



British Columbia Geological Survey Geological Fieldwork 1980

BARRIERE LAKES – ADAMS PLATEAU AREA (82M/4, 5W; 92P/1E)

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INTRODUCTION

Mapping during the 1980 field season was continued in the Barriere Lakes–Adams Plateau area by the writer and D. Forster. Mapping along the Fennell–Eagle Bay contact from Chu Chua Creek to Clearwater was initiated by P. A. Schiarizza and is reported on separately. Work by the writer was concentrated in those portions of the project area between Sinmax Creek and Fadear Creek, northeast of Brennan Creek to the contact of the Baldy batholith, and from Nikwikwaia Creek to the east shore of Adams Lake. Three days were spent in late June with M. J. Orchard of the Geological Survey of Canada sampling carbonates throughout the project area in a further effort to find microfossils; results from this work were disappointing. Although mapping south of Sinmax Creek and east of Forest Lake indicates that folds outlined in 1979 in the Mount Dixon area continue for some distance to the southeast, sparse exposures and dense vegetation preclude accurate mapping of these structures.

'STRATIGRAPHY'

Most of the stratigraphic relationships between mappable units remain undetermined and consequently some aspects of the structural geology remain unresolved and stratigraphic repetitions caused by unrecognized early folds or faults may exist.

Two well-dated fossil localities in map unit 6 (numbers refer to Figure 9, Preto, *et al.*, 1980) and recent dating of zircons from felsic metavolcanic rocks of map unit 7a and quartz feldspar porphyry of map unit 2c in the Birk Creek–Sprague Creek area are beginning to help solve parts of the puzzle. The Eagle Bay Formation is an eugeosynclinal assemblage of high energy, proximal volcanic rocks such as tuff breccias and flows. Rapid lateral facies changes and discontinuity of units in such lithologies are inherent with the origin of the rocks. Use of the word 'stratigraphy' for the Eagle Bay assemblage at this point in time is therefore premature and the legend accompanying Figures 3 and 4 is really a description of mappable rock units, the age of only some of which is known at this time. For the sake of continuity and to minimize confusion most map unit numbers used on Figure 3 are the same as those used on Figure 9 (Preto, *et al.*, 1980).

EAGLE BAY FORMATION – Late Devonian to Early Mississippian (Units 1 and 3 to 12)

A great variety of rock types have been included in the Eagle Bay Formation, and no attempt to subdivide it will be made until more data on the age and stratigraphic relationships of this complex assemblage are obtained.

UNIT 1: Rocks of this unit are generally of higher metamorphic grade but lithologically similar to much of the rest of the Eagle Bay assemblage. The contact between higher and lower grade rocks, though poorly understood, was originally thought to be a structural discontinuity

