GEOLOGICAL SURVEY OF CANADA

OPEN FILE 2172

GEOLOGY OF PRINCE GEORGE (EAST HALF) MAP AREA (93 G/E HALF) DESCRIPTIVE NOTES AND F0SSIL LIST

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1990

Natural Resources Canada Ressources naturelles Canada

Canada

GEOLOGY OF THE PRINCE GEORGE (EAST HALF) MAP AREA (93G/E)

Geology by H.W. Tipper, 1959-1960; S.P. Leaming and J.E. Armstrong, 1966-1967; and L.C. Struik, 1983-1985.

Surficial geology compiled and reinterpreted by E.A. Fuller, 1989.
Bedrock geology compiled and interpreted by L.C. Struik, 1989.
Mineral occurrences and fossil localities compiled by T. Lynch, 1989.

British Columbia Ministry of Energy, Mines and Petroleum Resources is gratefully acknowledged for supplying recent, unpublished data on mineral occurrences for the Prince George map area, and for permission to quote from its mineral inventory system MINFILE. Joey Freese shared information on the Slide Mountain Group serpentinitic rocks between Hixon and Terry creeks during 1984 and 1985 while employed with Mark Management Ltd. Ted Faulkner, District Geologist at Prince George for the British Columbia Ministry of Energy, Mines and Petroleum Resources, shared his knowledge of the local geology.

DESCRIPTIVE NOTES and FOSSIL LIST

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About 200 million years ago as North America drifted westward it bulldozed some islands and ocean floor rocks. Rocks that were the continental margin (bulldozer blade) and the scrapings from the ocean floor are now partly exposed in the Prince George map area. The east half of the map area, described here, consists mainly of the North American continental margin rocks and those rocks deposited onto and intruded into it during and after the scraping event.

Before 200 million years ago, along the length of the North American continental margin, an outer ribbon of islands was separated from the mainland by a fairly deep sea (greater than 1 km?) and, closer in, by a shallow sea. Those different rock sequences deposited on the islands and in each of the seas and the depositional environments they represent; we call terranes. The sequence of rocks scraped from the ocean floor is another terrane. Rocks that were deposited after the bulldozing are called overlap assemblages.

The legend and these notes are divided on the basis of terranes and the overlap assemblages and describe the rocks from youngest to oldest. Rocks of the eastern half of the Prince George map area are similar to those along much of the length of the Canadian Cordillera to the southeast and northwest.

All mineral occurrences mentioned in these notes are previously known and recorded within the British Columbia Ministry of Energy, Mines and Resources publication MINFILE.

OVERLAP ASSEMBLAGES

Quaternary

Unconsolidated Recent and Pleistocene sediments cover most of the area and dominate the geological map pattern. Deglaciation outwash, lake, and drift deposits form the bulk of those sediments. Bedrock is exposed mainly in the highlands and along the larger creeks and rivers.

The distribution of Quaternary deposits has been interpreted from aerial photographs and some ground control. Tipper (1961) described the glacial deposits as 1.5 to 6 m thick, and covering the area with "...monotonous uniformity...". He found that all rocks of the area were covered by glacial ice during the later part of the Pleistocene ice age, and that the ice had moved "... from the west in the northwest quarter, from the southwest quarter, and from the south in the southeast quarter."

An extensive lake or system of lakes formed during the melting of the last Pleistocene ice sheet and has left sand, silt and muddy-silt lake deposits over a large region around Prince George, along Nechako River, and north of West Road (Blackwater) River. Clague (1987, p.156-157) described the general history and extent of the lake throughout central British Columbia. The active slumping and landslide along the Fraser River at Moose Heights has been described by Evans (1982).

Some placer gold has been found in Quaternary sediments (MINFILE # 9, 25?, 26, 41?, 49, 50?, 51?, 52, 53?, 54, 55?, 56, 57, 58, 59, 60, 61, & 62).

Tertiary

The Tertiary was a tectonically active period. Granitoid bodies formed and were intruded, and large volumes of basalt and rhyolite were erupted. In places depressions grew and became filled with sediments and volcanic flows. The youngest Tertiary unit, the Chilcotin Group, consists of flood basalts that form nearly horizontal plateaus and locally fill some valleys. These flood basalts are preserved mostly in the western part of the area where the pre-Chilcotin Group topography was relatively flat.

