, and crossbedding is common.

The Middle Division is essentially a thick sequence of thin-bedded quartzites, light to dark in color, separated by thin partings of black to grey argillite and phyllite. The quartzite beds vary from 2" to 2' in thickness and the argillite varies from 1" to 6 inches. It weathers normally to a grey color and is rusty where the beds are thin and argillaceous.

At the top of this sequence there is a gradational transition to the Upper Division or Argillite member. It consists of rusty weathering, thin-bedded, black and grey laminated argillites, aeranaceous argillites, and argillaceous quartzite.

The mineral constituents in the Aldridge rocks are fine-grained. Biotite and sericite is common. Other accessory minerals are magnetite, chlorite, pyrrhotite, and pyrite, though their occurrence is minor and scattered.

The Creston Formation, lying conformably above the Aldridge Formation, consists of green, grey and purple argillaceous quartzites, argillites and siltstone, which weather to a similar shade of the fresh color. A basal member overlying the Aldridge Formation consists of dark weathering, grey to black argillites which contains mud-cracks.

The Creston rocks are thin-bedded, laminated, and usually fine-grained. Quartz is the main constituent but biotite, sericite, and chlorite is abundant and the latter may form about 50% of the rock. The accessory minerals are magnetite and hematite, the former is present in considerable quantities in Creston rocks near the boundary.of Finlay Creek and Canal Flats map area.

(3) Structure

The exploration area is on the crest and both flanks of a regional anticline which strikes and plunges northerly. Its axis lies along a line near the SE corner of the St. Mary Lake map area, cut by the White Creek Batholith, to just east of the NW corner of the Finlay Creek map area.

Two major faults occur in the region. The St. Mary Fault strikes NE - SW across the map area south of the St. Mary River. The Hall Lake Fault strikes northerly from the Creston map area along the western boundary of the St. Mary area, and then turns northeasterly along White Creek to end at the White Creek Batholith. The St. Mary Fault is the southern limit of the Aldridge Formation and the other fault borders the formation on the SW corner then cuts across it from Hall Lake to the St. Mary River. From this point to the batholith, the Hall Lake Fault forms the contact between the lower Aldridge units on the west and

the upper Creston member on the east. Both faults show a north-east curving structure. Other large faults in the St. Mary area are: (a) Kimberly Fault, which strikes easterly across the northern part of St. Mary area and cuts the northern section of the Sullivan orebody; (b) Bootleg Fault strikes northeasterly on the northern part of Bootleg Mountain; (c) Alki Fault strikes northwesterly from St. Mary Lake; (d) and "Fiddler Creek" Fault which strikes northwesterly from the St. Mary Fault near Mallandaine Pass, parallels and then joins the Hall Lake Fault north of the St. Mary River.

Three large faults occur in the Dewar Creek area and extend northerly into the Finlay Creek map area. Finlay Creek and "Alton Creek" faults terminate at the north edge of the batholith and were not mapped in the Finlay area. The "Silver Key" fault extends from Greenland Creek to Doctor Creek. The northeasterly fault north of Doctor Peak may be the extension of this fault, which have been offset by east-west cross-faults similar to the Greenland Creek area.

(4) Mineralization

Mineral occurrences in the Aldridge Formation is abundant, especially within the St. Mary Lake area. The most important are the lead-zinc-silver deposits of the Sullivan, North Star, and Stemwinder type which are bedded, replacement sulphide bodies. Deposits of a second type are veins or fillings and replacement along faults and sheared zones. They contain Pb, Zn, Ag and Au associated with pyrite, pyrrhotite, and arsenopyrite. Deposits of a third type are veins and lenses in Moyie diorite sills which contain copper and are associated with quartz, calcite,

pyrite, pyrrhotite, galena, and sphalerite. The second and third types have received considerable attention. Small shipments have been made in the past but none has been extensive deposits. Deposits of a forth type are contact metamorphic which contain scheelite and cassiterite and are associated with chalcopyrite, pyrrhotite, and/or molybdenite. Less attention has been focused on them.

