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FIELD TRIP NUMBER 16

GEOLOGY AND MINERAL DEPOSITS OF THE ADAMS PLATEAU-CLEARWATER REGION

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This field trip examines the geology and mineral deposits of the western part of the Omineca Crystalline Belt as exposed in the Adams Plateau-Clearwater region and represented by the Fennell and Eagle Bay Formations.

The Eagle Bay Formation was first named and described by Jones (1959) as part of the Mount Ida Group, and considered to be of Precambrian age. The Fennell Formation, another major map unit in the area, was first named by Uglow (1922, pp 77A) and more recently described by Campbell and Tipper (1971) who correlated it with the Slide Mountain Group and considered it to be of Mississippian or later age.

More recently, Okulitch (1979) revised the geology of the region and, on the basis of radiometric and paleontologic dating and re-interpretation of rock assemblages, correlated part of the Eagle Bay (units EBF, EBA, EBM, EBK EBS, EBG and SDQ of this report) with the Cambro-Ordovician Lardeau Group of the Kootenay Arc, and part (unit EBP of this report) with the Upper Mississippian to Pennsylvanian Milford Group, thus postulating a major unconformity or disconformity between these two parts of the Eagle Bay Formation. In a subsequent paper, Okulitch (1984) described the fault contact between the Fennell and Eagle Bay Formations as the suture zone between the allochthonous Slide Mountains Terrane (part of Quesnel Terrane) and continental North America.

Detailed mapping by the B.C. Ministry of Energy, Mines and Petroleum Resources in the Adams Plateau-Clearwater area, under the direction of V.A. Preto was carried out between 1978 and 1981. The main results of this work have been published recently (Schiarizza, 1983; Schiarizza and Preto, 1984) and are summarized in the accompanying geological map and correlation chart (Figures 1 and 2).

This work has contributed to a better understanding of the geology of the area and particularly the nature and setting of numerous stratabound precious and base metal deposits. Specifically it led to the recognition of four distinct but in part related tectonic slices in the map area, each representing a distinct environment of deposition ranging from shelf to volcanic arc and ocean floor, and each characterized by its own type of mineral deposit, or lack thereof (Figure 4; Table 1).

LOCATION AND ACCESS

The Adams Plateau-Clearwater area covers in excess of 2700 square kilometres from Lat 51°00'N, Long 119°30'W to Lat 51°45'N, Long 120°15'W. It's western boundary is the Louis Creek Fault (Figure 1) which in this region follows the Louis Creek, Thompson River and Lemieux Creek Valleys and marks the boundary between the Omineca Crystalline Belt and the Intermontane Belt.

Easy access is provided northward from Kamloops to Louis Creek, Barriere and Clearwater by Highway 5 and thence to most parts of the area by an excellent network of major and secondary access and logging roads. Access may also be gained from Highway 1 by crossing the South Thompson River at Squilax and proceeding northward along the west shore of Adams Lake or northeastward to Adams Plateau.

GEOLOGICAL SYNOPSIS

The map area is located along the western flank of the Shuswap Metamorphic Complex, a major tectonic element which dominates the geology of South-Central British Columbia, Northeastern Washington and Northwestern Idaho (Okulitch, 1984). Southeast and east of Barriere (Figure 1) the area is underlain by rocks of the Eagle Bay Formation of Devono-Mississippian and older(?) age and by strata of the Spapilem Creek-Deadfall Creek Succession of Lower Cambrian(?) and/or Hadrynian(?) age. North of Barriere the geology is dominated by rocks of the Fennell Formation of Devonian to Permian age, which are in fault contact to the east with Devono-Mississippian Eagle Bay Strata (see Figure 1).

All of these rocks were complexly deformed and metamorphosed during the Jura-Cretaceous Columbian orogeny and are cut by post-tectonic granitic rocks of the Mid-Cretaceous Baldy Batholith. The metamorphic grade is lower greenschist through most of the area, but increases sharply to amphibolite facies in the northeast corner.

Structurally the area is subdivided into three distinct easterly derived paratochthonous slices, some internally imbricated, separated by two northeasterly dipping thrusts. A fourth allochthonous westerly derived and internally imbricated package of oceanic rocks, the Fennell Formation, is separated from Mississippian clastic rocks of the Eagle Bay Formation (unit EBP) by an earlier thrust fault which has been deformed and overridden by later westerly verging structures. It now has a subvertical orientation through most of the area. Each of these structural packages consists of a distinct, internally coherent rock association which represents a distinct environment of deposition and is characterized by its own type(s) of mineral deposits, or lack thereof.

Progressing in a southwesterly direction from older to younger and from shelf to ocean floor these structural elements and the environments they represent may be described as follows (see Figures 1 and 4).

1) SPAPILEM CREEK-DEADFALL CREEK SUCCESSION, UNIT SDQ

This package is composed mainly of light to dark gray quartzite, micaceous quartzite, and phyllite, with lesser amounts of calcareous and chloritic clastic sediments. The northeastern part of the unit includes staurolite-garnet-mica schist, calc-silicate, some marble, and amphibolite. These rocks represent a shelf depositional environment and are devoid of important mineral deposits. Their age is unknown, but a Lower Cambrian to Hadrynian age is considered possible in view of lithological and stratigraphic similarities with the lower part of the Snowshoe Group mapped by Struik (in press) in the Wells area, and with Hadrynian-Cambrian strata of Kootenay Arc.

Rocks of unit SDQ are cut by a Late Devonian orthogneiss (unit Dgn Figure 1) (Okulitch, Wanless and Loveridge, 1975; Okulitch, 1979) and by post-tectonic quartz monzonite of the Cretaceous Baldy Batholith (unit Kg).

2) EAGLE BAY FORMATION, UNIT EBG

This package is dominated by medium to dark green calcareous chlorite schist derived from mafic and intermediate volcanic and volcaniclastic rocks. It includes a major carbonate member, the Tshinakin limestone-dolomite, as well as widespread and locally dominant intercalations of dark to light gray siliceous and graphitic phyllite, calcareous phyllite, limestone, dolostone, marble, calc-silicate, cherty quartzite and other metasedimentary rocks. Although the age of this unit is not directly known, it is considered on structural and lithologic grounds to be part of the Eagle Bay Formation and is thus assigned a Devonian(?) and/or older(?) age. On Adams Plateau, rocks of Unit EBG are cut by northerly trending, post-tectonic quartz-feldspar porphyry dykes (unit qp) of Cretaceous or Tertiary age.

This volcanic-sedimentary succession is characterized by Type 1 (Table 1) deposits, stratiform sulphides containing silver, lead and zinc in predominantly metasedimentary sequences, and by Type 2 deposits, stratahound disseminations of sulphides containing copper, lead and silver in mafic volcanics and chlorite-sericite-quartz-phyllite. The entire package can be interpreted to represent an arc (or rift?) related basin depositional environment.

3) EAGLE BAY FORMATION, UNITS EBP, EBF, EBA, EBM, EBK, EBL, and EBS

This large and heterogeneous package makes up the bulk of the Eagle Bay Formation within the map area. For the purpose of this discussion it is considered to be a single parautochthonous slice, although it contains at least two major imbrications, one provided by the easterly dipping thrust which separates units EBA and EBF from unit EBP between North Barriere River and Clearwater, and the other provided by a thrust which separates units EBS and EBP between Sinmax and Fadear Creek in the southwestern corner of the map area. The entire package is in fault contact to the northeast with unit EBG, to the west with the Fennell Formation and, south of Barriere, with the Intermontane Zone across the Louis Creek Fault.

Package 3 consists of two main subdivisions. The structurally (and presumably also stratigraphically) lower division comprises a heterogeneous assemblage of metasediments and mafic volcanic rocks (mainly Unit EBS) of uncertain age. This is overlain by a Devono-Mississippian assemblage comprising felsic to intermediate metavolcanic rocks (Units EBA and EBF) intercalated with, and overlain by, dark gray phyllite, sandstone and grit (Unit EBP).

The lower, undated, portion of this package is exposed between Barriere River and Adams Lake in the southwestern portion of the map area. It is dominated by phyllitic sandstone, grit, phyllite, quartzite, and discontinuous but locally prominent carbonate horizons of Unit EBS. Chloritic schist and greenstone of mafic volcanic origin are present at various places within the Unit, and a discrete metabasalt horizon (Unit EBM) occurs locally at its top. Unit EBS is lithologically similar to, and probably correlative with, parts of the Lardeau Group within the Kootenay Arc (Read and Wheeler, 1976; Okulitch, 1979), and with parts of Struik's Barkerville terrane within the Cariboo Mountains (Struik, in preparation).