Underlying the Chilcotin Group basalt are three mid-Tertiary units of poorly consolidated and generally undeformed sediments. These formations, the Australian Creek, Fraser Bend and Crownite, occupy local(?) sedimentary basins now exposed only along the larger rivers. Rouse and Matthews (1979) showed that the unconsolidated sediments range in age from Oligocene to late-Middle Miocene and interpreted the older sediments of the Australian Creek Formation to have been deposited on a surface that was downdropped during the middle to late Tertiary to the level of the Fraser River valley. Like Tipper (1961) and other previous workers they suggested that the Miocene sediments may have been deposited in a river system that was ancestral to the Fraser River.

Placer gold has been found in probable Tertiary sediments (MINFILE # 26, 41, 51?, 53, 54, 55, 56, 57, 58?, 60, 61?, 62). Diatomite (MINFILE # 34, 39, 46) and various clay deposits (MINFILE # 34, 35, 36, 37, 38, 39, 40) are also known from these units.

The middle Tertiary sediments overlie Eocene and possibly some Oligocene basalt, andesite, and minor sediments assigned to the Endako Group. Tipper (1961) included these basalts with younger ones now thought to be part of the Chilcotin Group. The volcanic rocks are mainly pyroclastic and volcaniclastic breccias, agglomerates and shattered flows. Descriptions of the rocks from the Fraser River valley south of the map area are given by Rouse and Matthews (1979).

Beneath the basalt, felsic volcanic rocks and minor sediments of the Ootsa Lake Group are presumed to be of Paleocene and Eocene age. The rhyolite is generally banded on the millimetre to centimetre scale. Rhyolite dykes which intrude faults that offset compressional structures near Mount Bowron are presumed to be the same age as the flow rocks of the Ootsa Lake Group.

Cretaceous

The Cretaceous Naver Pluton intrudes rocks of both the Quesnel and Barkerville terranes. The borders of the pluton are generally sharp. In some places border-parallel 2-10 m thick sheets(?) of country rock are included within the granite up to 200 m inboard of its contact. Although fairly homogeneous in composition the texture of the pluton varies from coarse with orthoclase megacrysts to aplitic. Small satellites of the pluton are exposed throughout much of the southern part of the area. U-Pb and K-Ar ages for two sites range from 113 to 98 Ma. Tipper et al. (1979) showed the location of two sites dated with K-Ar on biotite (107 Ma, 104 Ma; for technical details see Wanless et al., 1967). Tipper et al. mapped the main part of the Naver Pluton as two bodies on either side of the Eureka Thrust, however the two bodies are now interpreted to be one, and to have intruded the Eureka Thrust.

The Naver Pluton is associated with a molybdenite occurrence on the Naver River near Mary Lake (MINFILE # 6).

Jurassic

The Middle Jurassic Ste. Marie Pluton intrudes rocks of Quesnel Terrane and may have intruded the Eureka Thrust at depth. Except for having hornblende rather than biotite as the predominate mafic mineral, the Ste. Marie Pluton is macroscopically similar to the Naver Pluton. Potassium feldspar of the Ste. Marie Pluton is mainly microcline whereas that of the Naver Pluton is orthoclase. A lower intercept U-Pb age on zircon from one site is 167 Ma (inheritance of Precambrian lead) and a K-Ar age on hornblende from the same site is 165 Ma. Small nearby hornblende granitic plutons were assigned to the Jurassic on the basis of their similarity with the Ste. Marie Pluton.

TERRANES

Cache Creek Terrane

Tipper (1961) reported Upper Permian fossils from the Cache Creek Group, and he speculated that the age of the group may span the Permian. The Cache Creek Group limestone in southwest McLeod Lake map area (directly to the north of the Prince George map area) is primarily Pennsylvanian based on conodonts (M.J. Orchard, pers. comm., 1989). In Prince George east half, rocks of the Cache Creek Group are mainly ribbon chert and limestone, are tightly folded, and are commonly broken by many narrow faults. The limestone is generally recrystallized, veined with calcite, and locally silicified. No depositional relationships have been seen between the sedimentary and volcanic rocks.