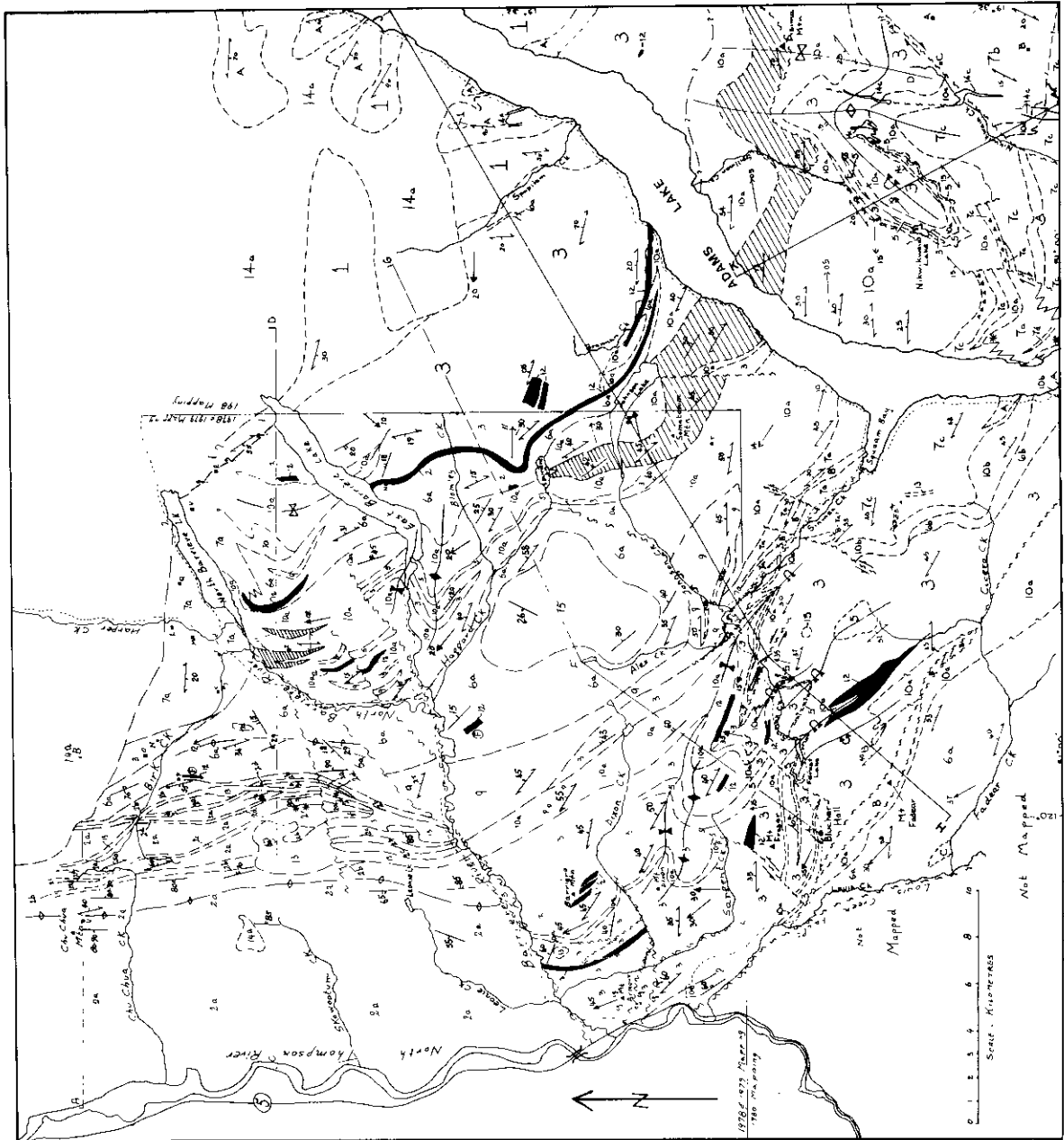


Figure 3. Generalized geological map of the Barriere Lakes-Adams Plateau area.

LEGEND

PLEISTOCENE AND/OR EARLIER

15 OLIVINE BASALT FLOWS, MINOR INTERBEDDED MUDSTONE

CRETACEOUS

14a HALY BATHOLITH BIOTITE QUARTZ MONZONITE GRANITE AND GRANODIORITE

14c QUARTZ FELDSPAR PORPHYRY DYKES AND SILLS

JURASSIC OR TRIASSIC

13 DIORITE AND MICRODIORITE

UPPER TRIASSIC ?

C SHEARED AND POORLY FOLIATED AUGITE PORPHYRY TUFF BRECCIA, SOME INTERBEDDED VOLCANIC SANDSTONE

AGE UNKNOWN

B SERPENTINITE

LATE DEVONIAN

A GRANODIORITE ORTHOGNEISS, CUTS ROCKS OF UNITS 1, 7a, 7c, AND 10b

LATE DEVONIAN--EARLY MISSISSIPPIAN

EAGLE BAY FORMATION (UNITS 1 AND 3 TO 12)