Unit EBA, consisting largely of sericite-quartz phyllite and sericite-chlorite-quartz phyllite of felsic volcanic origin overlies Unit EBS metasediments west of Adams Lake, but is locally separated from them by two distinctive units comprising epidote-actinolite-quartz schist, garnet-epidote skarn and chloritic schist (Unit EBK), and dark grey calcareous phyllite and limestone (Unit EBL). Zircons extracted from felsic metavolcanic rocks of Unit EBA on the east shore of Adams Lake have yielded Pb/U radiometric ages of about 387 +/- 4 Ma (see Figure 3). Rusty weathering feldspathic phyllite and fragmental phyllite derived largely from intermediate tuff and volcanic breccia (Unit EBF) overlies Unit EBA in the Johnson Creek area, and is itself overlain by dark grey phyllite, siltstone, sandstone and grit of Unit EBP between Johnson Creek and Barriere River. Conodonts extracted from two separate limestone lenses within Unit EBP south of the Barriere River are Upper Mississippian in age.

The upper (Devono-Mississippian) portion of package 3 is also recognized north of Barriere River Fault (Figure 1) where the distinctive feldspathic and fragmental phyllites of Unit EBF once again overlie sericite-quartz phyllite and schist of Unit EBA. The clastic rocks of Unit EBP, which have yielded lower Mississippian conodonts in this area, are in fault contact with this package of felsic to intermediate metavolcanic and metavolcaniclastic rocks, as well or with the imbricated Fennell succession.

The clastic rocks of Unit EBP are lithologically similar to age-equivalent rocks of the Guyet and Black Stuart Formations within the Cariboo Mountains (Struik, 1981), and to Devono-Mississippian clastic rocks of the Earn Group and "Black Clastic Unit" within the northern Cordillera (Gordey, 1979; Gordey et al, 1982). The associated felsic to intermediate volcanic rocks of Units EBA and EBF have no apparent counterpart within the southern and central Omineca Belt, but felsic volcanics (trachytes and rhyelites) are, in places, associated with the Devono-Mississippian clastics of the Northern Cordillera where they may be related to Devono-Mississippian rifting (Templeman-Kluit, 1979; Gordey, 1979; Mortensen, 1982). The Devono-Mississippian clastics and volcanics of the Eagle Bay Formation may, similarly, comprise a rift-related assemblage; alternatively, they may comprise a volcanic arc built on, or in close proximity to, the North American Continental margin.

The most important mineral depesits within this package (type 3) are volcanogenic precious-base metal massive sulphides, commonly with barite, within the mainly felsic to intermediate metavolcanic rocks of Units EBA and EBF. A further type (Type 4) comprises uranium-thorium bearing pyrite-fluorite replacement associated with trachytic and rhyolitic rocks within a Unit EBA volcanic centre at Rexspar.

4) FENNELL FORMATION, UNITS uF and lF

The Fennell Formation is an internally imbricated allochthonous assemblage of oceanic rocks which was thrust eastward over Mississippian clastic rocks of the Eagle Bay Formation (Unit EBP) prior to the main period of westerly directed folding and thrusting within the area. The thrust contact between the Fennell Formation and Unit EBP marks the eastern boundary of the Fennell Formation in the area south of the Baldy Batholith, as well as within a small fault bounded block direcly south of Clearwater. This fault contact has a subvertical orientation as a consequence of subsequent deformation. Elsewhere along its eastern boundary the Fennell Formation is overridden by Devono-Mississippian intermediate to felsic metavolcanic rocks of the Eagle Bay Formation (Units EBP and EBA) along a relatively later westerly directed thrust fault.

The Fennell Formation is bounded to the south by the Barriere River strike slip fault, and is separated from Intermontane Zone strata to the west by the Louis Creek Fault. To the north, just outside the map area, it is intruded by Cretaceous granitic rocks of the Raft Batholith.

The Fennell Formation outcrops as a steeply dipping, west-facing assemblage which in large part comprises the forelimb of a major west verging fold system (Figure 1a, section C-C'). It has been divided into two structural divisions. The Lower (eastern) division is a heterogenous assemblage of dominantly bedded chert, gabbro, diabase, and pillowed basalt, which also includes units of sandstone and phyllite, Devonian aged quartz-feldspar porphyry rhyolite, and intraformational conglomerate. The Upper (western) structural division comprises a monotonous west facing succession of pillowed and massive basalt with minor amounts of bedded chert, gabbro, basaltic breccia and tuff.

Bedded cherts within the lower division of the Fennell Formation have yielded several collections of conodonts which were identified by M.J. Orchard of the Geological Survey of Canada as ranging in age from Lower Mississippian to Middle Permian. This paleontological data, combined with a

Devonian radiometric age on quartz-feldspar porphyry rhyolite, indicates that the lower division of the Fennell Formation comprises at least four westerly facing imbricate fault slices. Only two paleontological age dates are provided by the sparse horizons of bedded chert within the upper division of the Fennell Formation. These are Lower (?) Pennsylvanian and Middle Permian respectively, and indicate that the upper division occupies the same time span as at least the younger known rocks of the lower division. The two divisions are therefore inferred to be separated by a thrust fault similar in nature and age to the inbricate thrusts within the lower division and to the thrust which separates the Fennell Formation from Mississippian clastic rocks of the Eagle Bay Formation.

Rocks of the Fennell Formation accumulated in an ocean basin an unspecified distance west of co-eval rocks of the Eagle Bay Formation. Sandstone within the Fennell Formation, along with siltstone and phyllite intercalated with bedded chert, is very similar to Mississippian sandstone within the Eagle Bay Formation and may have been derived from it. Similarly, Devonian aged quartz-feldspar porphyry rhyolite within the Fennell Formation is similar to Devonian felsic volcanic rocks within the Eagle Bay Formation and may be a more westerly expression of the same igneous activity. It appears probable, therefore, that the Fennell Formation accumulated in an oceanic (probably marginal) basin directly outboard from the Eagle Bay Formation and that subsequent tectonic juxtaposition of the two assemblages did not involve the extreme amount of telescoping that is indicated by divergent faunal assemblages and paleomagnetic data for terranes accreted more outboard in the western Cordillera (eg Cache Creek) (Monger, 1977; Monger & Ross, 1971; Monger & Irving, 1980).

The Chu Chua (Type 5) massive sulphide deposit occurs within upper division basalts of the Fennell Formation just east of Chu Chua Mtn. This deposit consists of semi massive to massive lenses of cupriferous pyrite (with minor chalcopyrite) and magnetite with an average grade of 2% copper and 0.1%

cobalt. These lenses are associated with massive to finely laminated pyritic cherty rock which may be of exhalative origin. They are underlain by altered, fractured, silicified and sparsely mineralized basalt and are sharply overlain by relatively fresh and barren pillowed basalt.

ROAD LOG

DAY 1

Day 1 will be devoted to the examination of geological units along Adams River and Adams Lake. Because of snow cover the geology and mineral deposits on Adams Plateau proper cannot be visited at this time of the year. From Kamloops the tour will proceed eastward along Trans Canada Highway approximately 69 km to Squilax, then north along the west shore of Adams River and Adams Lake.

Km 0 - Squilax Bridge across Thompson River. The bluffs to the south are of schist of the Silver Creek Formation.

Stop 1-1; km 6.9, Tsalkom Formation along Adams River. This roadside exposure of Tsalkom Formation greenstone is along the western shore of Adams River and outside the map area (Figure 1). These rocks, though not as foliated as those of Eagle Bay Formation display considerable deformation and few, if any, original structures. Massive and fragmental greenstone are the dominant rock types in Tsalkom Formation. Some pillow structures and intercalated shale and limestone beds have been mapped. The age of the Tsalkom Formation is unknown, though tentative correlations have been made by some with the Fennell Formation or with parts of the Kaslo Group of Permian Age.

Stop 1-2; Km 10.6, Sicamous Formation along Adams River. Typical exposure of Sicamous Formation. Black phyllitic limestone and calcareous argillite are the dominant Sicamous rock types. The age and external relationships of the Sicamous Formation remain unclear. It has been extensively sampled for conodonts (Okulitch and Cameron, 1976) and sampled again by Orchard and Preto in 1980, with no positive results. Jones (1959) considered the Sicamous to be of Precambrian Age, while Okulitch (1979) correlated it with the Upper Triassic Slocan Group on the basis of similar lithology. To allow for this correlation, Okulitch (1979) postulated a fault contact with the Eagle Bay. The Sicamous-Eagle Bay contact, however, has been drilled in the area between Scotch Creek and Sicamous during the course of mineral exploration (K.L. Daughtry, pers. comm., 1980) and appears unfaulted. Within the map area (Figure 1) unit EBL is similar to the Sicamous as exposed south of Adams Lake. This unit is considered part of the Eagle Bay Formation as it lies in apparent structural conformity and continuity with units EBS and EBK.

Stop 1-3; Km 17.6, Bush Creek on West Adams access road. The contact between calcareous phyllite and argillaceous limestone of unit EBL (possibly correlative with the Sicamous Formation) and sharply layered tuff of unit EBK is exposed on an old logging road. The contact is one of gradual change and conformity with no structural or stratigraphic breaks apparent. At the contact between the two units, skarn alteration and sparse sulphide mineralization is well developed and has been traced intermittently for more than 15 km to the northwest together with these two distinctive lithologies.

