GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL REPORT

PIG-KATE GROUP

Watson Lake Mining District
Yukon Territory

N.T.S. 105 J - 2, 7.

Latitude: 62° 14' N
Longitude: 130° 40' W

by

W. ROBERTS
CYPRIUS ANVIL MINING CORPORATION

January 30, 1978

Field Work Done During the Period August 1, 1977 - September 10, 1977

090276
This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of $31,770.29.

M. DeRose
Assistant Commissioner

S.R. Baxter
Supervising Mining Surveyor

Commissioner of Yukon Territory

May 31, 1978

Representative figures should be $31,770.29 (See note 4 corrections)

Resident Mining Eng.
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GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL REPORT

PIG-KATE GROUP

INTRODUCTION

Regional geochemical silt sampling programs conducted in regions of favourable geology in the Selwyn Basin outlined areas of possible lead and zinc mineralization. Streams draining the previously staked KATE Group and the area immediately to the east were found to be highly anomalous in lead.

The PIG-50 claims were staked in July, 1976 to cover the eastern source of the anomalies. Field work in 1976 consisted of line cutting and grid soil sampling over much of the PIG claims.

In 1977, the adjoining KATE Group was optioned from Welcome North Mines and a grid was established over economically interesting geology. Further soil sampling, rock chip sampling, geologic mapping, magnetometer and electromagnetic surveys were conducted on both claim groups during the 1977 field season.

LOCATION AND ACCESS

The PIG-KATE Group is located approximately 11 miles northwest of Traffic Mountain on claim sheets 105 J - 2 and 7. Longitude and latitude of the centre of the claims is roughly 130° 40' W and 62° 14' N respectively.

Access is by helicopter from a base camp at Pike Lake, approximately 6 miles to the south, or from Ross River 60 miles to the southwest. The base camp was supported with float equipped fixed wing from Ross River.
# LIST OF CLAIMS

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GEOLOGY

The Selwyn Basin, a negative basinal feature, defined during Cambrian time, is located between the Mackenzie Arch to the east and the Pelly-Cassiar Platform on the west. Basinal sedimentation consisted of deep water cherts with facies changes to black shales, siltstones and finally carbonates approaching the shallow platforms. This pattern of sedimentation occurred from the Cambrian to mid-Devonian, before the area was uplifted. Alternating periods of uplift and quiescence, evidenced by interbedded black shales and conglomerates to siltstones, is typical of the depositional environment during the Upper Devonian to Triassic. Various lithologic units within the Selwyn Basin, with the exception of the deeper water chert, are highly variable and difficult to trace laterally because of extreme facies changes due to changing depositional environments. Units on either side of the basin are distinct and are difficult to correlate.

Major stratiform lead-zinc mineralization discovered to date occurs in black shales along the eastern and western edge of the basinal structure. Mineralization along the eastern edge occurs in restricted euxinic depressions in black shale. So far, no such depressions have been identified along the western extremity of the basin.

The PIG-KATE Group cover interbedded black to grey chert and shale and minor carbonates of Ordovician to Devonian age that occur along the eastern margin of the Pelly-Cassiar Platform.

Calc-silicates, assigned Unit 1, occur extensively throughout the south central portion of the KATE Group. The characteristic rock type is a white to pale green weathering, pale green to dark green, purple and white banded quartz-diopside-actinolite-biotite skarn, with minor bands of marble, limestone and amphibolite. Carbonate content is variable and often the unit is largely composed of dark grey to black phyllite and fine-grained schist. Individual laminae vary from 2mm to over 10cm in thickness but average roughly 1cm. Contacts between laminae are sharp and generally parallel to the penetrative foliation. The interbeds of quartz biotite phyllite vary from 50 feet to over
200 feet in thickness, weathering rusty brown due to oxidation of disseminated pyrite.

Irregular beds, pods and lenses of limestone are common throughout the section of calc-silicates but are more predominant along the southern boundary of the KATE Group. Shaly limestone, Unit 1b, is considered to be correlative to the "wavy banded" limestone to the north and east.

The apparent thickness of the calc-silicates is misleading due to the complexity of tight isoclinal folding but it is estimated to be over 1000 feet thick in this area. Foliation of the calc-silicates trends approximately 110 degrees and dips at 60 degrees to the south. This foliation is sub-parallel to the limbs of northeast verging overturned isoclinal folds.