12 LIMESTONE DARK TO LIGHT GREY, BANDED TO MASSIVE, MINOR DOLOMITE

11 TSHINAKIN LIMESTONE MASSIVE LIGHT GREY TO WHITE, FINELY CRYSTALLINE LIMESTONE AND DOLOMITE

10a GREENSCHIST DERIVED FROM MAFIC MASSIVE AND PILLOWED TUFF, PHYLLITE, AND MINOR AMPHIBOLITE, TYPICALLY WITH STRIPED APPEARANCE DUE TO THIN GREY AND GREEN INTERLAYERS, OCCASIONALLY ALTERED TO GARNET EPIDOTE SKARN, LOCALLY WITH APPRECIABLE PYRRHOTITE, PYRITE, AND TRACES OF CHALCOPYRITE AND GALENA, LOCALLY WITH DISTINCTIVE ASBESTIFORM AMPHIBOLE

10b

9 BRICK RED TO RUSTY COLOURED SIDERITE AND/OR ANKERITE-RICH PHYLLITE

LATE DEVONIAN--EARLY MISSISSIPPIAN (CONTINUED)

8 HOMESTEAK SCHIST PLATY, LIGHT RUSTY YELLOW-WEATHERING SERICITE-PYRITE QUARTZ PHYLLITE AND FINE GRAINED SCHIST

7 INTERMEDIATE TO FELSIC PHYLLITE AND FINE-GRAINED SCHIST DERIVED MOSTLY FROM FELSIC TUFFS AND LITHIC TUFFS LOCALLY GRADES INTO MINOR, THINLY LAMINATED SERICITE-CHLORITE SCHIST AND PHYLLITE

6 (a) DARK GREY TO BLACK PHYLLITE, INTERBEDDED GRIT, SAND STONE, SILTSTONE, AND ARGILLITE
(b) CALCAREOUS DARK GREY TO BLACK PHYLLITE, WITH THIN LAYERS AND LENSES OF GREY, IMPURE LIMESTONE AND OF WHITE CALCITE, VERY SIMILAR IN LITHOLOGY TO PARTS OF THE SICAMOUS FORMATION
(c) RELATIVELY PURE LIGHT GREY QUARTZITE
(d) PYRITIC CHLORITOID SERICITE QUARTZ SCHIST AND SERICITE QUARTZ SCHIST

5 INTERLAYEDED GRIT, MICACEOUS QUARTZITE, PHYLLITE, CALCAREOUS QUARTZITE, IMPURE LIMESTONE, CALCAREOUS PHYLLITE, AND MINOR GREENSCHIST (c) CONGLOMERATE ON MOUNT ARMOUR)

4 AMPHIBOLITE, MICACEOUS QUARTZITE, GARNET BIOTITE SCHIST, IMPURE FINE-GRAINED MARBLE

LATE DEVONIAN

2 FENNEL FORMATION

(a) MASSIVE AND PILLOW BASALT WITH MINOR INTERBEDDED CHERT AND CHERY ARGILLITE
(b) CHERT AND RIBBON CHERT, LOCALLY BRECCIATED
(c) QUARTZ FELDSPAR PORPHYRY (SPHAGNE CREEK CREEK AREA)
(d) CONGLOMERATE WITH PEBBLES AND COBBLES OF CHERT, ARGILLITE, QUARTZ FELDSPAR PORPHYRY, AND BASALT

SYMBOLS

BEDDING TOPS KNOWN, OVERTURNED

BEDDING TOPS NOT KNOWN

EARLY SCHISTOSITY INCLINED, HORIZONTAL

PHASE 1 FOLD AXES

PHASE 2 FOLD AXES

INFERRED FAULT

GEOLOGICAL CONTACT

RADIOMETRIC AGE LOCALITY

FOSSIL LOCALITY

MINERAL OCCURRENCE

EARLY AXIAL TRACE

SYNFORM UPRIGHT, OVERTURNED

ANTIFORM UPRIGHT, OVERTURNED

LATE AXIAL TRACE

SYNFORM UPRIGHT, OVERTURNED

ANTIFORM UPRIGHT, OVERTURNED

NOTE: The order of superposition between the Fennell Formation and the Eagle Bay Formation has been established. Units within the Eagle Bay Formation, however, are lithologic units and not lithostratigraphic units. For instance, every unit of greenschist within the Eagle Bay has been designated 10, regardless of its stratigraphic position.

