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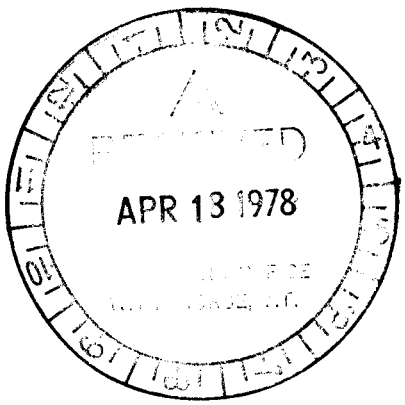

REPORT ON
GEOLOGICAL MAPPING
AND
GEOCHEMICAL SURVEYS

ABBEY 1-216 CLAIMS

ITSI JOINT VENTURE

WATSON LAKE MINING DISTRICT, Y.T.

CLAIM SHEETS 105J/9 & 105I/12

Latitude 62°42'N Longitude 130°00'W

R.J. CATHRO, P.Eng.

JANUARY 15, 1978

090317

GEOLOGY AND GEOCHEMISTRY

ABBEY 1-216 CLAIMS
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CLAIM SHEETS 105J/9 & 105I/12

Lat. 62°42'N Long. 130°00'W

R.J.CATHRO, P.ENG.

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work to the amount of $ 21,300.00

Acting Resident Geologist or
Resident Mining Engineer

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act.

R. R. BAXTER
Supervising Mining Recorder

for Commissioner of Yukon Territory

090317

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INTRODUCTION

The Abbey claims were staked by Itsi Joint Venture (Union Oil Co. of Canada Ltd., Aquitaine Co. of Canada Ltd., and St. Joseph Exploration Ltd.) in July, 1976 to protect an area underlain by the Road River Formation along the extension of the belt containing the stratiform, shale hosted, Howard Pass lead-zinc deposits. No mineralization has been found on the property but the area is considered to be favourable because the geologic setting is apparently the same as that of known deposits located farther southeast. Outcrop is scarce and relatively subdued topography combined with locally thick overburden may have masked any obvious geological response.

The area was outlined and explored on behalf of Itsi Joint Venture by an Archer, Cathro crew led by Grant Abbott under the direct supervision of the writer. Field work in 1977 consisted of preliminary geological mapping and prospecting, grid layout and geochemical surveys and test EM survey between July 15 and August 30. Field personnel consisted of geologists Grant Abbott and Earl Jensen and assistants Frank Gish, John Gibson, Mike Maser and Grant Lowey. Part of the work was performed from a basecamp at Wishbone (Wye) Lake, 20 km southeast while the grid geochemical sampling was conducted from two fly camps on the claims.

PROPERTY, LOCATION AND ACCESS

The Abbey property consists of 216 contiguous claims which form a block about 20 km long and 1.5 km wide extending from the southern margin of Cominco

Lake at Latitude 62°39', Longitude 129°52' west-northwestward across the Prevost River at Latitude 62°43', Longitude 130°08', The claims are registered in Watson Lake Mining District in the name of Archer, Cathro & Associates Ltd. as follows:

CLAIMS	TAG NUMBERS	EXPIRY DATE
Abbey 1-200	YA20951-YA21150	13 July/78
Abbey 201-216	YA21653-YA21668	5 August/78

Fixed wing, float equipped aircraft can be landed on Cominco Lake. Otherwise, access is only possible by helicopter. The nearest float plane base is located at Ross River, 170 km to the southwest. Jeff Lake, located 65 km to the northwest on the Canol Road, can be used as a float plane base to ferry supplies. Gravel airstrips, which will accommodate light aircraft on wheels, are located at MacMillan Pass on the Canol Road, 70 km to the north and at Howard Pass, 30 km to the southeast. The Nahanni Range Road in presently being extended northwestwards from Tungsten to this strip and will be completed during 1978.

GEOLOGY AND GEOMORPHOLOGY

The Abbey property is situated along the western margin of the Selwyn Mountains. Within the core of this range, peaks commonly reach elevations of greater than 2000 m and locally greater than 3000 m. With the exception of the higher peaks, local relief is about 600 to 700 m or less and terrain is relatively subdued and gentle. Main valleys within the central part of the range are U-shaped with truncated spurs below elevations of about 1800 m. Valleys in low areas along the edge of the range are generally broad and poorly defined. The

Abbey claims are situated below timberline along the southwest side of a wide glaciated valley. Local relief is less than 200 m.

The region has been covered by two or more continental ice sheets, one of which reached a minimum elevation of about 2200 m. Younger, less extensive valley and alpine glaciers also covered much of the area. Small glaciers still occur on some of the higher peaks, notably the Itsi Range and Keele Peak.