Quesnel Terrane

Tipper (1961) assigned these rocks to the Late Triassic and Lower Jurassic on the basis of poorly preserved marine fossils. These rocks are here informally referred to the Nicola Group because they are age and lithological equivalents. To the south in the Quesnel Lake map area these rocks have been informally called the Quesnel River Group (Campbell, 1978), and more recently have also been referred to the Nicola Group (Bailey, 1989). To the north in the McLeod Lake map area they are Takla Group (Muller and Tipper, 1969).

The volcanic rocks of this terrane were erupted in a Japanese-style subduction setting, and the intrusive rocks fed the younger volcanics. Coarse-grained agglomerates are interpreted as proximal to volcanoes and the finer-grained volcaniclastic rocks to be distal to the volcanoes. The units 'a' to 'd' are divided on the basis of this interpretation; that the finer-grained the rock, the farther it was deposited from the volcano. The limestone is thought to have been deposited from reefs built up around submarine volcanoes.

Rocks of Quesnel Terrane have copper and gold concentrations, and locally silver, lead and zinc (MINFILE # 3, 4, 5, 7, 13, 14?, 19, 20, 21, 23, 24, 26(in the area of), 48). Placer gold showings appear to be spatially related to lode gold deposits.

A large quartz vein within Quesnel Terrane fragmental volcanic rock has been rated for industrial silica (MINFILE # 29).

Slide Mountain Terrane

Slide Mountain Terrane consists of the Slide Mountain Group, which is subdivided into the Antler Formation and Crooked Amphibolite. The distinction between the units is based on geography and metamorphic style rather than stratigraphic succession; the units may be laterally equivalent. The Antler Formation is confined to the eastern part of the area and consists of basalts and sedimentary rocks with recognizable primary textures. The Crooked Amphibolite lies between rocks of Quesnel and Barkerville terranes, and consists of serpentinite, actinolite- and hornblende-amphibolite, and minor talc, and has very few recognizable primary textures. Conodonts date ribbon chert of the Antler Formation to the southeast in the McBride map area as lower Carboniferous through Permian (Struik and Orchard, 1985). A Carboniferous age has been determined for zircons extracted from an agglomerate of the Antler Formation along Highway 16 (U-Pb isotopic method; P. van der Heyden, pers. comm., 1987).

Copper has been found within the Antler Formation basalt at Taspai Creek (MINFILE # 1), and silver, lead, copper, gold and zinc are reported from the Antler Formation and other rocks adjacent to a splay of the McLeod Lake Fault (MINFILE # 30).

Barkerville Terrane

In Prince George map area, Barkerville Terrane consists entirely of two units of Snowshoe Group metasedimentary rocks. The garnet grade metamorphism of these rocks is regional rather than a contact aureole around the Naver Pluton. Age of the two units mapped here is uncertain. However both units trend southeast into sequences mapped as uppermost Hadrynian and lower Paleozoic in McBride and Quesnel Lake map areas (Struik, 1988a). The rocks outline isoclinal and superposed asymmetric folds and locally display intense ductile shear fabrics. These rocks are overthrust by the Crooked Amphibolite along a mylonitic zone (Eureka Thrust), and by the Antler Formation along a narrow gouge and cataclastic zone (Pundata Thrust). The Eureka Thrust is best exposed near Terry Creek.

A mica prospect on Hixon Creek lies in schists of the Snowshoe Group (MINFILE # 47).

Cariboo Terrane

Although the two units of limestone assigned to Cariboo Terrane are exposed close to each other at Mount Bowron they are quite different in age and structural setting. The Triassic limestone was dated by shells and conodonts and looks similar to rocks of the Pardonnet Formation of the central and northern Rocky Mountains (M.J. Orchard and E.T. Tozer, pers. comm. 1985). The thin bedded limestone and slate sequence contains some thicker limestone layers made up of shells and shell fragments. At Mount Bowron, these rocks are interpreted to be overthrust by the Slide Mountain Terrane.

Medium bedded limestone (4-40 cm beds) east of Mount Bowron may be Cambrian (contains). Silty argillite interbeds are normally graded and cross-laminated. The Cambrian limestone is separated from the Slide Mountain Group by a splay of the McLeod Lake Fault that has dextral strike-slip motion.