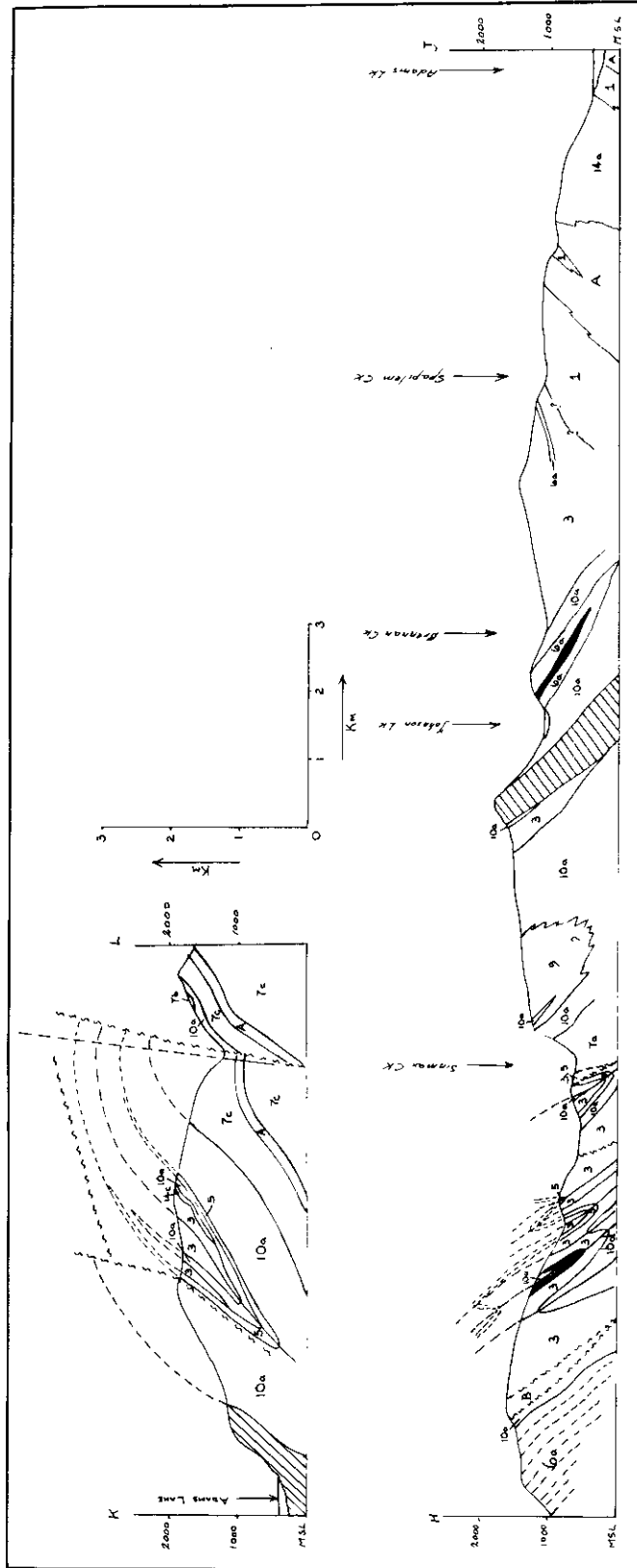


Figure 4. Cross-sections to accompany Figure 3.

(Preto, *et al.*, 1980, p. 28). Exposure is poor but mapping along and in the vicinity of Spapilem Creek suggests that the unit 1 assemblage is a more highly metamorphosed portion of the Eagle Bay. Because rocks of unit 1 are intruded by Late Devonian orthogneiss of unit A (Okulitch, *et al.*, 1975; Okulitch, 1979), they must be of Late Devonian or older age. This age is compatible with Late Devonian ages recently obtained for zircon from map unit 7.