Glacial deposits in the district tend to be rather thin and discontinuous in the mountains and are most common on the floor of the main valleys. Above timberline, particularly in places where the effects of younger glaciation are weak or absent, fissile rocks such as shale have been severly frost shattered into fine felsenmeer and talus. The Abbey property is covered by an extensive blanket of fluvial and glacial till and outcrop accounts for less than one per cent of the total area. The thickness of the till probably varies sharply from a few metres to several tens of metres depending on bedrock composition and glaciation.

The geology of the property is shown at a scale of 1:12,500 on Figure A-1 (in pocket). Because of the extremely poor exposure, this mapping is based, to some extent, on projection and extrapolation of units and structures from adjacent areas along strike to the northwest and southwest where exposures are relatively good. The Table of Formations on the following page shows the various map units in the vicinity of the property.

The Abbey property is situated along the eastern margin of Selwyn Basin, which comprises a varied sequence of clastic and carbonate rocks that range in age from Upper Proterozoic through Upper Paleozoic. Carbonate rocks of the Cambro-Ordovidian Rabbitkettle Formation are the oldest on the property. These are overlain by shales and chert of the Ordovician, Silurian and Devonian

TABLE OF FORMATIONS

RECENT

Q	unconsolidated alluvial and fluvial till

CRETACEOUS

Kg	granitic stocks and quartz-feldspar porphyry dikes, mostly quartz monzonite in composition

UPPER DEVONIAN OR MISSISSIPPIAN

IMPERIAL FORMATION

Iss	resistant, brown weathering chert grit, sandstone, shale

CANOL FORMATION

Cs	light bluish-grey weathering, black sooty chert, cherty argillite, light bluish-grey and locally rusty-brown weathering, dark grey and black silty shale; chert grit, chert pebble conglomerate; dark grey bedded barite near top of unit, may locally include younger clastic rocks of the Imperial Formation

ORDOVICIAN TO MIDDLE DEVONIAN

ROAD RIVER FORMATION

Rm	resistant, orange to tan weathering, 'chippy' mudstone, variably dolomitic and pyritic silty mudstone, irregular 'flaser bedding characteristic
rsh	dark grey, brown, blue or black weathering recessive carbonaceous black shale, mudstone, cherty argillite, coarse grained black limestone, a central siliceous zone is host to the Howard Pass zinc-lead deposits

UPPER CAMBRIAN TO ORDOVICIAN

RABBITKETTLE FORMATION

u€Oc	wavy banded silty limestone, resistant, light grey, yellowish or brownish grey weathering, thinly and irregularly bedded

Road River Formation which are, in turn, overlain by shale, cherty argillite and chert conglomerate of the Canol Formation. Shale and coarse clastic rocks of the Imperial Formation form thick sequences in nearby areas.

Upper Cambrian and Lower Ordovician

Rabbitkettle Formation

The oldest rocks in the vicinity of the Abbey claims belong to the Upper Cambrian and Lower Ordovician Rabbitkettle Formation, which consists mainly of a distinctive rock type informally called the "wavy banded" limestone. The wavy banded limestone is typically light grey or yellowish grey, blocky and resistant weathering. Bedding is usually defined by irregularly shaped or boudin-like strings of purer limestone nodules up to several centimetres in diameter. Although the nodules themselves are quite irregularly shaped, beds as a whole are fairly continuous and reach thicknesses of several centimetres. In places, the wavy banded texture is absent and the limestone is more massive and homogeneous.

The wavy banded limestone is the best exposed of all the sedimentary rocks in the vicinity of the Abbey claims and is therefore an extremely useful marker horizon. It occurs only along a single belt parallel and adjacent to the north-east margin of the property. Thicknesses cannot be estimated here but to the southeast, near Howard Pass, equivalent rocks reach thicknesses of 300 m.

The Rabbitkettle Formation and equivalent strata are widespread within most of Nahanni map area and most parts of southeastern Yukon wherever contacts have been mapped. These rocks unconformably overlie Middle Cambrian and older rocks and are overlain by Middle Ordovician shales of the Road River Formation or carbonates of the Sunblood Formation. A few widespread fossil localities also suggest an Upper Cambrian and Lower Ordovician age for these rocks.

Ordovician, Silurian, Lower and Middle Devonian

Road River Formation

Of all the formations in the region, the Road River is the most difficult to map because it is extremely recessive and structurally incompetent. Also, subtle internal changes in lithology are common and parts of the formation are indistinguishable in hand specimens and outcrop from the overlying Canol Formation. The Road River Formation (unit R) includes both lower (Ral) and upper (Rcm) units. The lower unit is host to the stratiform zinc-lead mineralization on the Canex Placer - U.S. Steel property at Howard Pass, where Morganti has called the Road River Formation the Howard Pass Formation.