STRUCTURAL GEOLOGY

Upper Tertiary rocks are essentially undeformed. Lower Tertiary rocks are described by Tipper (1961)(as "... warped into broad open folds and ...cut by many normal faults." Lower Tertiary and older bedrock is characterized by abundant brittle style faults and fractures. These faults offset folds on the outcrop scale, and in most places define several conjugate shear sets, and are generally vertically and steeply dipping. Individual faults range from hair width to metres wide surfaces. The wider faults are gouge zones filled with slickensided rock lenses and phyllonite. In some places motions on some of the conjugate fault systems can be determined as dextral strike-slip, but the majority of them remain unclassified. Many of the dextral strike-slip faults, such as the Vama Vama, Narrow Lake, Stony Lake, Willow River, and Pinchi, extend northwest and southeast of the Prince George map area.

Rocks of Barkerville Terrane and the main body of the Naver Pluton core a broad northwesterly plunging arch, about which the Eureka Thrust is folded. The arch is bound to the east by a series of dextral strike-slip faults and to the west by a broad synclinorium and the Pinchi Fault. Outcrop-scale folds also trend generally to the northwest-southeast, however, there are local variations. Outcrop-scale recumbant, isoclinal folds have been seen in the Triassic greywacke and tuff units of the "Nicola Group" and are thought to exist within rocks of the underlying Snowshoe Group. Generally rock of the Snowshoe Group appears to have a higher metamorphic grade than the overlying sequences.

Eureka, Pundata, Pleasant Valley, and Spanish thrusts separate the imbricated terranes from each other and are the earliest structures recognized (Struik, 1986, 1988b). Equivalents of these faults can be recognized for hundreds of kilometres southeast and northwest of the Prince George map area. Crooked Amphibolite of Slide Mountain Terrane and Quesnel Terrane were thrust eastward onto Barkerville Terrane along the Eureka Thrust. This thrust fault continues southeasterly for over 200 km, and is part of a thrust system that puts Slide Mountain Terrane onto more easterly terranes throughout the length of the Cordillera. Antler Formation of Slide Mountain Terrane was thrust eastward onto both Barkerville and Cariboo terranes along the Pundata Thrust (a possible lateral equivalent of the Eureka Thrust). Tipper (1961) suggested that the Slide Mountain Group rocks were thrust onto Late Triassic rocks near the Bowron River. Such seems to be the case, and the Triassic rock (mainly limestone) is here interpreted as part of the Cariboo Terrane. Cariboo Terrane was thrust westward onto Barkerville Terrane along the Pleasant Valley Thrust. Quesnel Terrane has been internally imbricated along the Spanish Thrust; it puts western volcanic rocks over eastern sedimentary rocks (Struik, 1988b).

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FOSSIL COLLECTIONS FROM PRINCE GEORGE EAST HALF (93G/E)

1-1

UTM: N5881750, E553400 (Junction of John Boyd Ck. and Cottonwood River)

Noted but Uncollected

Ammonite

Age: Probably Jurassic
Identified by H.W. Tipper, 1963, 1989, found by D. Hyndman, 1963

2-1

UTM: N5893050 E532550

GSC C-5670

Woodwardia maxoni Knowlton
Corylus macquarrii (Forbes) Heer

Age: Probably Eocene
Identified by F.M. Heuber, 1968, collected by H.W. Tipper, 1960

GSC C-5670

Carya sp. (large)
Quercus sp.
Alnus sp. (4-pored)
Myrica sp.
Tilia (weak pored)
Pterocarya sp.
Picea sp. (small)
Pinus haploxylon-type
Pseudotsuga
Cedrus perialata Martin & Rouse
Lycopodium sp.
Osmunda cinnamomites Martin & Rouse

Age: Alexandria-Narcosli equivalent, - probably Late Oligocene to Early Miocene.
Identified by G.E. Rouse, 1967, collected by H.W. Tipper, 1960

GSC C-7336

Alnus sp.
Fagus sp.
Carya (1 small, 1 large)
Onagraceae
Tilia sp.
Ulmus sp.
Juglans sp.
Pinus(strobus-type)
Taxodium hiatipites Wodehouse

Age: Probably Oligocene or Early Miocene; equivalent to Alexandria-Narcosli.
Identified by G.E. Rouse, 1967, collected by H.W. Tipper, 1965