Early fold axes in unit EBL plunge to the northeast. Later folds show a southwesterly vergence and plunge to the northwest. Post-tectonic, east trending dykes of porphyritic quartz monzonite cut both unit EBL and EBK. The stratabound nature of the mineralization and its association with unit EBK, probably an altered intermediate to mafic tuff, allow speculation as to a possible syngenetic origin of the sulphides and, even more tenously, the possible structural overturning of the section.

Viewpoint; km 19.1 - Approximately 1.5 km north of stop 1-3, a viewpoint along the main access road offers an unrestricted view of Adams Lake. Units EBL and EBK with the accompanying mineralization are also exposed at this point. Directly across the lake are steep wooded slopes and cliffs underlain by felsic metavolcanics of unit EBA and containing a number of Type 3 (Table 1) massive sulphide occurrences (Beca showings). Exposures of sericite quartz-feldspathic schist and gneiss occur on the lakeshore below the viewpoint and again along the main road a short distance north of the viewpoint.

Stop 1-4; 30.2 km, 2.7 km east of Squaam Bay on West Adams access road. Phyllite and fine grained schist derived from intermediate to felsic metavolcanic rocks of unit EBA are exposed at this stop and a short distance to the north are structurally overlain by a major package of massive and fragmental basic metavolcanic rocks of unit EBA. The extreme shearing, foliation and internal faulting displayed at this stop are characteristic of this belt of mainly felsic metavolcanic rocks which continues to the northwest for approximately 10 km and to the southeast across Adams Lake.

Mesoscopic structures, particularly folds, are rarely seen in these highly sheared rocks. Fragmental members, where still recognizable, display an extreme flattening of clasts. Zircons from felsic metavolcanic rocks of this unit on the east shore of Adams Lake have yielded ages of 387 +/- 4 Ma (Figure 3).

Stop 1.5; 34.3 km, Somatosum Creek, 6.8 km along west Adams access road northeast of Squaam Bay. Stop 1.5 offers good exposures of massive and fragmental greenschist of unit EBG and a good view to the north and east of the Tshinakin limestone-dolomite. This major carbonate is at least 1000 m thick and is structurally underlain and overlain by basic metavolcanic rocks. The Tshinakin carbonate has been continuously traced from South Barriere Lake to the eastern boundary of the map area, and is known to continue for many kilometres to the east. Its northern termination at south Barriere Lake is probably an original pinchout and not due to folding or faulting. A major lens of similar carbonate, also associated with greenschist, occurs just southwest of North Barriere Lake, and again near Vavenby, east of Clearwater some 35 km to the north. On Adams Plateau this massive, competent carbonate has been responsible for an extreme anisotropy of deformation that has resulted in a significant amount of layer-parallel faulting. The Nikwikwaia Lake Synform (Figure 1) a large apparently rootless early structure outlined by a thin micaceous quartzite in greenschist, was overriden by the Tshinakin carbonate. Although the carbonate is deformed, it appears to have been barely warped as a unit. The entire package was later gently refolded.

Stop 1.6; Km 42.2, Spapilem Creek, 21.7 km northeast along West Adams access road from Squaam Bay. Orthogneiss of unit Dgn, considered to be part of the Late Devonian Mt. Fowler Batholith, intrudes amphibolite along the shore of Adams Lake, a short distance north of Spapilem Creek. From Spapilem Creek the excursion returns to Squaam Bay and proceeds northwestward along Sinmax Creek.

Stop 1-7; Km 61.0, Homestake Mine. This past producer of silver is presently under re-assessment, due to the recent increase in exploration for precious metals. The deposit occurs in intensely sheared pyrite-sericite-quartz phyllite of unit EBA. Mineralization consists of pyrite, tetrahedrite, galena, sphalerite and argentite with quartz and barite. Underground workings are not accessible except when rehabilitated. The deposit is considered to be a highly deformed, possibly remobilized massive sulphide (Type 3, Table 1) associated with altered felsic to intermediate metavolcanic rocks of unit EBA.

DAY 2

From Kamloops the tour will follow Highway 5 to Louis Creek, a distance of approximately 5 kilometres, then proceed east to Squaam Bay via the Sinmax Creek Road, and on to the Rea Gold deposit. A presentation of the geology and setting of this deposit will be given by geologists of Corporation Falconbridge Copper.

Km 0 - Junction of Sinmax Creek road with West Adams road at Squaam Bay

Stop 2-1; Km 32.5, Rea Gold Deposit. Massive sulphide lenses (Figures 5 and 6) occur at the contact between altered mafic volcanic rocks, mostly pyroclastics, and mafic debris flows and pyroclastics. The section is overturned, with strata dipping to the northeast but facing southwest. The massive sulphides are stratigraphically underlain by stockwork mineralization in altered and silicified mafic pyroclastics and are overlain by massive barite and/or chert. Chert and chert breccia mark the sulphide horizon between known lenses and beyond, thus marking a target for further exploration. Massive sulphide mineralization mainly consists of pyrite, arsenopyrite, sphalerite, galena, chalcopyrite and tetrahedrite. Gold occurs mainly in the massive sulphides, but values are also found in barite, stockwork mineralization and even fault gouge. Silver is mainly associated with barite and massive sulphides while zinc, lead and copper go exclusively with massive sulphides. Drill indicated reserves in two lenses to date stand at 120,000 tonnes grading 18.2 grams of gold per tonne, 141.2 grams of silver per tonne, 0.85 percent copper, 4.11 percent zinc, and 3.67 percent lead. Further details on the geology of the Rea deposit will be given on site by Corporation Falconbridge Copper staff.

The tour will return to Squaam Bay and proceed westward along Sinmax Creek road.

Stop 2-2; Km. 73.7, Forest Lake. Roadside exposures at Stop 2-2 display tight isoclinal early folds in quartzite, calcareous quartzite and other clastic metasedimentary rocks of unit EBS. Although fold axes here trend more easterly than the usual northerly to northwesterly regional average, these exposures afford a good example of the degree and style of deformation in this area and show the general southwesterly vergence of the folds.

Proceeding westward, the route enters the valley of Louis Creek and crosses the Louis Creek Fault approximately 7 km west of Forest Lake. The Louis Creek Fault is a major, northerly trending fault system that has been traced for more than 200 km from near Vernon to the Quesnel Lake region where it merges with the Pinchi Fault system. In the Vernon and Bonaparte Lake map areas (Jones, 1959: Campbell and Tipper, 1971), the Louis Creek Fault marks the boundary between the Omineca Crystalline Belt and the Intermontane Belt.

Stop 2-3; Km 98.8, Fennell Formation along Barriere River. Massive basalt and ribbon chert of the Lower Structural Division of the Fennell Formation (units 1Fb and 1Fc, Figure 1) are exposed at this locality. The cherts have yielded conodonts of Pennsylvanian age.

Barriere River marks the trace of the northeast trending Barriere River Fault. The wooded slopes across the valley are underlain by metasedimentary rocks of unit EBS. Movement along the Barriere River Fault appears to be greatest at the western end and lessens to the northest, away from Louis Creek Fault.

Stop 2-4; Km 119.0, Massive sulphides at Birk Creek. Visiting this locality requires leaving the vehicles at the new logging road bridge on Birk Creek and following an old trail along the north bank of the creek upstream for 1.2 to 1.7 Km to the Rainbow and Anaconda Lynx showings. These showings were discovered in the 1920's and are marked by short adits and dumps (Goutier, F., et.al, 1985). Stratabound lenses of semi-massive to massive pyrite locally in excess of 2 metres thick and carrying values in gold, silver, copper, lead and zinc occur in sericite-quartz phyllite of unit EBA. Gray phyllite, calcareous phyllite and some limestone are interlayered with the sericite-quartz phyllite, indicating a mixture of metasedimentary and metavolcanic rocks in the section. Early recumbent isoclinal folds with axial planes parallel to the pronounced schistosity trend roughly east-west, parallel to the mineral lineation and probably account for the discontinuous nature of the pyrite lenses.

Stop 2-5; Km 125.1, on main Birk Creek logging road at the fourth switchback. A well bedded turbidite succession including grit, quartzite, siltstone and argillite of unit EBP is well exposed. Graded bedding and some channel scours indicate that the beds here are right-side-up and dip gently to the northeast in most of the outcrop. In the northern part of the exposure they are thrown into a series of northerly trending, westerly verging late folds which locally overturn and tend to thicken the section. Approximately 4 km north of this stop, a lens of argillaceous bioclastic limestone interbedded with similar turbiditic sediments and very close to the Fennell contact has yielded an excellent collection of conodonts of Late Kinderhookian (Early Mississippian) age (M.J. Orchard, pers. comm., 1980). South of Barriere River a somewhat similar limestone, also associated with similar rocks of unit EBP has yielded conodonts that are now considered to be of Chesterian (Late Mississippian) age (M.J. Orchard, pers.

comm., 1980). Felsic to intermediate volcaniclastic horizons are rarely intercalated with Unit EBP phyllite, while dark grey phyllite and siltstone similar to that of Unit EBP is commonly intercalated with the felsic to intermediate volcanic rocks of Units EBA and EBF. These relationships,

combined with the Devonian radiometric age date for Unit EBA, suggest that these rocks are related stratigraphically and do not differ greatly in age. The Mississippian clastic rocks of Unit EBP are therefore not separated from other rocks within the Eagle Bay succession by a major unconformity such as that which separates Mississippian-aged Milford Group rocks from the underlying Cambro-Ordovician succession within the Kootenay Arc (see Okulitch, 1979). If a similar unconformity is present within the map area it occurs somewhere beneath Unit EBA.