The dominant lithologies within unit Ral are dark grey, brown, blue or black weathering, very recessive, variably carbonaceous, calcareous and siliceous argillite or mudstone. Thin bedded, dark blue or black weathering chert is also characteristic of the unit and forms thick, extensive sequences in the south-western part of the map area although it is a minor constituent in most other areas. Dark grey and black limestone occurs locally in the central and eastern part of Nahanni map area.

Unit Ral rarely forms outcrop except locally along stream cuts or when it consists of chert and is only exposed in three small outcrops on the Abbey claims. The distribution of the unit can only be inferred, without detailed study, by the presence of the Rabbitkettle Formation which underlies it and unit Rcm which overlies it. Both of these bounding units form good markers because they are distinctive and relatively more resistant.

Unit Ral is no more than 200 m thick east of a west-northwest trending line extending from Howard Pass through Cominco Lake and the Abbey claims. Southwest

of this line, the unit appears to thicken abruptly. The amount of thickness change cannot be determined precisely because of intense internal deformation but is indicated by the widespread distribution of the unit in areas of high relief. Near Summit Lake, for example, the unit is probably greater than 1000 m thick.

The internal stratigraphy of unit Ral is poorly known. Dark, silvery blue or black weathering rocks comprise most of the unit in the western part of the map-area, whereas brown, grey and generally lighter coloured rocks seem to occur farther east. Silvery-blue weathering rocks occur mainly in the middle or upper part of the section. Colour changes caused by weathering commonly occur not only upon exterior surfaces but also for up to several centimetres into the rock. Close examination of the weathered fine-grained rocks shows that they are porous and leached. Fresh surfaces can only be seen in places such as stream cuts, where they are invariably black or dark grey. A single rock type seen in the fresh and weathered condition could easily be mistaken for two different units.

The middle part of unit Ral seems to be consistently more cherty and resistant than the remainder although cherty argillite and chert are also common near the top of the unit. The chert invariably forms beds about 5 to 10 cm thick rhythmically interlayered with shale and cherty argillite. The thickness of the central siliceous member varies from 0 to 60 cm in the thinner eastern part of the unit but is at least 200 or 300 m in the thicker western part.

The thick western part of the unit Ral is non-calcareous whereas the thinner eastern part tends to be calcareous. Weathered rocks are generally non-calcareous, however, probably because the calcite has been leached. Thin grey limestone bands up to several centimetres across are common near the bottom of the unit. Graptolites occur everywhere within unit Ral and are invaluable in distinguishing it from younger rocks.

Minor beds of distinctive, coarse-grained, black limestone have been seen within the belt of Road River Formation that passes through Howard Pass, Anniv Zone and Abbey claims. This rock type seems to form intermittent lenses less than one metre thick and is characterized by a peculiar fabric composed of radiating aggregates of rod-shaped calcite(?) crystals up to 10 m or so long. This unique rock, which occurs within the mineralized zone in trenches at the Anniv Zone, is apparently a local phenomenon and may be an indicator of both the time horizon and the sedimentary environment in which the mineralization occurs.

The upper part of the Road River Formation (unit Rcm) consists almost entirely of a distinctive rock type that has been given the informal name "chippy mudstone" in this report. Other geologists have referred to it as the orange mudstone, wispy mudstone or flaggy mudstone. The "chippy mudstone" is fairly resistant, tan to orange weathering, fine grained and light greenish grey to medium grey on fresh surfaces and varies from about 20 to 60 m in thickness. It is also hard, siliceous and variably dolomitic. Pyrite is common and takes the form of crystals and nodules up to 5 mm across. In the southwestern part of the Nahanni map-area, the rocks become more shaley and argillaceous and less dolomitic. The term "chippy" refers to peculiar and ubiquitous flaser bedding which is defined by wispy, discontinuous, darker layers, generally a centimetre or less in length, that are enclosed in a lighter coloured matrix. The wispy orientation of the bands are sometimes oriented parallel to bedding but elsewhere are oriented in a more random fashion. The origin of this texture is not known, but worm burrows were recognized in several localities and it may be a result of bioturbation. Coarse grained, grey limestone lenses up to about a metre across are also interbedded with the "chippy mudstone", particularly northwest of the Abbey claims.

The "chippy mudstone" is present in most areas except for a few places south of Howard Pass, southeast of Wishbone Lake and northeast of the South Nahanni River where it has apparently been removed beneath an unconformity.

The widespread, uniform extent of unit Rcm suggests that it is wholly sedimentary in origin, however, it has a volcanic or tuffaceous appearance in places.