2-2
UTM: N5879430, E527100 (west bank of Fraser River)

GSC C-5534

Platanus cf. *dissecta* Lesquereux

Age: No specific age can be determined
Identified by F.M. Heuber, 1968, collected by H.W. Tipper, 1965

GSC C-5671

Quercus simulata Knowlton
Quercus cf.
columbiana Chaney

Age: Probably Middle to Late Miocene
Identified by F.M. Heuber, 1968, collected by H.W. Tipper, 1960

GSC C-5671

Pterocarya sp.
Alnus sp. (small annuli; small size)
Corylus sp.
Quercus sp.
Carpinas sp.
Ulmus sp.
Tsuga heterophyllites Martin & Rouse
Tsuga minisaccata Martin & Rouse

Cedrus perialata Martin & Rouse
Pinus (contorta-latifolia type)
Abies sp.
Pseudotsuga sp.
Picea sp. (big)
Polypod spores
Liquidambar sp.
Jugians sp.

Age: Late Miocene-Early Pliocene, Chilcotin sediment equivalent.
See Mathews & Rouse, 1963, GSA Bull. 74, p. 55-60.
Identified by G.E. Rouse, 1967, collected by H.W. Tipper, 1960

GSC C-5672

Freshwater sponge spicules
Melosira granulata (Ehrenberg) Rolfs
with small percentage of larger diatoms
Ulmus sp.

Age: late Middle and Late Miocene
Identified by F.M. Heuber, 1968, collected by H.W. Tipper, 1960

GSC C-5672

Carya sp.
Ulmus sp.
Quercus sp.
cf. *Typha* sp.
Tsuga heterophyllites Martin & Rouse
Tsuga minisaccata Martin & Rouse
Cedrus perialata Martin & Rouse
P. contorta-latifolia type
Abies sp. (large)
Pseudotsuga sp.
Picea sp. (large)
Taxodium hiatipites Wodehouse

Age: Late Miocene - Early Pliocene, Chilcotin sediment equivalent.
Identified by G.E. Rouse, 1967, collected by H.W. Tipper, 1960

GSC C-5534

Tsuga heterophyllites Martin & Rouse
Keteleeria sp.
Juglans sp.
Pterocarya sp. (heavy annulate pores-older)
Carya sp.
Alnus sp.
Liquidambar sp.
Laevigatosporites sp.
Deltoidospora sp.

Age: Tertiary. Equivalent to Alexandria-Narcosli, probably Late Oligocene-Early Miocene
Identified by G.E. Rouse, 1967, collected by H.W. Tipper, 1965

7-1

UTM: N5927100, E522420 (east bank of Fraser River above Woodpecker Island)

GSC C-42511

Poorly preserved ammonites

Age: cannot be determined
Identified by H. Frebold, 1961, collected by H.W. Tipper, 1960

GSC C-91759

Undeterminable ammonite

Age: Probably Middle Jurassic
Identified by H. Frebold, 1974, collected by J. Ager, 1974

GSC C-91754

Crushed ammonite, probably sonniniid
Impression of small ammonite: stephanoceratid, gen. et sp. indet.

Age: Bajocian
Identified by H. Frebold, 1974, collected by L. Jeletzky, 1974

GSC C-91757

Extremely poorly preserved small ammonites comparable to the sonniniids from GSC 91754

Age: Probably Bajocian

Identified by H. Frebold, 1974, collected by L. Jeletzky, 1974

GSC C-91748

Small laterally crushed ammonites, probably inner whorls of sonniniids
Small *Inoceramus* Sonninia? sp. indet.

Age: Bajocian
Identified by H. Frebold, 1974, collected by H.W. Tipper, 1974

GSC C-91760

Ammonites, very poorly preserved. Probably inner whorl of sonniniids.

Age: Bajocian
Identified by H. Frebold, 1974, collected by L. Jeletzky, 1974

GSC C-91743

Impressions of fine-ribbed stephanoceratids and *Sonninia?* sp. indet.