UNITS 3, 4, AND 5: See descriptions in Preto, *et al.*, 1980.

UNIT 6a: An extensive unit of interbedded dark grey siltstone, sandstone, and slate, some dark grey to black phyllite and argillite with interbedded grit, some calcareous argillite, and some impure limestone is exposed in the southwest corner of the area. These rocks are separated from the Mount Feadar serpentinite belt and fault zone by a thin but continuous septum of greenschist, with which they are in structural and, apparently, stratigraphic continuity. This sedimentary package has been correlated recently with fossiliferous Upper Triassic strata that crop out east of Vernon (Okulitch, 1979). Structurally and lithologically, however, they more closely resemble rocks of unit 6a that crop out a short distance to the north. At least part of unit 6a is known to be of Early Mississippian age (Preto, *et al.*, 1980, p. 29).

UNIT 6b: A narrow belt of calcareous black phyllite and interbedded dark grey argillaceous limestone with conspicuous lenses of white calcite has been traced from the lower reaches of Bush Creek, a short distance south of the map-area, to approximately 4 kilometres north of South Cicero Creek. This unit structurally underlies, and is apparently conformable with, the very distinctive map unit 10b. Rocks of unit 6b are very similar to parts of the Sicamous Formation exposed along the main road south of Adams Lake, and may well be correlative with it. The Sicamous Formation recently has been assigned to the Upper Triassic Slocan Assemblage (Okulitch, 1979). The correlation is based on lithology because no fossil localities are known within the Sicamous Formation proper.

UNIT 7: Rocks that are similar to and structurally continuous with those of unit 7a at Squam Bay crop out on the slopes east of Adams Lake. These rocks are generally pyritic and have been derived from felsic tuffs and lithic tuffs as indicated by fragmental members with numerous flattened felsic clasts. Unit 7a is associated with foliated rhyolite (unit 7d) and grades laterally into nondescript, less pyritic, sericite and sericite-chlorite phyllite (unit 7c). Unit 7c is probably also of intermediate volcanic origin as indicated by scattered layers of volcanic breccia with flattened mafic and felsic clasts as much as 50 centimetres in the longest dimension. Fine-grained cherty tuff, calc-silicate rock, thin layers of impure limestone, and minor argillaceous sedimentary rocks (unit 7b) underlie the southeast corner of the map-area. This sequence contains abundant pyrite and pyrrhotite and numerous mineral showings. It dips gently to the north and northwest and is probably relatively thin. It structurally overlies and is apparently conformable with parts of units 7c and 10, but is in fault contact with rocks of units 3 and 10 to the northwest.

UNIT 8: See descriptions in Preto, *et al.*, 1980.

UNIT 9: A thin and possibly discontinuous layer of highly foliated, rusty weathering siderite and/or ankerite-rich phyllite is infolded with metavolcanic and metasedimentary rocks of units 3 and 10 on the wooded slopes south of Sinmax Creek opposite Johnson Creek. It is considered to be a distal equivalent of intermediate to acid metavolcanic rocks previously mapped from Johnson Creek to Barriere River.

UNIT 10: Greenschist, clearly derived from massive, fragmental, and, occasionally, pillowed mafic volcanic rocks, is widespread in the map-area and associated with virtually every other rock unit (see also Preto, *et al.*, 1980). Map unit 10b is an easily recognized and traceable unit with characteristic thin light grey and green layers. It structurally overlies calcareous phyllite of unit 6b and has been traced northwestward from the west shore of Adams Lake at Bush Creek for several kilometres to the south slopes of Sinmax Creek, south of the Homestake mine. Although it is dominantly sharply banded tuff and phyllite, unit 10b also contains some amphibolite. In several places it is altered to garnet-epidote skarn with abundant pyrite, pyrrhotite, and lesser amounts of chalcopyrite and galena. A distinctive asbestiform amphibole is associated with the zones of skarn and sulphide alteration.

UNIT 11: Tshinakin limestone – see description in Preto, *et al.*, 1980.