The depositional environment of the Road River Formation is speculative although it must have been significantly different from that of older rocks in the Howard Pass area. In general, the Road River Formation is a deeper water facies than both shallow water carbonates of the same age that occur about 80 to 100 km to the east and underlying Rabbitkettle Formation limestone. It probably represents local deepening rather than widespread continental subsidence, as indicated by the presence of graptolites of different ages from place to place at the base of the formation, the presence of a mid-Ordovician unconformity in parts of the Mackenzie Mountains, and the fact that the facies-equivalent carbonate rocks to the east were probably deposited in water of comparable depth to carbonates that underlie the shale. The abundance of carbonaceous material and chert, lack of significant clastic debris and thinness of the unit as a whole, suggests that sedimentation rates were extremely slow. The black colour, lack of most macro-fossils other than graptolites, and the presence of only small amounts of black limestone, indicates a stagnant euxinic environment that was particularly unfavourable to life. These types of rocks are also considered to be indicative of very deep water but precise depths cannot be determined. Other factors which possibly influenced the depositional environment are: restricted circulation of sea water, climatic conditions and low rate of clastic sedimentation.

The central part of Selwyn Basin is underlain by enormous thicknesses of chert, which are at least partially equivalent to the Road River shale. This type of rock is usually deposited in extremely deep water and the lack of associated limestone suggests that it was too deep for carbonate stability. The transition to the thick chert sequence seems to occur in the vicinity of Summit Lake, which suggests that the shales in the vicinity of Howard Pass were deposited in relatively deep water.

Middle and/or Upper Devonian

Canol Formation

The Canol Formation (unit Cs) overlies the Road River Formation. The unit is characteristically light grey, blocky weathering and talus-forming although it locally weathers rusty brown as well. The main rock types are black "sooty" chert, "sooty" cherty argillite, bluish grey silty shale, dark grey chert grit and pebble conglomerate. Bedded barite is a distinctive, though minor, component.

Isolated exposures of Canol chert, cherty argillite or shale that lack distinctive, underlying lithologies are almost impossible to distinguish from similar rocks in the Road River Formation. Coarse clastic parts of the unit are, in turn, difficult to distinguish from the same rock types within the Imperial Formation unless they are associated with blue weathering, sooty rocks or barite. However, clastic rocks of the Canol Formation generally have a black "sooty" matrix, and the coarse component usually consists entirely of subangular chert grains less than about 2 cm across. Unlike the conglomerates of the Imperial Formation, which form sequences hundreds of metres thick, those in the Canol Formation appear to form massive beds less than a few tens of metres thick.

In one locality 13 km east of Cominco Lake, a medium grey limestone band up to several metres thick occurs in a structurally complex area adjacent to both graptolitic shale and younger shale, siltstone and chert of the Canol Formation. The limestone contains crinoids with double axial canals ("two hole crinoids") that occur only within Middle Devonian rocks. The limestone is tentatively included within the Canol Formation because similar limestone occurs at the base of this unit in the MacMillan Pass area and because regional evidence indicates that this correlation is the most probable.

The Canol Formation varies greatly in both thickness and internal stratigraphy. The cherty argillaceous rocks apparently occur at any position within the unit and are interbedded with chert grit and sandstone. The coarser grained conglomerate seems to occur fairly high in the section and forms only one main bed at any one locality. Whether this is a continuous bed or a series of separate lenses is not known. Southwest of Summit Lake, coarse clastic rocks are apparently completely absent and the entire unit consists of black chert and cherty argillite with a thickness of more than 300 m, much thicker than elsewhere. Extensive areas farther to the northwest are also underlain by similar chert sequences but there it cannot be determined if they belong to the Canol or Road River Formations.

Bedded barite is an invaluable marker horizon that invariably occurs within a few metres of the top of the unit and is bounded by blue weathering, black cherty argillite. The barite is resistant, well bedded, dark grey, locally rusty weathering and varies from a few centimetres or less to more than 5 m thick. Locally, barite nodules or blebs up to 1 cm across also occur in this horizon within cherty argillite. This form of barite may occur at the same stratigraphic position as the bedded barite. Barite also forms coarsely crystalline veins

within black, cherty argillite and in this form is epigenetic in origin. No evidence has been seen to suggest that more than one major period of barite sedimentation occurred in this district.

Bedded barite occurs in two localities in the western end of the Abbey claims. In both places, the barite is about 2 m thick but occurs in isolated outcrops and cannot be traced for any distance.

An assay of 2.5% Zn was obtained from a rusty-weathering zone of calcite veins within the bedded barite occurrence situated on the southwest side of the Abbey claims. Sulphides were not seen in the veins and the zone is probably occurring either as disseminated pale-coloured sphalerite or as hydrozincite.