Mineralization in this Unit consists of discontinuous bands, irregular patches, small blebs, fracture fillings, and disseminations of varying amounts of pyrite, pyrrhotite, chalcopyrite, galena and sphalerite. Mineralized areas are generally easily found as they contain well developed limonitic coatings on weathered surfaces. Malachite and azurite are common in weathered copper rich zones.

This polymetallic mineralization in the calc-silicates yields excellent coincident multi-element soil geochemical anomalies. Several showings and geochemical anomalies were prospected but detailed assessment of the showings was not undertaken due to their low economic potential.

A thin band of black to silvery-grey weathering, black siliceous shale directly overlies the calc-silicates just south of the KATE baseline. Monograptus found in bedding planes indicates an Ordovician to Devonian age. Bedding, outlined by fine light grey bands on weathered surfaces, generally trends at 120 degrees and dips steeply to the south. This Unit is thought to be correlative to the Howard's Pass Formation, host for the stratiform lead-zinc deposit at Howard's Pass. No mineralization was noted in Unit 2.
Unit 3, consisting of light grey to black weathering, black thick bedded chert, overlies the shale horizon but also contains several black shale and grey chert beds. The chert is predominantly black and contains minor black shale partings that often contain graptolites. All fractures and shear zones contain varying amounts of graphite. This Unit may represent the transition zone between deposition of shallow water black shales and deep water vari-coloured cherts. Unit 2 and 3 are the potentially interesting hosts for possible stratiform lead-zinc mineralization.

Unit 4, the Road River Formation, is composed of a thick sequence of thick to thin bedded, dark to vari-coloured weathering, black, light grey, white, green, and red chert. The central portion of Unit 8, containing vari-coloured cherts with little to no interbedded shale, is presumed to be the centre of the Selwyn Basin; a deep water environment of deposition with little addition of pelitic material.

Individual chert beds up to 1 foot thick are common but tend to become narrower as the amount of interbedded shale increases. Bedding is generally undulating with evidence of rip off clasts indicating turbidity. Worm burrows are common in the deeper water cherts.

Structurally, the Road River cherts show evidence of a strong northeast compressive force as most exposures contain northeast verging tight isoclinal folds. The axes of most folds trends from 290 to 330 degrees. Amplitudes vary from 50 feet to over 500 feet.

The Road River Formation has resulted from sedimentation and chemical precipitation of chert in a northwest orientated elliptical depression in the centre of the Selwyn Basin. The true thickness of Unit 4 on the PIG-KATE Group is unknown but is estimated to be over 1000 feet.

Light grey weathering, interbedded grey to greenish-grey shale with lenses, pods and thin beds of grey limestone was mapped as Unit 5. This calcareous unit occurs as thick beds within the lower portion of the chert sequence. Although fossils were not obtained, it is thought that Unit 5 is Ordovician to Devonian
in age and possibly correlative to the light grey calcareous phyllite in the Faro-Ross River area. Mineralization was not discovered in this Unit.

Several outcrops of dark brown weathering, dark green diorite were noted near the junction of the PIG and KATE claim groups. The diorite dykes and sills are probably related to prominent Tertiary intrusions and volcanism a few miles to the south of the claims. Mineralization was not found within or adjacent to the diorite.

Structurally, the PIG-KATE area has suffered from a period of strong southwest-northeast compression, characterized by northwest trending imbricate mesoscopic thrusts, northeast verging isoclinal folds and a strong penetrative foliation. Isoclinal folds plunge to the east-southeast and are responsible for the absence of Unit 1 on the PIG Group. Faulting is of minor importance as it does not alter trends of major rock units.

**LINE CUTTING**

A hand cut grid, totalling 15 miles, was established over Units 2 and 3. All lines were chained and 100 foot stations were accurately positioned with pickets. Slope corrections were made on all hillsides.

**GEOCHEMICAL SURVEYS**

A total of 830 soil and 114 rock samples were taken during the 1977 field season. Soil samples were taken every 200 feet along 800 foot spaced grid lines. In economically interesting areas, samples were taken every 100 feet along 400 foot spaced lines. Roughly, one quarter pound of "B" or "C" horizon soil was packed in kraft sample bags and sent to Acme Analytical Laboratories in Ross River for analysis. Each sample was dried, sieved to -80 mesh, weighed to 0.5 grams, digested in nitric per chloric acid and analysed for total trace element content of copper, lead, and zinc by atomic absorption. All tabulated results are in parts per million (ppm).

Rock chips were also packaged in kraft sample bags and sent to the Acme
Lab in Ross River. After the rocks were pulverized, the procedure was similar to previously mentioned soil analysis.