In the program conducted during the 1971 field season, no evidence of bedded sulphide deposits were noted. The second and third type of mineral occurrences were found in all four map areas. Probably only a few of these locations have not been previously prospected. One of the showings located at 49° 58' Lat./116° 14' Long., north of Skookumchuck Creek was staked. Trenching exposed mineralization in a shear zone rather than in bedded quartzite as first noted. The shear strikes N60W and dips 50° SW and cuts the quartzite which strikes N20E and dips 25° NW. Mineralization is massive sulphides which consist of pyrrhotite, chalcopyrite, sphalerite, and galena.

Another area covered by quartz rubble, located at 50° 6.4' Lat./ 116° 14' Long. in the Finlay Creek E½, was staked on evidence of galena float and a Pb geochemical anomaly. The quartz-galena appears to be vein material and the outcrops show quartz lenses conformable to the argillite and quartzite.

Most of the mineralization associated with Moyie diorite sills was found as minor occurrences of no economic significance.

The contact-metamorphic minerals occur in skarn zones and most of these are located immediately north of the White Creek Batholith. Red garnet is the most prominent gangue mineral and scheelite is the most abundant economic mineral. Mineralization does not appear to be extensive.

(5) Geochemistry

Silt and soil sampling is a favourable method for prospecting within the project area. Total Heavy Metal test solutions, supplied by Vancouver Geochemical Laboratories, were used throughout the field season. It was found that by doubling the strength of dithizone in benzene and using standard T.H.M. buffer, the field tests were less sensitive to color change, and more apt to indicate a truly anomalous sample.

Geochemical follow-up work was done in six areas:

(a) Pitt Creek headwaters, immediately north of magnetic anomaly No. 3, in the St. Mary E½, was checked for three anomalous (212-245 ppm) Cu samples. Follow-up soil sampling showed spotty, moderate copper values which indicated minor mineralization in Moyie diorite sills. Diorite and light grey quartzite outcrop on the ridge and hill on the west.

(b) Angus Creek west tributary, located 5,000 feet south of its junction with Hellrearing Creek, in the St. Mary E½, was the site of a high (200 ppm) Pb sample. High lead values were traced 3,000' up the creek and its southern branch where these locations were within 400' and 1700' SE of the Warhorse prospect claims. The last two creek samples assayed about 800 ppm Pb and 300 ppm Zn. Two sample lines on the east

and one line along the west side of the ridge, across the projected Warhorse shear, each gave one high (200-300 ppm) Pb sample on 400-foot sample separation. This indicated a narrow mineralized zone. A drift from Hellroaring Creek portal extending over 4,000 feet to the SE claim boundary, was completed in 1956 without finding enough mineable ore. In view of these facts, no further work was done.

(c) Morris Creek, located in the Dewar Creek map SW corner, was soil sampled when investigating magnetic anomaly No. 11. (See Page 14).

(d) Nine Lake sulphide showing, located at 49° 58' Lat/116°14' Long., (see page 24) was soil sampled at close intervals around the outcrop but picked up only one Pb high. A Sharpe magcrometer test survey could not detect the shear on strike. Four mineral claims (Mc Group) were staked for protection while work was carried out.

(e) Greenland (Burnt) Creek area was soil sampled concurrently with the staking of 84 mineral claims. These were staked on the basis of silt zinc anomalies with moderate to high copper values, covering an area 2 miles by 3 miles within the Greenland Creek drainage system. The geochemical soil survey was conducted along claim location lines, plus a few traverse lines, so the survey is far from completion. Rock samples were also collected for geochemical analysis. Aside from the mineralized shear on the Mc Claims, no mineralization was found to account for the high Zn and Cu silt samples.

Results from the soil and rock geochemical survey are not encouraging, although much is left undone to ascertain the potential of the ground.