From Stop 2-5 the excursion will return to Barriere and continue to Kamloops along Highway 5, a distance of approximately 60km. Having crossed the Louis Creek Fault near Barriere, we shall view the section along the valley of the North Thompson River to Kamloops. This portion of the tour is entirely in the Intermontane Belt and is mostly underlain by Late Paleozoic volcanic, volcaniclastic and sedimentary rocks. The northern portion of this Late Paleozoic assemblage is poorly understood in its structure, stratigraphy and correlation. Farther to the south similar rocks contain pods of Mississippian, Pennsylvanian and Permian limestone and are part of the Harper Ranch assemblage. Eocene-Oligocene volcanic rocks of the Skull Hill Formation of the Kamloops Group cap the hill west of the highway at Fishtrap Rapids. Farther to the south, near Kamloops, an overturned succession of

Upper Triassic argillite, shale and limestone, structurally underlies the Late Paleozoic assemblage.

REFERENCES

Campbell, R.B. and Tipper, H.W., 1971. Geology of Bonaparte Lake map-area, British Columbia; Geological Survey of Canada, Memoir 363, 100 p.

Gordey, S.P., 1979. Stratigraphy, structure and tectonic evolution of southern Pelly Mountains in the Indigo Lake area, Yukon; Geological Survey of Canada, Bulletin 318.

Gordey, S.P., Abbott, J.G., and Orchard, M.J. (1982). Devono-Mississippian (Earn Group and younger strata in east-central Yukon; Geological Survey of Canada, Paper 82-1B, pp. 93-100.

Goutier, F., et al., 1985. Mineral deposits of the Birk Creek Area: an introduction to a metallogenic study of the Adams Plateau-Clearwater Area (82M) in Geological Fieldwork 1984, British Columbia Ministry of Energy, Mines and Petroleum Resources, Paper 1985-1, pp. 67-76.

Jones, A.G., 1959. Vernon map-area, British Columbia; Geological Survey of Canada, Memoir 296, 186 p.

Monger, J.W.H. and Ross, C.A., 1971. Distribution of fusulinaceus in the western Canadian Cordillera. Canadian Journal of Earth Sciences, V.8, pp. 259-278.

Monger, J.W.H.,1977. Upper Paleozoic rocks of the western Canadian Cordillera and their bearing on cordilleran evolution. Canadian Journal of Earth Sciences, V. 14, pp. 1831-1859.

Monger, J.W.H. and Irving, E., 1980. Northward displacement of northcentral British Columbia; Nature, V.285, pp. 289-294.

Mortensen, J.K., 1982. Geological setting and tectonic significance of Mississippian Felsic metavolcanic rocks in the Pelly Mountains, southeastern Yukon Territory; Canadian Journal of Earch Sciences, V.19, pp. 8-22.

Okulitch, A.V., Wanless, R.K. and Loveridge, W.D., 1975. Devonian plutonism in south-central British Columbia. Canadian Journal of Earth Sciences, V.12, pp. 1760-1769.

Okulitch, A.V. and Cameron, B.E.B., 1976. Stratigraphic revisions of the Nicola, Cache Creek, and Mount Ida groups, based on conodont collections for the western margin of the Shuswap Metamorphic Complex, south-central British Columbia; Canadian Journal of Earth Sciences, V.13, pp. 44-53.

Okulitch, A.V., 1979. Lithology, stratigraphy, structure and mineral occurrences of the Thompson-Shuswap-Okanagan area, British Columbia; Geological Survey of Canada, Open File 637.

Okulitch, A.V., 1984. The role of the Shuswap Metamorphic Complex in Cordilleran tectonism: a review. Canadian Journal of Earth Sciences, V.21, pp. 1171-1193.

Preto, V.A. and Dickie, G.J., in preparation. Mineral Deposits of the Adams Plateau-Clearwater area.

Read, P.B. and Wheeler, J.O., 1976. Geology of the Lardeau west-half map-area, British Columbia. Geological Survey of Canada, Open File 432.

Schiarizza, P.A., 1983. Geology of the Barriere River-Clearwater area. British Columbia Ministry of Energy, Mines and Petroleum Resources, Preliminary Map 53.

Schiarizza, P.A. and Preto, V.A., 1984. Geology of the Adams Plateau-Clearwater area. British Columbia Ministry of Energy, Mines and Petroleum Resources, Preliminary Map 56.

Struik, L.C., 1981. A re-examination of the type area of the Devono-Mississippian Cariboo Orogeny, central British Columbia. Canadian Journal of Earth Sciences, V.18, pp. 1767-1775.

Struik, L.C. in preparation. Tectono-stratigraphic terranes of Cariboo Gold Belt and their correlations in Southern British Columbia.

Templeman-Kluit, D.J., 1979. Transported Cataclasite, ophiolite and granodiorite in Yukon: evidence of Arc-continent Collision; Geological Survey of Canada, Paper 79-14, 27p.

Uglow. W.L., 1922. Geology of the North Thompson Valley map-area, B.C. Geogical Survey of Canada, Summary Report 1921, Part A, pp. 72-106.

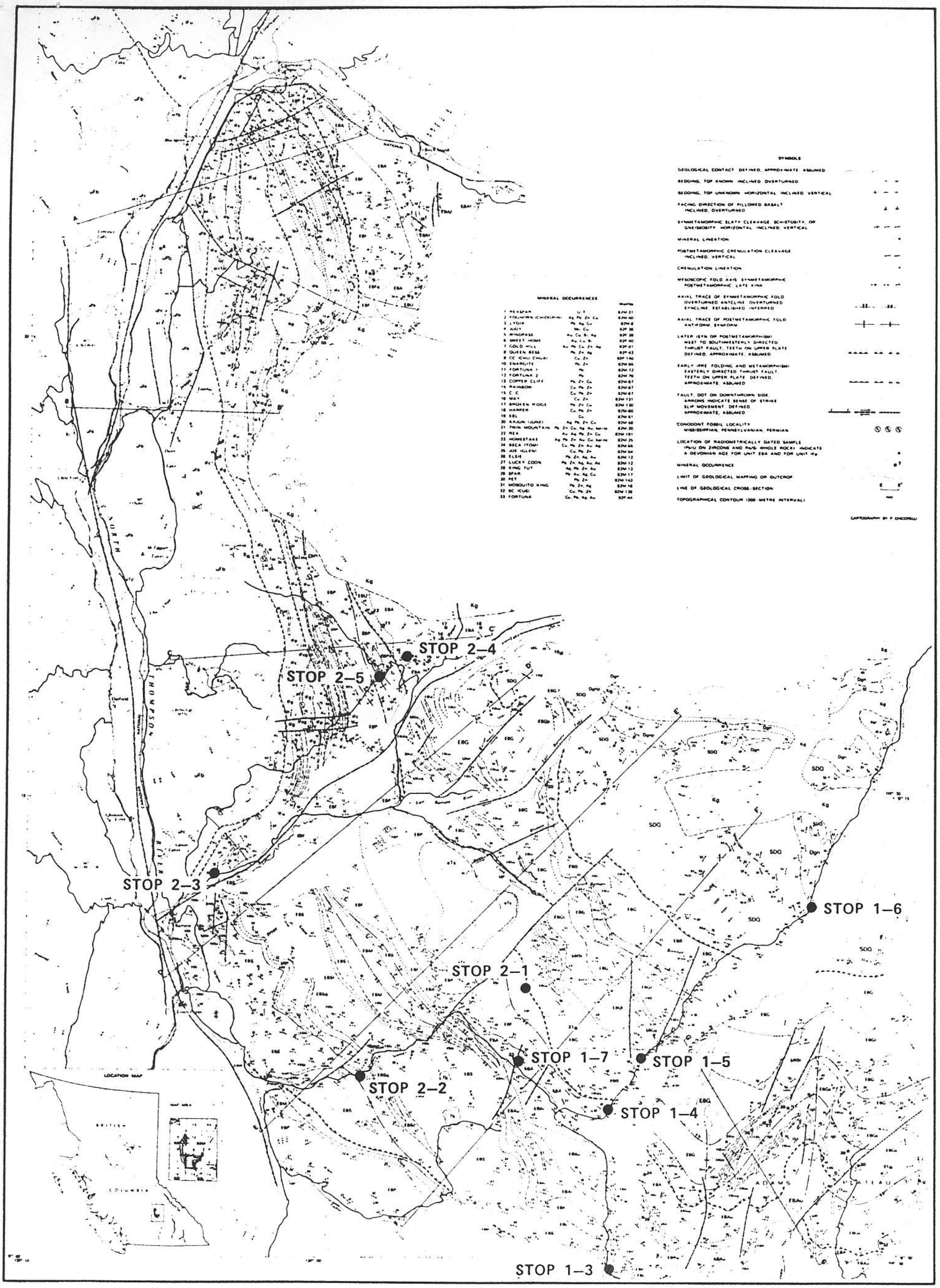
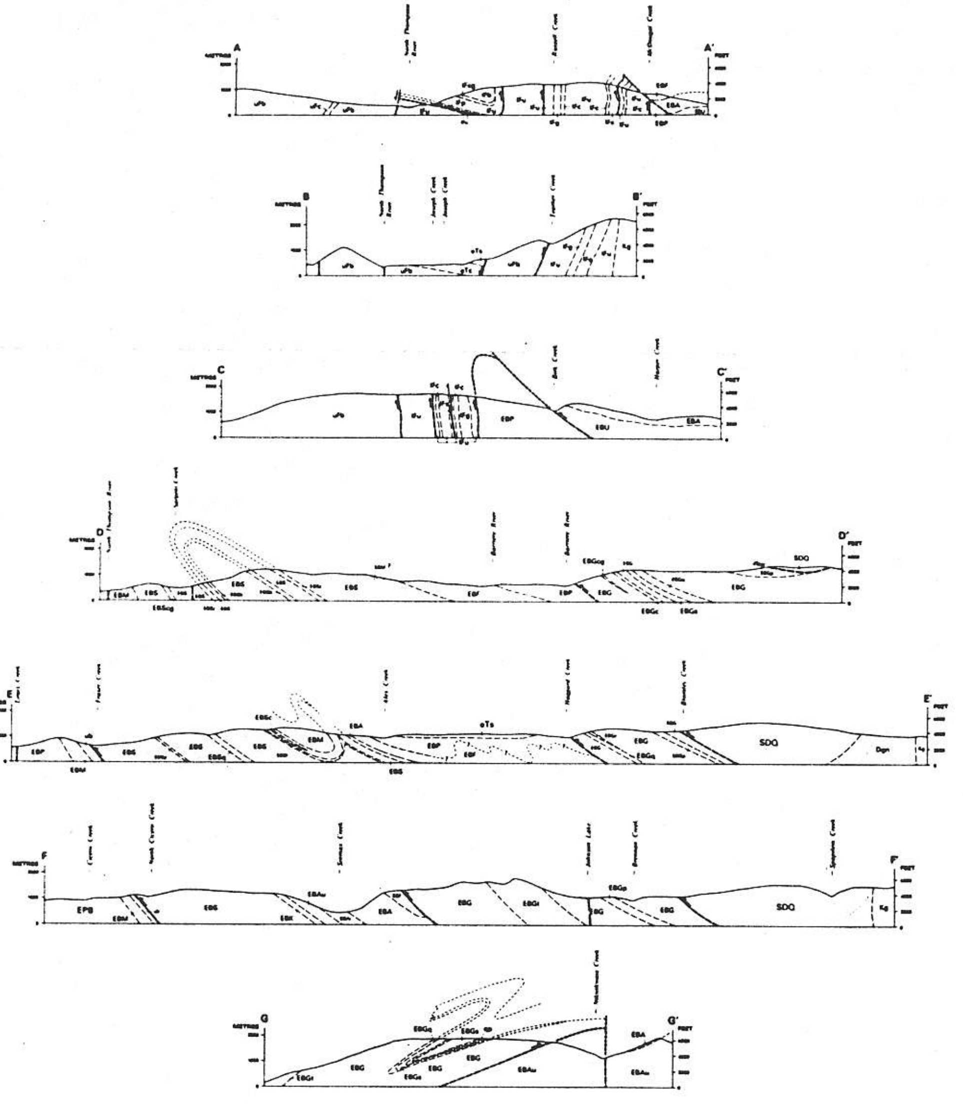