UNIT 12: A large lens of grey, massive to poorly banded limestone and dolomite forms a prominent ridge southeast of Forest Lake. To the southeast it pinches out before it reaches the north branch of Cicero Creek, but to the northwest it splits into two parallel ridges separated by a narrow septum of greenschist. It appears, therefore, to outline the keel of a tight, northerly plunging synform. A short distance to the northwest the same fold is outlined by a quartzite unit near Forest Lake. Although this carbonate has been included in map unit 12, it closely resembles, and is comparable in size, with part of the Tshinakin limestone and dolomite. Unlike the Tshinakin, it is primarily associated with clastic rocks of map unit 3 rather than greenschist of unit 10. If a firm correlation of this carbonate with the Tshinakin could be made, it not only would imply a major stratigraphic repetition either by folding or by faulting but also a major facies change from primarily greenschist in the north to mostly clastic rocks in the south.

DIORITE AND MICRODIORITE – Jurassic or Triassic (Unit 13)

See description in Preto, *et al.*, 1980.

BALDY BATHOLITH – Cretaceous (Unit 14)

See description in Preto, *et al.*, 1980.

OLIVINE BASALT FLOWS, MINOR MUDSTONE – Pleistocene and/or earlier (Unit 15)

See description in Preto, *et al.*, 1980.

ORTHOgneiss – Late Devonian (Unit A)

Biotite granodiorite and leucogranodiorite orthogneiss cut metamorphic rocks of unit 1 along the west shore of Adams Lake north of Spapilem Creek and in turn is cut by the Cretaceous Baldy batholith. This orthogneiss recently has been correlated with the Mount Fowler pluton to the east from which zircons give a Late Devonian age of 372 ± 6 Ma (Okulitch, *et al.*, 1975; Okulitch, 1979). A similar, and probably related, orthogneiss, occurs as a sill in the southern part of the map-area where it intrudes members of units 7 and

10. A Late Devonian age for this orthogneiss would be possible since zircons from parts of unit 7a have yielded ages of 367 to 379 Ma (R. L. Armstrong, 1980, personal communication).

SERPENTINITE – Age Unknown (Unit B)

Serpentinite (unit B) forms a prominent and well-defined belt from Blucher Hall to Cicero Creek. The serpentinite is massive to brecciated, occasionally contains short fibers of asbestos, and generally forms prominent ridges, the largest of which is Mount Fadear. Three separate bodies, separated by narrow septa of unit 10 greenschist, have been mapped. The generally sheared and brecciated appearance of this rock, as well as the tendency of ultrabasic rocks of this type to follow fault zones, suggests that the serpentinite marks a major southeast-trending fault zone which branches off Louis Creek fault at Blucher Hall.

UPPER TRIASSIC ? (Unit C)

Sheared and poorly foliated augite porphyry tuff breccia and interbedded volcanic sandstone crop out over a limited area near the confluence of Fadear and Louis Creeks. The volcanic rocks form a small area surrounded by sparse exposures of sedimentary rocks of unit 6, but the contact is not exposed. Volcanic rocks with conspicuous augite phenocrysts are rare in the rest of the map-area and it is therefore probable that this unit is a sheared block of younger, possibly Mesozoic, volcanic rocks faulted in from the Intermontane Belt west of the Louis Creek fault.

STRUCTURE

Mapping south of Sinmax Creek and further mapping on the Adams Plateau have generally confirmed the structural pattern previously outlined (Preto, *et al.*, 1980). It has also shown that the Nikwikwaia Lake fold is a larger and more complex structure than originally thought. The relative open folds of the Mount Dixon area continue and become much tighter to the east and southeast of Forest Lake.

Poor stratigraphic control is the biggest obstacle to a fuller understanding of the structure in the map-area. Bedding-cleavage relationships, where observed, indicate a general westerly vergence of folds and the axes of most earliest recognizable folds deforming the bedding plunge to the north or even slightly east of north.