(f) Doctor Creek NW tributary, at 50° 6.4' Lat./116°14' Long. (see page 24), was prospected closely during the initial reconnaissance survey when galena-quartz was found in the creek. The soils indicated a high lead content. A grid soil survey was launched on the mountain side on the south side of the creek, but was partly finished when the season ended. Six mineral claims (Doc Group) were staked over the mineral float area which also contain the highest Pb geochemical anomaly. Values range from 100 - 3400 ppm Pb against a background reading of about 50 ppm within the drainage area, and 25 ppm Pb for the region. Copper and zinc are not significant elements. A small, 100 ppm Cu anomaly was outlined within the centre of the Pb zone. A 100 ppm Zn contour coincides with the above anomalies but its values are not anomalous.

Geochemical prospecting has outlined two other broad areas of interest. The Doc Group represents a small portion on the NE end of a geochemically high area which is about 2 miles wide by 8 miles long. It extends 5.5 miles southwestward to at least Doctor Peak, then occurs again on the SE side of Doctor Creek for about one mile southward to the Silver Key Ag-Pb property. Immediately south is the anomalous zinc area of Greenland Creek. The Doctor Creek zone is mainly anomalous in Pb with varying combinations of Cu and/or Zn highs. The anomalous values range between 100-250 ppm Pb, 100-250 ppm Cu, and 200-300 ppm Zn. Widely scattered, small occurrences of quartz veins containing chalcopyrite with or without galena were noted, and sphalerite is believed to be present. The underlying rocks range from Upper Aldridge on the Doc Claims to probably Middle Aldridge along Doctor Creek to the south.

The Silver Key Ag - Pb property consists of bedded quartz veins, in phyllitic quartzites of the Lower Aldridge Formation, which contain high and low grade silver (tetrahedrite) in galena with minor sphalerite and malachite, and associated with pyrite. These veins strike northwesterly with some northeasterly, and one has been found to be offset 500 feet by a major N-S fault (see "Silver Key" fault, Page 23, structure).

The main stream (Granite Creek) flows down the fault and carries a high concentration (1600-2000 ppm at source) of lead into Doctor Creek which is detectable (100 ppm Pb) 4.5 miles downstream. For comparison, the tributary draining the Doc M.C. area contains 160 ppm Pb at a location 3 miles downstream, which is of similar value to that obtained in Doctor Creek 3 miles from the Silver Key deposits. This does not serve to better the economic aspects of the Doc claims.

Nonetheless, the geochemically high Doctor Creek zones should be studied further when work is done on the Doc claims.

The Redding Creek - Meacham Creek drainage of the St. Mary River system is the other broad, geochemically high area. The southwesterly side of Redding Creek from Hall Lake Creek to Meacham Creek shows zones containing moderate values in Pb (50-100 ppm) and Zn (100-300 ppm) in stream silt and soil samples. The drainage area from Ailsa Lake to Meacham Creek also show similar geochemical values. Copper values are generally low. Follow-up work has indicated scattered occurrences of quartz-chalcopyrite-galena mineralization but did not outline any significant geochemical anomalies. The NE drainage area located 1.5 miles east of Hall Lake and the drainage area NE from Ailsa Lake to Meacham

Creek contains the best geochemical values. More work is required to trace the source of the lead and zinc or to define an anomalous area. The underlying rocks are the Middle Aldridge sedimentary units intruded by Moyie diorite sills and two quartz monzonite plugs.

The terrain is mountainous, with spurs of sharp, ragged ridges. Trees and underbrush are thick, making travel difficult in the area. For these reasons, prospecting may have been limited.

This area should be held in reserve for future consideration of a small scale exploration program.