STOP 2–4
STOP 2–5
STOP 2–3
STOP 1–6
STOP 2–1
STOP 1–7
STOP 1–5
STOP 2–2
STOP 1–4
STOP 1–3

FIGURE 1



Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

PRELIMINARY MAP NO. 56

GEOLOGY OF THE ADAMS PLATEAU–CLEARWATER AREA

GEOLOGICAL COMPILATION BY
PAUL SCHIARIZZA AND V. A. PRETO,
BASED ON GEOLOGICAL MAPPING BY
V. A. PRETO, 1977–1980, P. SCHIARIZZA, 1978–1981,
G. P. McLAREN, 1978–1979, L. J. DIAKOW, 1979, AND
B. FORSTER, 1980

CONODONT IDENTIFICATIONS BY
M. J. ORCHARD,
GEOLOGICAL SURVEY OF CANADA,
VANCOUVER

RADIOMETRIC DATING BY
R. L. ARMSTRONG AND S. RYAN,
UNIVERSITY OF BRITISH COLUMBIA

KILOMETRES 0 1 2 3 4 5 KILOMETRES

SCALE 1:100 000

LEGEND

UPPER TRIASSIC AND LOWER JURASSIC NICOLA GROUP (?)

UPPER TRIASSIC OR LOWER JURASSIC

[TJv] AUGITE PORPHYRY BRECCIA

UPPER TRIASSIC

[Tl] DARK GREY LIMESTONE

DEVONIAN TO PERMIAN

ALLOCHTHONOUS INTERNALLY IMBRICATED OCEANIC ASSEMBLAGE

FENNELL FORMATION

UPPER STRUCTURAL DIVISION

[uFb] GREY AND GREEN PILLOWED AND MASSIVE METABASALT, MINOR AMOUNTS OF BASALTIC BRECCIA TUFF, DIABASE, GABBRO, AND CHERT

[uFc] GREY AND GREEN BEDDED CHERT

LOWER STRUCTURAL DIVISION

[lFc] GREY AND GREEN BEDDED CHERT, CHERTY ARGILLITE, SLATE, AND PHYLLITE

[lFb] GREY AND GREEN PILLOWED AND MASSIVE METABASALT, MINOR AMOUNTS OF BASALTIC BRECCIA AND TUFF

[lFg] GABBRO, DIORITE, DIABASE

[lFp] LIGHT TO MEDIUM GREY QUARTZ-FELDSPAR PORPHYRY RHYOLITE

[lFs] LIGHT TO DARK GREY SANDSTONE SILTSTONE, SLATE, PHYLLITE, AND QUARTZITE, MINOR AMOUNTS OF LIMESTONE AND CHERT, IN PLACES INCLUDES GREY TO GREEN QUARTZOSE AND FELDSPATHIC PHYLLITE (METATUFF)

[lFcg] INTRAFORMATIONAL CONGLOMERATE, CLASTS DERIVED EXCLUSIVELY FROM FENNELL FORMATION LITHOLOGIES

[lFu] UNDIVIDED: MAINLY lFs, lFg and lFb, BUT MAY INCLUDE ANY OR ALL OF ABOVE ROCK TYPES

DEVONO-MISSISSIPPIAN AND OLDER PARAUTOCHTHONOUS ROCKS (EBP TO SDQ)

EAGLE BAY FORMATION (EBP TO SDQ)

MISSISSIPPIAN

[EBP] DARK GREY PHYLLITE AND SLATE WITH INTERBEDDED SILTSTONE, SANDSTONE, AND GRIT, MINOR AMOUNTS OF CONGLOMERATE, LIMESTONE, AND METATUFF. EBPl–LIMESTONE, EBPv–METAVOLCANIC BRECCIA AND TUFF

DEVONIAN AND/OR MISSISSIPPIAN

[EBF] LIGHT TO MEDIUM GREY, RUSTY WEATHERING FELDSPATHIC PHYLLITE AND FRAGMENTAL PHYLLITE DERIVED FROM INTERMEDIATE TO FELSIC TUFF AND VOLCANIC BRECCIA; MINOR AMOUNTS OF DARK GREY PHYLLITE AND SILTSTONE. EBFq–LIGHT GREY MASSIVE "CHERTY QUARTZITE" (SILICEOUS EXHALITE ?)