The Canol Formation commonly produces rusty ferricrete gossans, even in areas where there is no outcrop. The gossans are not as large and extensive as those which occur north of the Canol Road.

Upper Devonian(?), Mississippian and Younger(?)

Imperial Formation

In this report, the name Imperial Formation is loosely applied to the thick and variable group of clastic rocks in the map-area that are younger than the Canol Formation. This assemblage is characterized by its rusty brown, tan and greenish brown weathering colour, relatively resistant nature and great thickness and clastic composition (except for minor chert) with silt-size or larger clasts. The greater part of the Imperial Formation within the area bounded by the Abbey claims, Howard Pass and the South Nahanni River is made up mainly of thick bedded to massive sandstone, grit, pebble and, locally, cobble conglomerate, which are interbedded with lesser amounts of thinly laminated "pinstripe" shale. The

dominant rock type varies in places from shale to coarser grained rocks, apparently due to abrupt lateral facies changes. The unit is commonly more than 700 m thick and probably much greater in places.

In the vicinity of the Abbey claims, thin bedded, alternately brown and grey weathering silty limestone and thinly laminated, light olive green shale and siltstone have been included with unit Iss but have not been seen elsewhere. The limestone may be as much as 150 m thick and commonly contains siltstone and limestone clasts up to 20 cm across which appear to be intraformational. In the same area, unit Iss also includes brown weathering resistant grey shale, sandstone and grit which are more typical of the Imperial Formation. Stratigraphic relations between these various rock types are uncertain and will only be resolved with more detailed mapping.

Cretaceous

Mid-Cretaceous granitic rocks of intermediate composition form batholiths and plutons throughout the Selwyn Basin. In general, these rocks are resistant to weathering and make up many of the higher mountains. The granitic rocks cut regional structures but commonly produce local domes or arches within enclosing rocks. Penetrative schistose fabrics are also common within metamorphosed rocks near the granites.

Near the Abbey claims, a small pluton underlies Mt. Prevost and numerous small dikes and plugs are located immediately northwest of the claims. Hornfels is extensive in both areas.

STRUCTURE

The structural geology in the vicinity of the Abbey claims appears to be simple and is dominated by a southwesterly dipping sequence of rocks that strike parallel to the claim block. Within this sequence, the contact between the Rabbitkettle Formation and the overlying Road River Formation marks the northeast boundary of the claims. Northeast of this sequence, a major west-northwesterly-trending fault juxtaposes the Rabbitkettle Formation against Devono-Mississippian clastic rocks of the Imperial Formation. West of the sequence, there is virtually no outcrop and the strucutre can only be inferred from that seen within the area southwest of Cominco Lake where rocks are relatively well exposed (see Figure A-1). In this area, the predominant structures are a series of broad, open folds. The sequence of strata which underlie the Abbey claims form the limb of the northeastern-most syncline. The southwesternmost part of the area is underlain by a thick sequence of chert and cherty argillite of the Road River Formation in which large scale folds cannot be defined. It is probable that the broad, open folds continue northwestward along the southwestern margin of the Abbey claims.

The only other major structural features on the Abbey claims are two probable faults. One at the northwestern most end of the claim group trends west-northwesterly and juxtaposes Road River argillite against Canol shale. The other fault, located near the eastern end of the claim block, trends northerly and shows apparent right lateral displacement of about 1 km.

Smaller scale structures include steeply dipping penetrative cleavage which is axial planar to large scale folds. Small scale, upright, isoclinal folds with orientation parallel to larger scale folds are common in the less competent shales.

GEOCHEMISTRY

Introduction

The geochemical survey of the Abbey claims included analysis of 1570 soil samples and 100 silts for lead, zinc and copper and 43 stream water samples for pH, Zn and SO_4. The soil and silt assays are plotted on Figures A-2 (copper), A-3 (lead), and A-4 (zinc). Water analyses are plotted on Figure A-1.

Analytical Procedures

The analyses were performed at Chemex Labs Ltd., North Vancouver, B.C. Standard procedure for each soil and silt sample consisted of screening to minus 80 mesh screen size, digestion in nitric-perchloric acid and analysis for copper, lead and zinc by atomic absorption spectrometry.

The analytical procedure used on the water samples in 1977 was as follows. Following pH measurement in the field and shipment to the lab by air freight, the samples were carefully vacuum filtered through Watman GF/c 0.45 micron glass-fibre paper. The filtrate was returned to the original bottle and was retained, along with the filtered residue, for possible future analysis. An aliquot of the filtrate was then assayed for SO_4 content, adjusted to a pH of 2.5 to 3.0 with the addition of 3M HNO_3 and analyzed for zinc using the APDC/MIBK method, in which the element was chelated or complexed with ammonia pyrrolidine dithio-carbamate (APDC) and extracted into the organic solvent methy isobutyl ketone (MIBK). After the organic and aqueous phases separated, the metal content of the MIBK fraction was determined by AAS.