VIII Mc AND NINE LAKE MINERAL CLAIMS

(1) Location and Staking

The Mc and Nine Lake mineral claims are located within the Greenland Creek drainage area (82F-16E½) in a topographical high (2500' - 8300' elev.) region in the Fort Steele M. D. The Mc Nos. 1-4 mineral claims were staked on August 5, 1971, and the Nine Lake mineral claims, Nos. 1-84 inclusive, were staked during August 25-29 and on September 8, 1971.

(2) Geochemical Surveys

Soil sampling within the immediate area of the Mc sulphide showing was negative. The Nine Lake claims were staked to cover an anomalous zinc (500-1000 ppm) silt area. A soil and rock geochemical survey was conducted during the location of the claims; therefore the sampling pattern follows these lines with a few lines added. No soil geochemical anomaly was outlined on the survey and the results show only moderate (200-300+ ppm) Zn values over short distances.

Twenty-three diorite and 55 quartzite rock specimens were collected for geochemical analysis. In general, the diorite contains higher values in Cu, Zn and Pb than the quartzites. Also, these values go up with the increase in rusty weathering. Average Cu, Zn and Pb content of diorite and quartzite are as follows:

Diorite Sills	p.p.m. Cu	Zn	Pb	Amount Specimens	Remarks
1. Fresh Rock	36	59	16	14	-
2. Rusty Surf. & Fract.	61	103	14	6	One H.G. spec. excluded, 1030 Cu, 119 Zn, 17 Pb
3. Mineralized Surf. & Fract. (few specks chalco)	302	105	23	2	

Quartzites	p.p.m. Cu	Zn	Pb	Amount Speciments	Remarks
1. Grey Weathering	11	56	10	11	One H.G.spec.excluded 185/112/30
2. Rusty Surfaces	23	55	12	18	One unclassified excluded 94/11/48
3. Rusty Fract. & Surfaces	24	45	11	15	
4. Rusty Weathering	39	86	13	6	
5. Rusty Weathering plus Fe oxide plating	133	232	44	3	

There is a close correlation in geochemistry between the rocks and silt samples which suggests the anomalous values obtained in the latter may be caused entirely by the same elements in the rocks. The higher geochemical values could indicate more occurrences of mineralized quartz veinlets along the diorite sill contacts, plus possible mineralized shear zones of the Mc claim type.

(3) Geology and Structure

Lower Aldridge quartzites and Moyie diorite sills underlie the Nine Lake mineral claims. The thickness of this division is over 4500 feet, of which about 1,000 feet is composed of diorite sills. Pegmatite dykes cut the quartzite and diorite on a northerly trend along the west boundary of the claims. The quartz monzonite phase of the White Creek Batholith wraps around the south and east sides. One contact lies approximately along Nine Creek, within the southern boundary of the claims.

The strike of the Aldridge Formation is generally northeasterly with dips ranging from 20° - 30° NW. The pegmatite dykes are near vertical and strike northerly. The "Silver Key" fault near the eastern boundary

extends to "Nine" Creek and is displaced by E-W cross faults along Greenland Creek and "Nine" Creek. The area straddles the crest of the regional anticline and through subsequent erosion has exposed the lower unit of the Aldridge Formation. Intrusion of the batholith has caused partial uplifting and metamorphism of sediments near the contact.

(4) Assessments of Results

The limited amount of soil sampling may not be conclusive but the rock geochemistry does suggest the probable source of the high geochemical silt assays to be caused by the minute elements in the country rocks. Spotty mineralization migrating downslope would accumulate to give abnormally high silt values. However, a replacement sulphide body could still be hidden below the surface. A contact sulphide deposit or a shear zone similar to but much larger than the one on the Mc claims is a possibility within the high "metal zone".

The Aldridge Lower unit rocks combined with folding, faulting, and intrusive contact within the claim area provide a favourable environment for the aforementioned types of mineral deposits.