Re-sampling of a small portion of the 1976 PIG grid yielded almost identical results, thus the cumulative Frequency Plots resulting from the 1976 survey may be used for the 1977 survey. Data points for lead values outlined a smooth curve indicating a bi-modal density distribution with an inflection point at 50 ppm lead. The background population was calculated from the curve using the method described by Sinclair (1973). Threshold, calculated at the 98 cumulative percentile, was 100 ppm lead. Data points for zinc also indicated 2 or more distinct populations. All values over 400 ppm zinc and 150 ppm copper are considered anomalous.

All anomalous copper values occur within Unit 1, the calc-silicates. Anomalies reflect minor chalcopyrite mineralization in fractures, veins and small pods in isolated zones of sulphide deposition. Coincident copper, lead, and zinc anomalies on Lines 204 to 220 West are due to pyrrhotite-chalcopyrite and minor galena-sphalerite mineralization as fracture fillings, disseminations and small irregular skarns within a calcareous zone of the calc-silicates. This showing, termed the "Nipple Showing" by previous workers, received little attention during the 1977 program. The two coincident 3 metal anomalies on Line 32 West were not prospected since they are likely reflecting similar mineralization.

Zinc response was disappointingly low. The most prominent anomaly located between Lines 144 W and 196 W, appears to reflect a high zinc background in underlying massive bedded, black graphitic chert. This low magnitude elongate feature is not associated with any significant lead response and thus is not considered to be of any economic significance.

Excellent lead response was obtained in soils near the boundary of the two claim groups. Several of the prominant anomalies were designated block letters to simplify discussion on location and orientation. The linear alignment of anomalies A, B, C, and D, parallels the attitude of the underlying inter-bedded black chert, black shale and minor light grey chert and shale. It was
hoped that these four anomalies represented the surface trace of stratiform lead mineralization and the area was prospected in detail. Quartz vein float containing minor arsenopyrite and galena was the only mineralization discovered in the area.

Anomaly E, a one sample high, is underlain by a thick bedded green to grey chert with minor black shale partings. Prospecting failed to locate any sulphide mineralization.

Although the peaks of anomalies F and G do seem to align, the irregular and discontinuous nature of the two anomalies would suggest the lack of any associated major stratabound lead mineralization. Both areas were prospected; no mineralization was found.

Since surface prospecting failed to locate the source of the anomalous lead geochemistry, pits and trenches were hand dug within and upslope from anomalies A to F. Chip samples were taken from bedrock, when reached, as well as from all float in the pits. Pit locations and sampling results may be noted on the "Geochemical Values Map - Rock Chips" in the pocket accompanying this report.

Metal content of the rock units sampled is generally very low. Surprisingly, high lead values, obtained in sample numbers 390, 424, 448, and 487, occur in light grey chert and shale. Sample number 402, silicified grey shale and chert with minor arsenopyrite, contained 2750 ppm lead. Veins and fracture fillings of quartz with minor arsenopyrite and traces of galena are likely the source of lead anomalies A to D. To date, both prospecting and rock geochemistry have failed to locate a black shale hosted mineralized source for the lead anomalies.
GEOPHYSICAL SURVEYS

HEM SURVEY

Instrumentation

Electromagnetics

The Apex MaxMin II electromagnetic system manufactured by Parametrics Limited, Markham, Ontario, was used on the entire claim block and the Crone CEM system manufactured by Crone Geophysics Limited of Mississauga, Ontario, was used on parts of the property.

Specification for the two instruments are shown below:

APEX MAXMIN II EM SYSTEM SPECIFICATIONS

OPERATING FREQUENCIES: 222, 444, 888, 1777 and 3555 Hz.

COIL SEPARATIONS: 100, 200, 300, 400, 600 and 800 feet.

MODES OF OPERATION: (a) Tx coil plane and Rx coil plane horizontal (Horizontal loop mode).
          (b) Tx coil plane horizontal and Rx coil plane vertical (Minimum coupled mode).

PARAMETERS MEASURED: In-phase and Quadrature component of the secondary field.

READOUTS: Automatic, direct readout on 3½" size meters.

SCALE RANGES: In-phase: ±20% normal, ±100% by switch.
          Quadrature: ±20% normal, ±100% by switch.
          Inclinometers: ±50% tilt.

READING REPEATABILITY: ±½% to ±1%.

CRONE CEM EM SYSTEM SPECIFICATIONS

STANDARD FREQUENCIES: 390, 1830 and 5010 Hz (others available upon request).