Survey Control

Soil samples were collected at 50 m intervals on lines 1600 to 2200 m long that were spaced at 400 m intervals across the trend of the Road River Formation. Numerous small streams drain the property and silt samples were taken wherever possible throughout the full 18.4 km length of the property. Survey control was provided by chaining and picketing the four claim location lines at 100 m intervals. These were designated Baselines A,B,C, and D. The two principal baselines, A and B, were tied together by chained and picketed tie-lines at intervals of 2 km. The baselines were well flagged and blazed but not cut. The sample lines were established with compass and hip-chain and were flagged at each sample site. Soil samples were dug with a mattock grub-hoe and were collected from the B horizon where possible. This was not always possible in the many swampy portions of the property and in those situations an organic-rich sample was taken. The portions of the property where samples were organic are identified on Figure A-2. Approximately 35% of the soil samples collected on the Abbey grid were organic and these were most abundant at the southeast end.

Soil and Silt Results

The grid sampling failed to show any significant anomalies in lead or copper although several zinc anomalies were outlined in those portions of the property underlain by Road River and/or Canol shale. The following assay response was obtained (in ppm):

	Threshold	Weakly Anomalous
Copper	125	126 - 200
Lead	35	36 - 100
Zinc	700	701 - 1400

Zinc is the only metal in which strongly anomalous values (up to greater than 4000 ppm) were obtained and these show a tendency to be concentrated in lower areas, suggesting hydromorphic concentration (Figure A-4). Silt assays are usually much higher than nearby soil assays. The best response is located 8 to 12 claim lengths from the northwest end of the property along the south side of the Abbey River and about 2500 m from the small intrusion on Mt. Prevost. The anomaly consists of variable assays of up to 4000 ppm Zn within an area about 1200 m long and 400 m wide. They are accompanied by background lead and copper values. The anomaly occurs below a steep hill, downstream from anomalous silt assays that are apparently derived from an area with low soil background that lies closer to the intrusive contact. Minor amounts of sulphide were found by Dynasty Exploration in 1973 on the south side of the stock and the anomaly could be derived from the weathering of similar mineralization or by hydromorphic accumulation of zinc derived from a high background shale horizon.

The copper map (Figure A-2) displays erratic weakly anomalous values, a few of which are associated with the main zinc anomaly. Copper shows no particular affinity with low ground but is, as previously mentioned, higher near the intrusion.

Only 16 samples in the entire survey exceeded 36 ppm lead (Figure A-3). These are erratically distributed throughout the grid but cluster slightly near the intrusion. The low lead response could be an indication that no mineralization is present near surface or that a combination of overburden, vegetation and topographic conditions is preventing the soil sampling technique from being effective.

Water Sampling Results

Regional orientation surveys conducted by IJV in 1976 and 1977 have shown that water is the only sampling medium that gives a strong Zn contrast from the

Canol Formation. Although routine lead analysis of both water samples and filter residue will detect the rare stream that is carrying dissolved lead (e.g. 35 ppb Pb draining the Tom deposit), lead anomalies can be detected more economically by sampling stream sediment (silt). This does not hold true for zinc, which is so soluble at low pH levels that it will not show up in silt in anomalous quantities for a considerable distance downstream. Although there is still much to be learned about the interpretation of the data, a combination of water testing for pH, SO_4 and Zn and silt sampling for Pb appears to provide the best approach possible with existing technology for detecting the presence of buried, oxidizing sulphide concentrations. Interpretation is hampered by insufficient case history data on the relative importance of the various water parameters (e.g. SO_4 vs pH) and the factors that inhibit water response from some units, such as the Road River argillite. This data will only become available when more water anomalies have been drilled and when more whole rock analyses are completed on the shale units.

Water sampling is locally useful on the Abbey claims because many of the streams draining the property originate as springs or seeps draining the Canol Formation. However, water sampling is probably of little value in exploring the Road River Formation.

Water sample results are plotted on Figure A-1. No anomalous pH values were obtained and the only samples anomalous in both Zn and SO_4 were obtained from two prominent limonite gossans located within the soil anomaly described previously. They returned 210 and 2100 ppb Zn and 800 and 140 ppm SO_4, respectively, with pH of about 6.2. Nearby water samples, several of which drained an unmineralized, thick barite zone in Canol shale, all assayed less than 50 ppb Zn and 35 ppm SO_4, with pH between 6.2 and 7.2.