Exploration should be continued on both the Mc and Nine Lake Group but limiting to areas which show the highest geochemical results. These areas are Mc No. 1-4 and Nine Lake Nos. 1-4, 7-12, 25-28, 29-38, 41-44, 49-52, 58-72 mineral claims. A combined soil, magnetic, and electromagnetic survey is recommended as follow-up work for the 1972 season.

IX DOC MINERAL CLAIMS

(1) Location and Staking

The Doc Mineral Claims are located on the most northwesterly tributary of Doctor Creek (82K-1E½) in the Golden M. D. The claims straddle the ridgetop at 8300' above sea level and across the creek at 6900' elevation. These were staked on September 13, 1971, the last day of the field season.

(2) Geochemical Survey

A detailed survey of the anomalous lead area was not completed due to bad, wintery weather during the last two weeks of the field season. An area NW of the mineralized rubble was prospected and soil sampled. Within this area, a zone of anomalous Pb values trends downslope from the showing. Values range from 3,000 ppm Pb along the centre to 100 ppm Pb on either side, across a distance of over 4,000 feet. There is little doubt the quartz-galena rubble is the source of the high geochemical values, and would mask the source below the surface.

The source of other Pb geochemical high samples along the ridge has not been traced. It is too widespread for normal downslope migration from the source at the ridge top. Similar occurrences of bedded quartz-galena veins is the likely cause.

(3) Geology and Structure

Black argillites and argillaceous quartzite underlie the area near the ridge top. Bedded quartz veins occur in the argillite and to a lesser amount in the quartzite. Galena mineralization appears to be spotty though leaching is evident. The strike of the rocks in the region is N80E and the dip is 30° NW, though locally the strike varies from N 30°E to N 70°E.

At the top of the ridge the rocks strike N 70° E and dip 15-30° NW. The slope of the ridge averages 27° to the NNE and 25° to the NW. This would mean that a considerable amount of the mineralized zone on strike and down dip has been eroded, unless the dip of the veins are steeper.

Grey quartzite is the only rock unit seen around the ridge, except the argillite on the showing. Argillite occurs in the Creston Formation towards the west and north of the area, about 1-2 miles away. The mineralization occurs near the top of the Upper Aldridge Formation. There is a possibility the rocks belong to the lower member of the younger Creston Formation.

The ridge lies within the eastern limit of an anticline. Its axis strikes northerly and is located about one mile on the west of the claims. The "Silver Key" fault projected northerly could be disrupted by a fault along Doctor Creek, reappearing again as the fault immediately north of Doctor Peak, and continue northerly to the Doc claim area.

Limonite occurs in about 5-10% of the quartz rubble. Random sampling of these specimens assayed: Tr. Au, 0.35 oz. Ag, 0.92% Pb, 0.04% Zn and 0.02% Sb in all quartz material, and assayed Tr. Au, 0.28 oz. Ag, 0.68% Pb, 0.01% Zn and 0.01% Sb in quartz-argillite rock. These assays are similar to the low grade quartz veins of the Silver Key property. The latter's high grade veins have assayed 100-200 oz. Ag/ton. Geochemical results indicate similar values in Cu, Zn, Pb, Ag and Au, but differ in As and Sb content.

The Silver Key veins are bedded, strike is northerly, and the dip varies between 45° to 70° westerly. The largest zone is 50 feet in

width but heavy mineralization is confined to a few inches and up to 6 feet in width. A small tonnage has been shipped during the past.

The mineralization on the Doc claims is likely similar to that above. Chances of finding an economic deposit is possible but rather remotely so.

(4) Assessment of Results

Although the Pb anomaly appears impressive, its significance is unimportant because of the large exposure of galena float at the source. The host rocks do not appear to be heavily mineralized.

The merit of these claims and adjoining ground should not be dismissed because the above assessment is based on the results of limited work done on a small area.

It is recommended that a more thorough investigation be made of the claims and adjoining ground. A program of mapping, prospecting, plus grid soil sampling of the entire NW slope of the ridge can be carried out by two men in two weeks.