DEVONIAN

[EBA] LIGHT SILVERY GREY TO MEDIUM GREENISH GREY SERICITE–QUARTZ PHYLLITE AND SERICITE-CHLORITE–QUARTZ PHYLLITE DERIVED FROM FELSIC TO INTERMEDIATE VOLCANIC AND VOLCANICLASTIC ROCKS INCLUDING PYRITIC, FELDSPATHIC, AND COARSELY FRAGMENTAL VARIETIES, LESSER AMOUNTS OF DARK GREY PHYLLITE, SILTSTONE, AND GREEN CHLORITIC PHYLLITE, INCLUDES BIOTITE–FELDSPAR–QUARTZ SCHIST AND GNEISS, BIOTITE–QUARTZ HORNFELS AND AMPHIBOLITE ADJACENT TO BALDY BATHOLITH; EBAf–FELDSPAR PORPHYRY, FELDSPATHIC PHYLLITE, PYRITIC SERICITE–FELDSPAR–QUARTZ PHYLLITE, METAVOLCANIC BRECCIA. EBAs–SERICITIC QUARTZO–FELDSPATHIC SCHIST AND GNEISS DERIVED FROM FELSIC INTRUSIVE ROCKS. EBAu–UNDIVIDED EBA and EBAs

DEVONIAN (?) AND/OR OLDER (?) (UNITS EBU TO EBG)

[EBU] LIGHT TO DARK GREEN CHLORITIC PHYLLITE, DARK GREY PHYLLITE AND SILTSTONE, LIMESTONE, QUARTZITE

[EBM] GREY AND GREEN VESICULAR AND PILLOWED METABASALT, GREENSTONE, CHLORITE SCHIST, MINOR AMOUNTS OF BEDDED CHERT, SILICEOUS PHYLLITE AND FINE-GRAINED QUARTZITE

[EBK] BANDED LIGHT GREY AND GREEN ACTINOLITE-QUARTZ SCHIST AND EPIDOTE–ACTINOLITE-QUARTZ ROCK, LESSER AMOUNTS OF GARNET-EPIDOTE SKARN, CHLORITIC SCHIST, AND SERICITE-QUARTZ SCHIST

DEVONIAN (?) AND/OR OLDER (?) (UNITS EBU TO EBG) (CONTINUED)

[EBL] CALCAREOUS BLACK PHYLLITE, DARK GREY LIMESTONE AND ARGILLACEOUS LIMESTONE

[EBS] GREY AND GREEN PHYLLITIC SANDSTONE AND GRIT, PHYLLITE AND QUARTZITE, LESSER AMOUNTS OF LIMESTONE, DOLOSTONE, GREEN CHLORITIC PHYLLITE, SERICITE–QUARTZ PHYLLITE, AND FELDSPATHIC SERICITE–QUARTZ PHYLLITE. EBSq–LIGHT GREY TO WHITE QUARTZITE, EBSl–LIMESTONE, DOLOSTONE, MARBLE, EBSg–GREENSTONE, PILLOWED METABASALT, CHLORITIC PHYLLITE; EBScg–CONGLOMERATE; EBSp–GREY PHYLLITE AND SILTSTONE; EBSt–SIDERITE–SERICITE–QUARTZ PHYLLITE AND FELDSPATHIC PHYLLITE (METATUFF); EBSp–PYRITIC SERICITE–QUARTZ PHYLLITE AND CHLORITOID–SERICITE–QUARTZ PHYLLITE

[EBG] MEDIUM TO DARK GREEN CALCAREOUS CHLORITE SCHIST AND FRAGMENTAL SCHIST DERIVED LARGELY FROM MAFIC TO INTERMEDIATE VOLCANIC AND VOLCANICLASTIC ROCKS, LESSER AMOUNTS OF LIMESTONE AND DOLOSTONE; MINOR AMOUNTS OF QUARTZITE, GREY PHYLLITE, AND SERICITE-QUARTZ PHYLLITE. EBGl–LIMESTONE, DOLOSTONE, MARBLE. EBGt–TSHINAKIN LIMESTONE MEMBER–MASSIVE, LIGHT GREY FINELY CRYSTALLINE LIMESTONE AND DOLOSTONE. EBGp–DARK TO LIGHT GREY SILICEOUS AND/OR GRAPHITIC PHYLLITE, CALCAREOUS PHYLLITE, LIMESTONE, CALC-SILICATE, CHERTY QUARTZITE; MINOR AMOUNTS OF GREEN CHLORITIC PHYLLITE AND SERICITE–QUARTZ PHYLLITE; EBGq–LIGHT TO MEDIUM GREY QUARTZITE. EBGp–DARK GREY PHYLLITE, CALCAREOUS PHYLLITE AND LIMESTONE, MINOR AMOUNTS OF RUSTY WEATHERING CARBONATE–SERICITE–QUARTZ PHYLLITE (METATUFF ?). EBGcg–POLYMICTIC CONGLOMERATE

SPAPILEM CREEK–DEADFALL CREEK SUCCESSION (SDQ)

LOWER CAMBRIAN (?) AND/OR HADRYNIAN (?)

[SDQ] LIGHT TO DARK GREY QUARTZITE, MICACEOUS QUARTZITE, GRIT, AND PHYLLITE, LESSER AMOUNTS OF CALCAREOUS PHYLLITE, CARBONATE, AND GREEN CHLORITIC SCHIST. NORTHEASTERN EXPOSURES INCLUDE STAUROLITE–GARNET–MICA SCHIST, CALC–SILICATE SCHIST, AND AMPHIBOLITE

TERTIARY OR QUATERNARY

[Tb] OLIVINE BASALT

MIOCENE OR PLIOCENE

[mTb] PLATEAU LAVA, OLIVINE BASALT

EOCENE

KAMLOOPS GROUP

[eTs] SKULL HILL FORMATION AND RELATED ROCKS: ANDESITE AND BASALT, INCLUDES MINOR AMOUNTS OF MUDSTONE AND SHALE IN THE VICINITY OF ALEX AND HAGGARD CREEKS