EARLY FOLDS

NIKWIKWAIA LAKE FOLD: Although it becomes less clearly defined eastward, Nikwikwaia Lake synform was traced more than 12 kilometres from Spillman Creek to the Nikwikwaia Creek fault. Within this distance the trend of the surface axial trace of the fold changes from northeast to southeast and east, and the axis plunges in various directions. It is apparent that the synform is refolded about northerly trending structures of undetermined plunge. The strong and polyphase deformation indicated by the Nikwikwaia Lake fold is in sharp contrast with the minimal external deformation of the nearby Tshinakin limestone. This thick, competent carbonate is only slightly warped; in no way is its deformation comparable to that of the rocks that structurally underlie it. A great deal of layer-parallel faulting or thrusting must have occurred at or near the lower Tshinakin contact in order to accommodate this discordance. This faulting apparently predated the second period of deformation which deforms the Tshinakin and the strata beneath it in much the same way.

FOREST LAKE – SINMAX CREEK AREA: East and southeast of Forest Lake there are a series of synformal and antiformal west-verging folds that have been outlined with varying degrees of accuracy and reliability. The surface axial traces of these structures trend northwesterly and, in most cases, can be related to traces of comparable folds in the Mount Dixon area to the northwest. Mesoscopic structures and geometric constraints indicate that axial planes dip moderately to the north-northeast. Fold axes also plunge moderately to the north-northeast.

LATE FOLDS

Late-generation mesoscopic structures trend in a number of directions within the map-area. In the southwest, and particularly along the east slopes of Louis Creek, a strong rodding lineation produced by the intersection of later fracture cleavage with the layer-parallel schistosity plunges at moderate angles to the north and northwest. This feature is spatially related to the Louis Creek fault and was probably produced by movement along it.

Along Adams Lake, late-generation mesoscopic folds and associated crenulation lineation trend east-west and plunge gently in either direction.

On the Adams Plateau, the Nikwikwaia Lake synform is refolded about northerly trending axes.

FAULTS

Several early, layer-parallel faults have been postulated either as required by the geometric constraints of fold structures like the Nikwikwaia Lake fold or to account for rotation of structures and truncation of map units. The Mount Feadar serpentinite belt was undoubtedly emplaced along a major northwest-trending fault. If the pelitic sediments southwest of Mount Feadar correlate with similar sediments in the Haggard Creek–North Barriere River area, then this fault caused considerable repetition of the section. Undoubtedly more unrecognized layer-parallel faults exist in this highly deformed region.

Numerous map units are offset by later north to northeasterly trending faults and fractures. On the Adams Plateau, many of these faults are followed by post-tectonic porphyry dykes (unit 14c).

AGE DATING

Recent dating of zircons from felsic metavolcanic rocks of unit 7a that are exposed east of Adams Lake have yielded three dates which range from 367 to 379 Ma and suggest that these rocks are of latest Devonian age (R. L. Armstrong, 1980, personal communication). Similarly, two zircon separates from quartz feldspar porphyry west of North Barriere River have yielded ages of 369 to 380 Ma (R. L. Armstrong, 1980, personal communication). This porphyry (map unit 2c, Preto, *et al.*, 1980) cuts basaltic rocks of the Fennell Formation but also occurs as clasts in intraformational conglomerate that is interbedded with basalt and chert of the eastern facies of the Fennell. The quartz feldspar porphyry was selected for dating because these field relationships suggested that it was roughly of the same age as the Fennell. The zircon dates are in reasonably close agreement with Early Mississippian ages given by conodonts from limestone pods in Eagle Bay rocks of unit 6 (Preto, *et al.*, 1980; M. J. Orchard, 1980, written communication). These data suggest that Eagle Bay rocks in this area are of Late Devonian to Early Mississippian age, rather than

Cambro/Ordovician (Okulitch, 1979). The radiometric dates also confirm field relationships (Preto, *et al.*, 1980) that indicate that the uppermost Fennell Formation correlates with Eagle Bay rocks in the Barriere Mountain—Mount Dixon area.

REFERENCES

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