Age: Bajocian
Identified by H. Frebold, 1974, collected by L. Jeletzky, 1974

GSC C-91746

Small laterally crushed ammonite, involute, numerous fine ribs.
Resembles *Bradfordia costidensa* Imlay and
Lissoceras cf. L. *semicostulatum* Buckman.
See Imlay, Bajocian ... Alaska, 1964, p. B39, pl. 8, figs. 1-10 (for *Bradfordia)* and p. 38, pl. 4, figs. 7, 8 (for *Lissoceras).*

Identified by H. Frebold, 1974, collected by H.W. Tipper, 1974

GSC C-91747

Sonninia sp.
indet. (poor impressions of inner whorl)
Stephanoceratid gen. et sp. indet. (fragment of medium size whorl)

Age: Early Bajocian
Identified by H. Frebold, 1974, collected by J. Ager, 1974

GSC C-91741

Stephanoceras sensu lato sp. indet. (fragmentary impressions)

Age: Bajocian
Identified by H. Frebold, 1974, collected by L. Jeletzky, 1974

7-2
UTM: N5924100, E522100

GSC C-91742

Poorly preserved sonniniids

Age: Bajocian
Identified by H. Frebold, 1974, collected by G. Burrowes, 1974

GSC C-91853

Halobiid bivalves indet. (very closely packed together)

Age: Middle or Late Triassic
Identified by E.T. Tozer, 1974, collected by H.W. Tipper, 1974

GSC C-41591

Numerous small specimens of either *Daonella* or *Halobia*

Age: Triassic. If they are *Daonella* the age is Middle Triassic; if *Halobia,* Late Triassic
Identified by E.T. Tozer, 1960, collected by H.W. Tipper, 1960

7-3
UTM: N5913800, E521420

GSC C-7332

Cedrus perialata Martin & Rouse
small close-reticulate Pine (or *Podocarpus)*
Pinus(contorta-type)
Picea sp.
Pseudotsuga sp.
Quercus sp.
Pterocarya sp.
Betula sp.
Myrica sp.
Ulmus sp.
Tsuga minisaccata Martin & Rouse
Tsuga heterophyllites Martin & Rouse
Keteleeria sp.
Glyptostrobus sp.

Age: Later Miocene-Early Pliocene
Identified by G.E. Rouse, 1967, collected by H. W. Tipper, 1965

GSC C-7337

Myrica sp.
Ulmus sp.
Pterocarya sp.
Alnus sp.
Betula (papyrifera-type)
Pinus (strobus- type)
Pinus (contorta- type)
Tsuga heterophyllites Martin & Rouse
Tsuga minisaccata Martin & Rouse
Picea (1 small, 2 large)
Taxodium hiatipites Wodehouse
Abies (large)
Pseudotsuga sp.

Age: Probably later Miocene-Pliocene. N.B. chance of Pleistocene, with re-worked Tertiary.
Identified by G.E. Rouse, 1967, collected by H.W. Tipper, 1965

7-4

UTM: N5912100, E523400 (Whiteslanding Creek)

GSC C-5669

Metasequoia occidentalis (Newberry) Chaney
Ginko adiantoides (Unger) Heer
Liquidambar pachyphyllum Knowlton leaf and fruit
Zelkova drymya (Lesquereux) Brown

Age: Probably in the range of the Oligocene to Middle Miocene
Identified by F.M. Heuber, 1968, collected by H.W. Tipper, 1960

GSC C-5669

Fagus sp.
Quercus sp.
small *Carya* sp.
Alnus sp.
Pterocarya sp.
Liquidambar sp.
Ulmus sp.
Juglans sp.
Weak-pored *Tilia* sp.
Taxodium hiatipites Wodehouse
Picea sp.
Tsuga minisaccata Martin & Rouse

Age: Alexandria-Narcosli equivalent, probably Oligocene-Early Miocene
Identified by G.E. Rouse, 1967, collected by H.W. Tipper, 1960

8-1

UTM: N5921550, E561800

GSC C-102839

bryozoans
Neogondolella sp.
Paragondolella sp.

Age: Middle-Late Triassic, late Ladinian-Carnian
Identified by M.J. Orchard, 1989, collected by L.C. Struik, 1985

10-1

UTM: N5946875, E519070 (east bank of Fraser River)

GSC C-68114

Indeterminate alacocerid probably belonging to Atractitidae but not identifiable with certainty even at the family level.