[eTc] CHU CHUA FORMATION: SANDSTONE, SHALE, CONGLOMERATE, COAL

CRETACEOUS OR TERTIARY

[qp] QUARTZ–FELDSPAR PORPHYRY

CRETACEOUS

BALDY BATHOLITH, RAFT BATHOLITH, AND RELATED ROCKS

[Kg] GRANITE AND GRANODIORITE

AGE UNKNOWN

[di] FOLIATED DIORITE, QUARTZ DIORITE, AND GABBRO

[ub] SERPENTINITE

LATE DEVONIAN

[Dgn] GRANITE AND GRANODIORITE ORTHOGNEISS. Dgnp INCLUDES SILLIMANITE-BEARING PARAGNEISS

FIGURE 1a

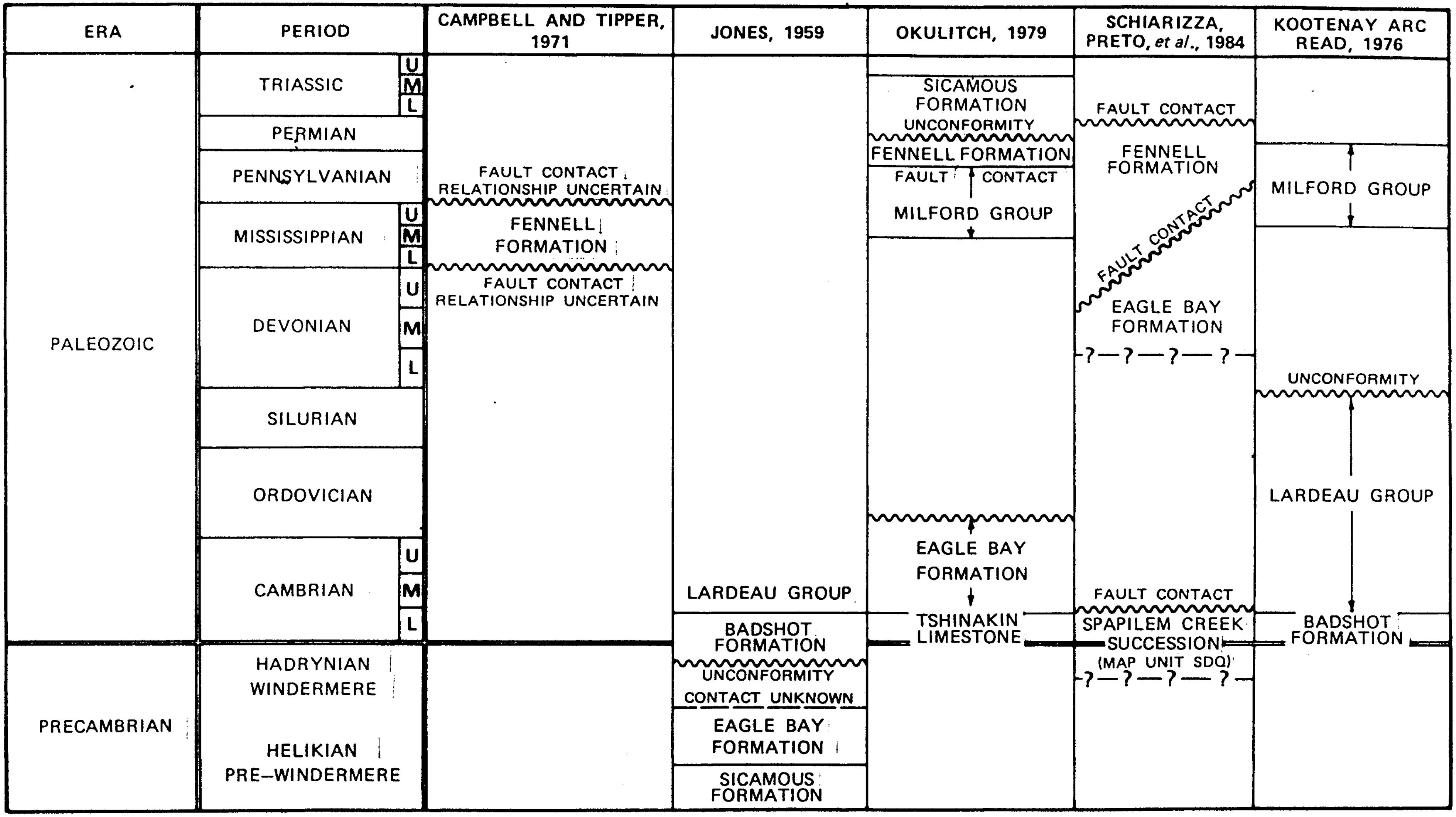


FIGURE 2. REGIONAL CORRELATION CHART

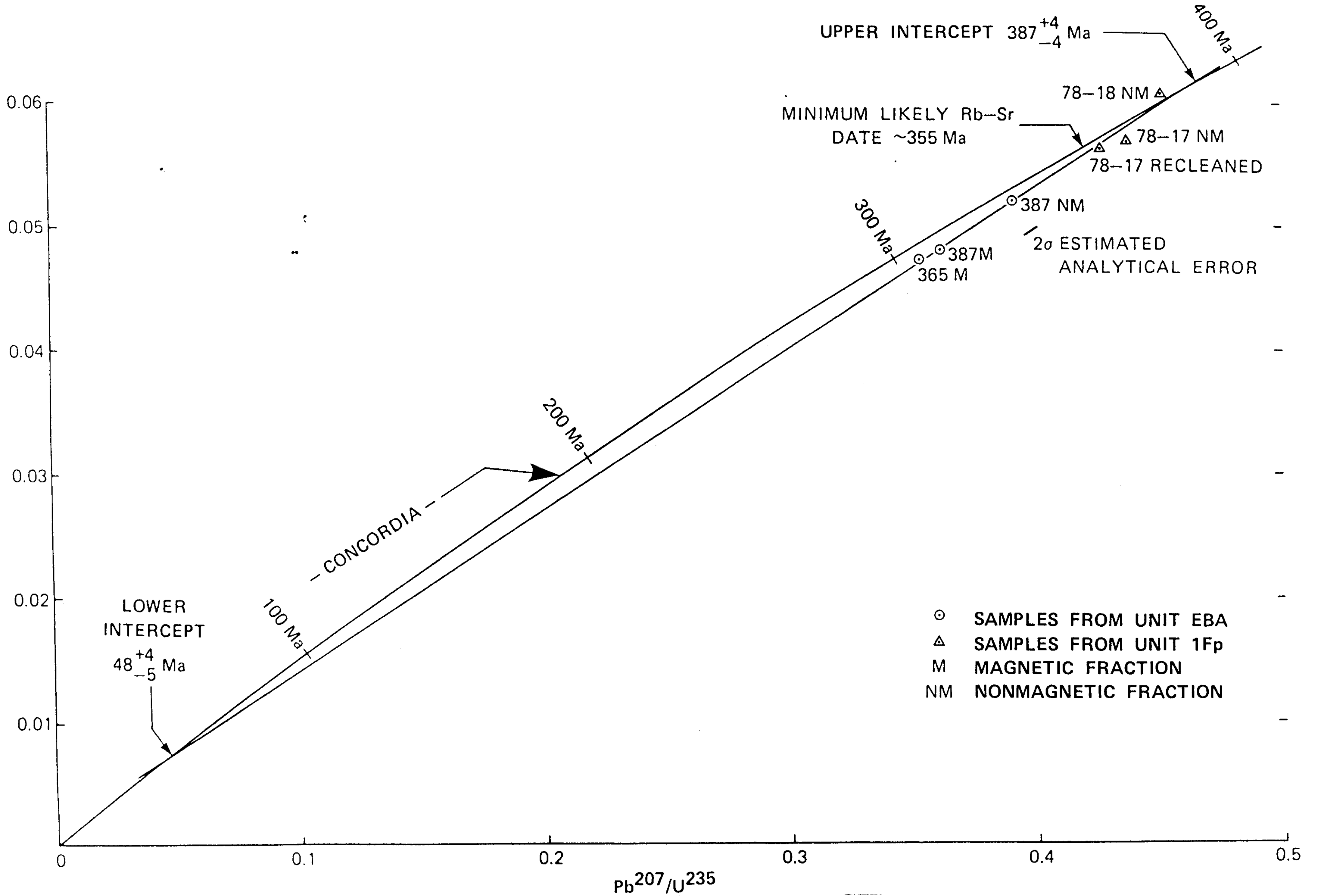


FIGURE 3. CONCORDIA PLOT FOR ZIRCONS FROM MAP UNITS EBA AND 1Fp
THE UPPER INTERCEPT OF 387±4 Ma INDICATES A LATE, DEVONIAN AGE FOR THE ZIRCONS EXTRACTED FROM MAP UNITS EBA AND 1Fp