SUMMARY AND CONCLUSIONS

The Abbey claims were staked as part of a two year program of regional exploration by Itsi Joint Venture to explore for shale-hosted stratiform mineralization in the Selwyn Basin of Yukon and N.W.T. Heavy emphasis was given to regional stratigraphic mapping and to identifying and tracing the various lithological units in the project area, distinguishing facies relationships in the favourable Road River Formation and mapping the facies and structural factors in the older rocks that may have influenced the localization of mineralization. The following observations and conclusions of the regional program led to the staking of the Abbey claims.

(1) The mineralized portions of the Road River Formation are indistinguishable from adjacent unmineralized portions except for their lead and zinc content. All known potentially economic lead-zinc deposits occur within a narrow west-northwesterly trending belt called the Howard Pass Belt in this report. The belt is remarkably similar in structural and stratigraphic style throughout its length. The main area of low relief in which the Road River argillite appears to reach surface was staked as the Abbey group.

(2) The Road River Formation consists of a lower argillite unit and a distinctive upper unit, informally named "chippy" mudstone. The argillite unit is extremely recessive and its presence is usually only inferred by the presence of the enclosing, more resistant units.

(3) The argillite unit, which is host to the Howard Pass mineralization, is no more than 200 m thick northeast of the Howard Pass Belt but thickens abruptly to the southwest, where it undergoes a facies change to chert and non-calcareous

argillite. This thickness change more or less coincides with the facies change from carbonate to shale in the underlying Lower Cambrian rocks.

The Abbey property was prospected and grid soil sampled with negative results. Glacial cover is extensive and thick in places however and it is possible that geochemistry is not effective in this environment.

In 1977, a test EM survey was conducted by Grant Hendrickson of Aquitaine over Canex Placer's Anniv deposit. This survey utilized a five frequency Maxmin II, which is a horizontal coplanar loop instrument operated in the metric mode. The method proved to be a very useful mapping tool although it could not differentiate between the response from sulphides and graphitic shale. The results of this survey with profiles of the test lines are contained in a separate report by Hendrickson dated October, 1977.

Recommendations

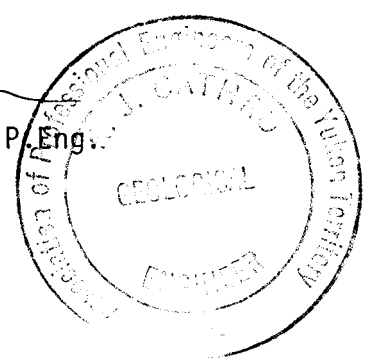
Continued exploration of the Abbey group is warranted. Initially, a more precise definition of the distribution of the Road River Formation is required. This could probably be done using both barium analysis of the 1977 soil and silt samples and a maximum-type EM survey.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES LTD.

/mc

R.J. Cathro, P.Eng.