Age: Most likely Late Triassic to Late Jurassic... but the earlier Triassic or late Palaeozoic age cannot be excluded.
Identified by E.T. Tozer, 1965, collected by H.W. Tipper, 1965

10-2

UTM: N5462100, E520520 (Redrock Creek)

GSC C-7912

Fungal spores
Converrucosisporites sp.
Lycopodium sp.
Anemia cf.
A. *poolensis* Chandler
Bisaccate, conifer, probably Pineaceae
cf. *Podocarpus* sp.
cf. *Liquidambar* sp.
cf. *Corylus* sp.
??*Aquilapollenites* sp.
Alnus verus (Potonie) Martin & Rouse
Tilia sp.
Pterocarya sp.
Betula sp.
Tricolpites sp.
Castanea-type
Tricolpate, striate, genus unknown

Age: Probably early Tertiary, post-Cenomanian
Identified by W.S. Hopkins, 1970, collected by H.W. Tipper, 1968

15-1

UTM: N5962100, E517090 (east bank of Fraser River)

GSC C-5673

Taxodium dubium (Sternberg) Heer
Gymnosperm wood

Age: No specific age determination can be made
Identified by F.M. Heuber, 1968, collected by H.W. Tipper, 1960

GSC C-7329

Castanea sp.
Quercus sp.
Fagus sp.
Carya sp.
Myrica sp.
Small pine (45u), cf. *contorta*-type
Picea sp.
Keteleeria sp.
Taxodium hiatipites Wodehouse
Glyptostrobus sp.
Osmundacidites primarius (Wolff) Couper
Parviprojectus
sp. nov.,
reworked Late Cretaceous (cf. Brazeau and Edmonton).

Age: Oligocene-Miocene; Aust.-Narcosli equivalent
Identified by G.E. Rouse, 1967, collected by H.W. Tipper, 1960

GSC C-7338

Osmunda sp.
Laevigatosporites sp.
Pinus (contorta-latifolia type)

Age: Oligocene-Early Miocene
Identified by G.E. Rouse, 1967, collected by H.W. Tipper, 1965

16-1
UTM: N5973800, E565280

GSC C-42501

Monotis cf.
subcircularis Gabb
Halobia ? sp.
indet.

Age: The *Monotis* are Late Triassic, Norian.
The *Halobia* specimens are on different pieces of rock and are probably Late Triassic.
Two Late Triassic zones are most

likely represented in this collection.
Identified by E.T. Tozer, 1961, collected by H.W. Tipper, 1960

16-2

UTM: N5972900, E560750

GSC C-103964

Spiriferid brachiopod
Bivalve fragments
Crinoid columnals

Age: Probably Triassic
Identified by E.T. Tozer, 1985, collected by L.C. Struik, 1985

16-3

UTM: N5970300, E559350

GSC C-103965

Smooth ammonoid, crushed,
Rhacophyllites?? sp.
Crushed, straight cephalopods; almost certainly *Rhabdoceras*

Age: Probably Late Norian
Identified by E.T. Tozer, 1985, collected by L.C. Struik, 1985

16-4

UTM: N5969370, E560050

GSC C-102850

Eomonotis sp.
Small fragment of ammonoid, probably a himavatitid

Age: Middle Norian, Columbianus Zone.
Identified by E.T. Tozer, 1985, collected by L.C. Struik, 1985

16-5

UTM: N5979700, E557100

GSC C-103956

Epigondolella bidentata Mosher

Age: Triassic, Late Norian
Identified by M.J. Orchard, 1989, collected by L.C. Struik, 1985

16-6

UTM: N5973950, E565350

GSC C-103995

Bivalves indet.

Age: Not determined
Identified by E.T. Tozer, 1985, collected by L.C. Struik, 1985

GSC C-86353

Ostracoda

Age: Possibly Triassic
Identified by B.E.B. Cameron, 1974, collected by H.W. Tipper, 1973

GSC C-86394

Ostracoda

Age: Possibly Triassic
Identified by B.E.B. Cameron, 1974, collected by H.W. Tipper, 1973

GSC C-91852

Pectenid bivalves indet. (ribbed)

Age: Undetermined
Identified by E.T. Tozer, 1974, collected by H.W. Tipper, 1974