Figure 4 - Generalized geological synopsis

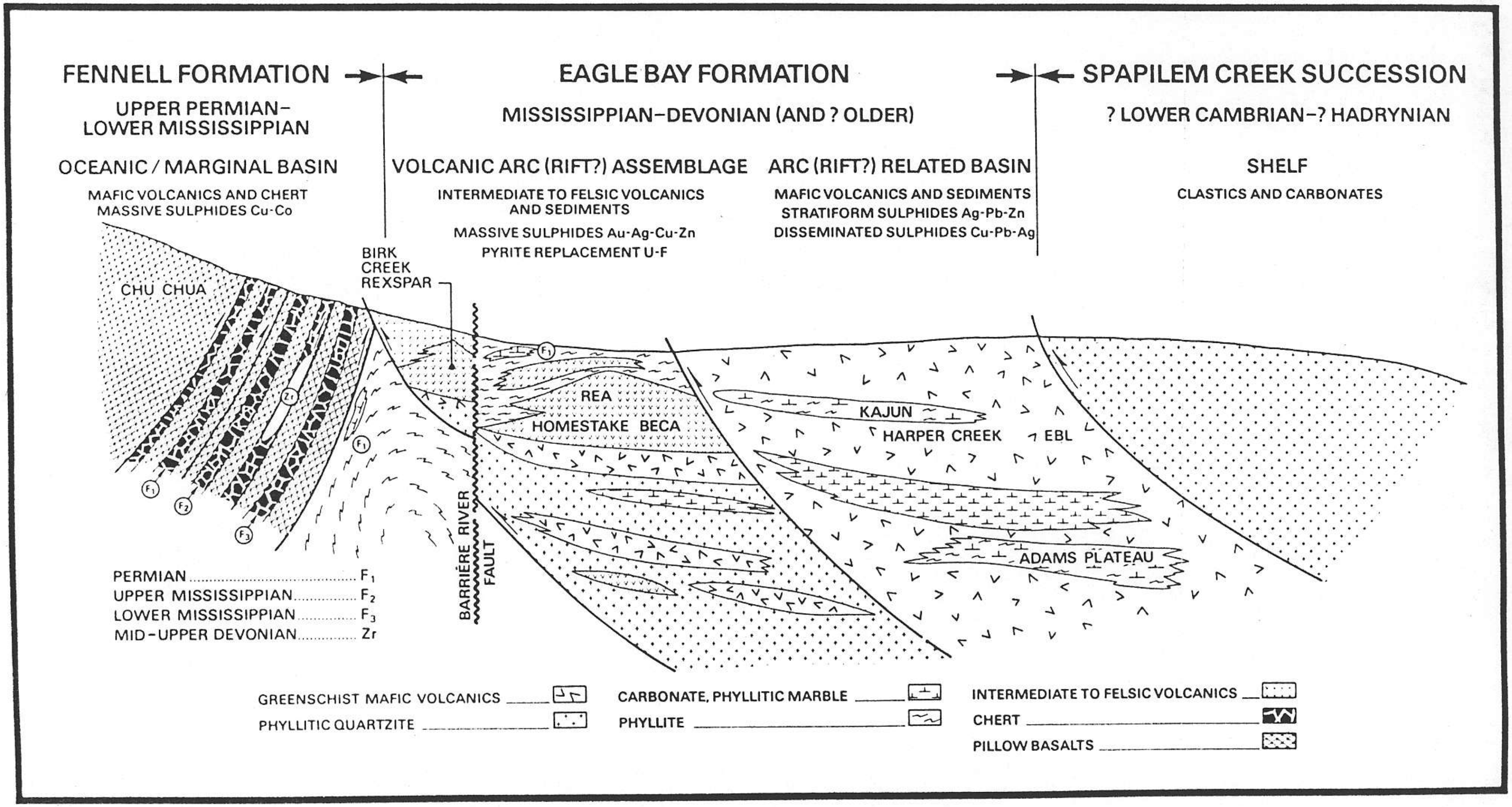


Figure 5

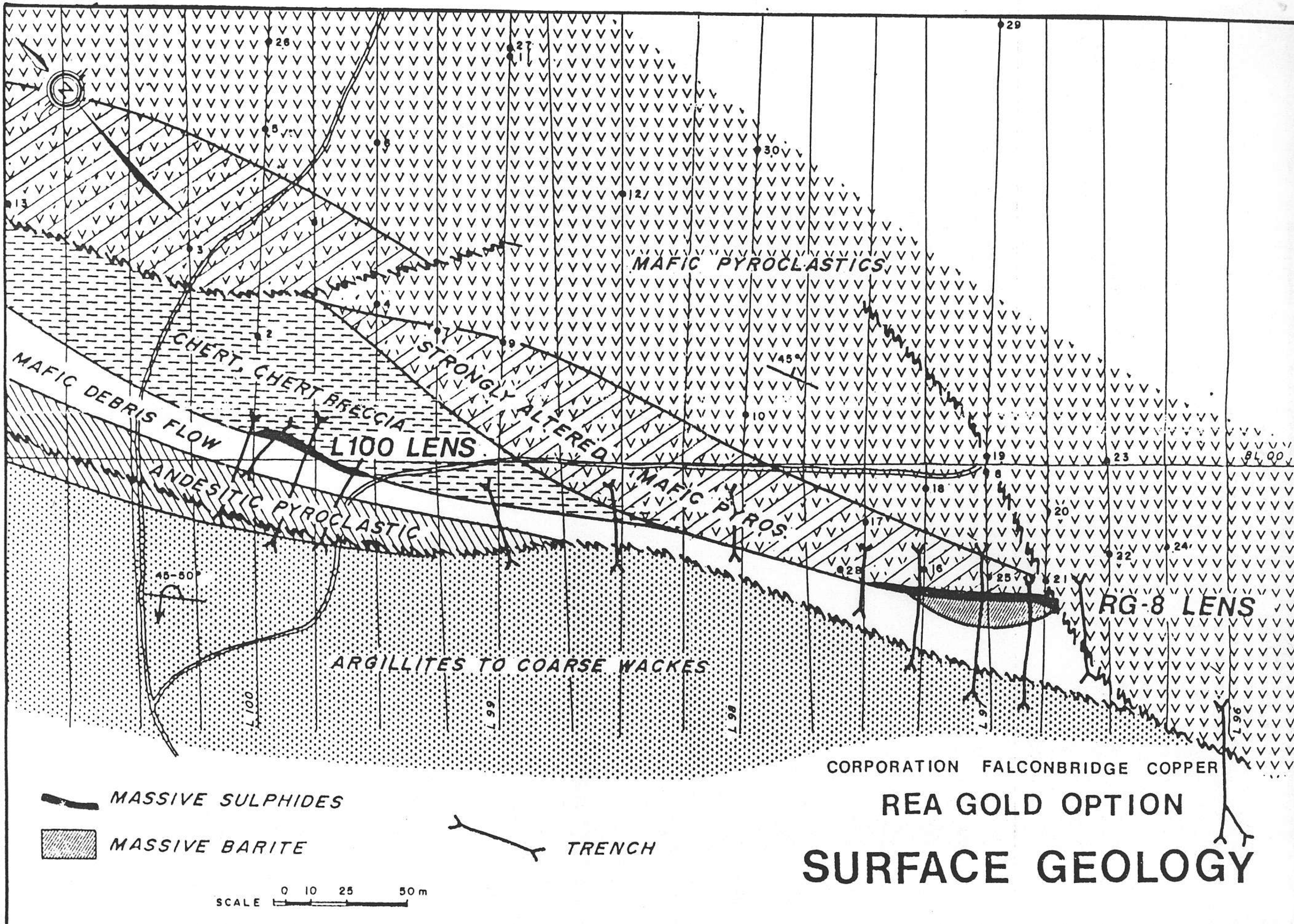
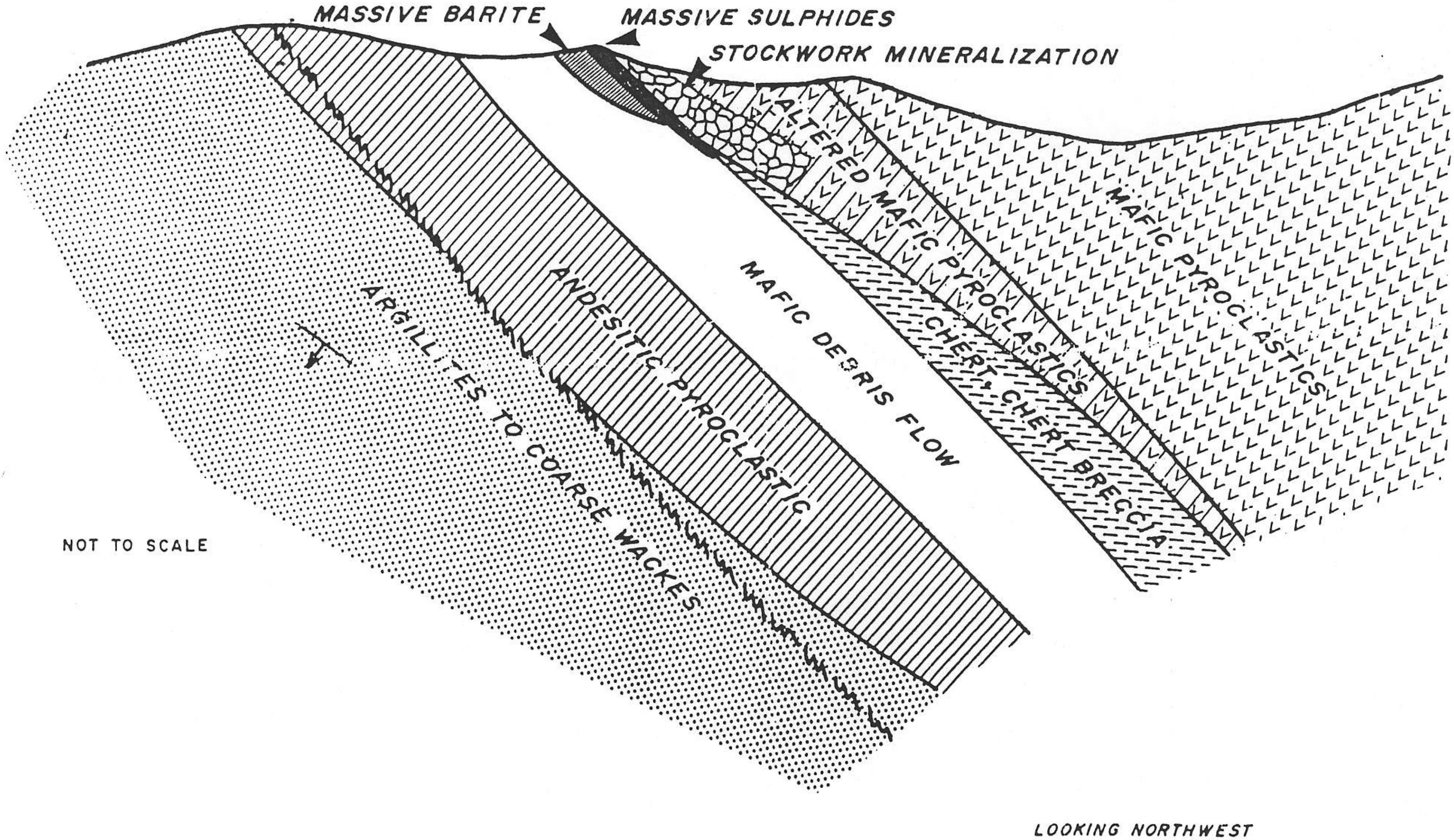

MAFIC PYROCLASTICS
CHERT, CHERT BRECCIA
STRONGLY ALTERED
MAFIC DEBRIS FLOW
L100 LENS
ANDESTIC PYROCLASTIC
MAFIC PYROS.
RG-8 LENS
ARGILLITES TO COARSE WACKES
BL 00
L100
L99
L98
L97
L96
45°
45-50°
MASSIVE SULPHIDES
MASSIVE BARITE
TRENCH
SCALE 0 10 25 50 m
CORPORATION FALCONBRIDGE COPPER
REA GOLD OPTION
SURFACE GEOLOGY

Figure 6

CORPORATION FALCONBRIDGE COPPER



REA GOLD OPTION

IDEALIZED CROSS SECTION

TABLE 1

MINERAL DEPOSITS OF THE ADAMS LAKE - BARRIERE AREA

	Deposit type	Prospects	Commodities	Rock Association	Probable Age
TYPE 1	Stratiform sulphides	Lucky Coon Mosquito King-Spar June	Ag-Pb-Zn	clastic sediments in a mafic volcanic succession: graphitic and siliceous phyllite, phyllitic limestone	Devonian
TYPE 2	Stratabound disseminations of sulphides	EBL Harper Creek Bowler Creek	Cu-Pb-Ag	mafic volcanics: greenschist, chloritic phyllite, sericite quartz phyllite	Devonian
TYPE 3	Massive sulphides	Hilton Homestake Birk Creek Beca Lydia Foghorn	Au-Ag-Cu Zn-Pb-Ba	felsic to intermediate volcanics: micaceous phyllite, pyritic schist	Devonian to Mississippian
TYPE 4	Pyrite-fluorite replacement	Rexspar	U-F	felsic to intermediate volcanics and intrusives: pyritic schist, micaceous phyllite	Devonian to Mississippian
TYPE 5	Massive sulphides	Chu Chua	Cu-Co	basic volcanics: pillow basalts chert	Pennsylvanian-Permian

V.A. PRETO and G.J. DICKIE