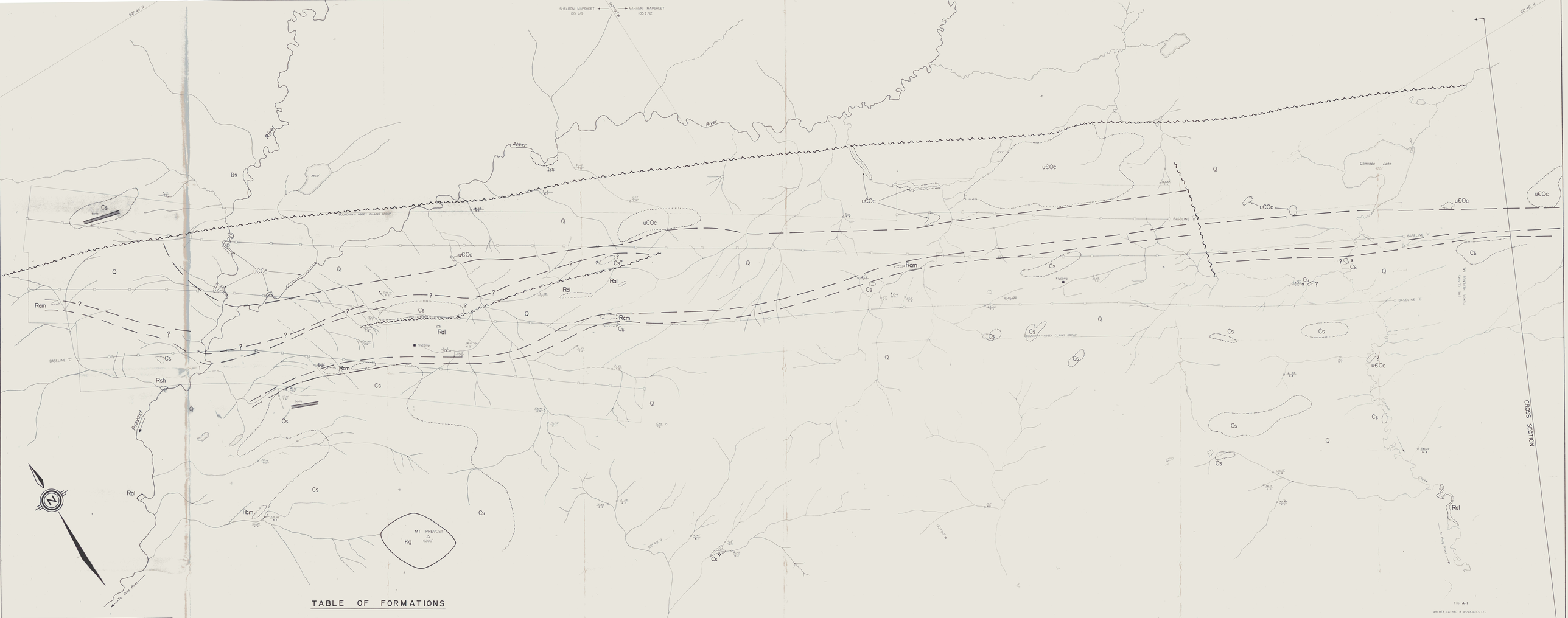


TABLE OF FORMATIONS

RECENT

Q — unconsolidated alluvial and fluvial till

CRETACEOUS

Kg — granitic stocks and quartz - feldspar porphyry dikes, mostly quartz monzonite in composition

UPPER DEVONIAN OR MISSISSIPPIAN

IMPERIAL FORMATION

Iss — resistant, brown weathering chert grit, sandstone shale

CANOL FORMATION

Cs — light, bluish-grey weathering, black sooty chert, cherty argillite, light bluish-grey and locally rusty-brown weathering, dark grey and black cherty argillite, minor grit, chert pebble conglomerate; dark grey bedded tuff in near top of unit; may locally include younger clastic rocks of the Imperial Formation

ORDOVICIAN TO MIDDLE DEVONIAN

ROAD RIVER FORMATION

Rcm — resistant, orange to tan weathering, chippy mudstone, variably dolomitic and pyritic silty mudstone, irregular flaser bedding characteristic

Ral — dark grey, brown, blue or black weathering recessive carbonaceous black shale, mudstone, cherty argillite, coarse grained black limestone, a central siliceous zone is host to the Howards Pass zinc-lead deposits

R — undivided Rcm Ral; CROSS SECTION only

UPPER CAMBRIAN TO ORDOVICIAN

RABBITKETTLE FORMATION

uЄOc — wavy banded silty limestone, resistant, light grey, yellowish or brownish-grey weathering, thinly and irregularly bedded

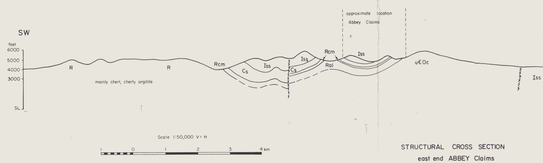


FIG. A-1

ARCHER, CATHRO & ASSOCIATES LTD

GEOLOGY

ABBEY CLAIMS

MACMILLAN PASS DISTRICT

ITSI JOINT VENTURE

Scale 1:12,500

FIG. A-2

ARCHER, CATHRO & ASSOCIATES LTD.

COPPER GEOCHEMISTRY

ABBEY CLAIMS

MACMILLAN PASS DISTRICT

ITSI JOINT VENTURE

To accompany a report by G.J. Abbot and R.J. Cathro, dated December/77

FIG. A-3

ARCHER, CATHRO & ASSOCIATES LTD

LEAD GEOCHEMISTRY

ABBEY CLAIMS

MACMILLAN PASS DISTRICT

ITSI JOINT VENTURE

To accompany a report by G.J. Abbot and R.J. Cathro dated December/77

SHELDON MAPSHEET
105 J/9
130° 00' W
NAHANNI MAPSHEET
105 I/12
Abbey
River
Prevost
MT. PREVOST
LOCATION MAP
MAP AREA
LEGEND
• 80 soil sample
x 260 silt sample
■ 200 rock sample
assays in ppm Zn
Analysis by nitric - perchloric extraction and atomic absorption by Chemex Labs, N. Vancouver, B.C.
FIG A-4
ARCHER, CATHRO & ASSOCIATES LTD
ZINC GEOCHEMISTRY
ABBEY CLAIMS
MACMILLAN PASS DISTRICT
ITSI JOINT VENTURE
Scale — 1:12,500
2000 Metres