Field tilt measurement by visual null on field strength meter and audio null through crystal earphones.

INCLINOMETER RANGE: 200°, accuracy ±0.5 degrees.

RECEIVER GAIN CONTROL: Linear calibrated 10 turn pot.

Field strength measurements from meter.

OPERATING RANGE OF COILS: Up to 200 meters (600').
Survey Methods

Electromagnetics

The MaxMin system was used in the horizontal loop mode with a cable length of 200 feet. Frequencies of 444 and 1777 Hz were used initially. The 444 frequency was eliminated when it was found that the additional readings were unnecessary. Readings were taken at 100 foot intervals and at 50 foot intervals in anomalous areas on lines 400 feet apart. Slopes were measured using an inclinometer and the transmitter and receiver coils were tilted using the attached tilt meter.

The Crone CEM system was used in the vertical loop mode to trace horizontal loop conductors between lines. The transmitter coil was located on the conductor, and receiver coil tilt angles were recorded at some distance from the transmitter until a crossover was obtained.

Survey Results

A multitude of excellent conductors were outlined by the HEM survey and may be noted on the accompanying "HEM Survey" maps at scales of 1 inch equals 200 feet and 1 inch equals 400 feet. In an effort to gauge these electromagnetic features, conductivity measurements were made of all major rock units within the survey area. Black massive chert with black graphitic shale partings and graphite-coated fractures and sheared surfaces is the best conductor on the claim group. Black siliceous shales, Unit 2, are slightly to moderately conductive. Calc-silicates, grey chert and shale as well as calcareous shale are non-conductive.

The close spacing of multiple conductors, outlined on the 400 scale map, likely represents a folded or stratigraphic repetition of the graphitic black chert horizon in Unit 3. Any electromagnetic response of shale hosted sulphides would probably be masked by the excellent conductivity of the graphitic chert. Since the black shale
and chert horizons are interbedded over narrow widths, it would almost be impossible to determine if the source of the conductor was in the shale or in the chert.

Hand trenching in the area of conductor number 1, lying upslope from lead anomalies A and B, failed to locate the source of the conductivity. Cat trenching or diamond drilling are required to define the source of this geochemical-geophysical target.

MAGNETOMETER SURVEY

Instrumentation

Fluxmaster Model MV-1 fluxgate magnetometers manufactured by Phoenix Geophysics Limited of Willowdale, Ontario, were used on the survey.

SPECIFICATIONS FOR PHOENIX MV-1 MAGNETOMETER

SENSITIVITY: ±5 gammas on 300 gamma range.

MEASURING RANGES: 300, 1K, 3K, 10K, 30K, 100K gammas.

LATITUDE ADJUSTMENT: ±100,000 gammas.

TEMPERATURE STABILITY: -40°C to +55°C.

An MV-1 magnetometer and a Rustrak single channel recorder were used as a continuous base station recorder.

Survey Method

Readings were taken with a fluxgate magnetometer at 50 foot intervals in background areas and at 25 foot intervals in anomalous areas. Diurnal variations of the magnetic field were measured by the continuous base station recorder described above.

Survey Results

The magnetometer survey was undertaken to aid geological mapping in the areas of good lead geochemical response. Potential stratiform lead-zinc mineralization being sought after, is not expected to have
a magnetic response.

Contoured magnetic values outline two elongate magnetic anomalies that are coincident with lead anomalies A-B and F-G. Two features are interpreted to be underlying intrusive rocks possibly related to the diorite dykes.

CONCLUSIONS AND RECOMMENDATIONS

Grid soil sampling on the PIG-KATE claim groups outlined several potentially interesting elongate lead geochemical anomalies within interbedded black shale, black chert, as well as grey chert and shale. Anomalous lead values obtained from the rock chip sampling program, occur in quartz-arsenopyrite veins and fracture fillings. Light grey chert float, found in several lead anomalous areas, also contained high lead values.

Geological mapping and prospecting failed to locate potentially economic stratiform mineralization or any evidence of third order basins within the two claim groups.

The electromagnetic survey successfully outlined several multiple conductors that are largely due to graphite coatings on sheared surfaces within the black graphitic chert horizon. The two magnetic features, coincident with the two major lead geochemical anomalies, appear to outline intrusives at depth. These intrusive bodies are likely the source for quartz-arsenopyrite mineralization found on the surface.

No further work is recommended at this time.

Respectfully submitted,

WAYNE J. ROBERTS
