MINFILE
NTS 092INW – ASHCROFT

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The Ashcroft map area, located in south-central British Columbia, contains 104 documented mineral occurrences. The **Pavilion** (092INW081) and **Ranchlands** (092INW095) deposits are currently producing limestone and zeolite, respectively.

The map area comprises two distinct geological and physiographic provinces, the Intermontane Belt to the east and the Coast Belt to the west, with the boundary delineated by the north-northwest trending Fraser fault system. The Intermontane Belt is a region of relatively low topographic and structural relief with mainly subgreenschist metamorphic grade rocks exposed across its entire width. By contrast, the Coast Belt has high topographic and structural relief with greenschist and lower grade rocks. The Thompson Plateau physiographic region occupies the east half of the map sheet and the Pavilion and Pacific ranges occupy the west half.

Pre-upper Mesozoic rocks of the Ashcroft map area can be subdivided into at least four lithotectonic terranes which from west to east are: Bridge River, Methow-Tyaughton, Cache Creek and Quesnel. Each terrane is bounded by major faults and has a distinctive geological record provided by its dated lithologies, and in some cases by characteristic faunal associations and mineral deposits. The Yalakom fault delineates the Bridge River and Methow-Tyaughton terranes. The Fraser fault system is the boundary for the Methow-Tyaughton and Cache Creek terranes, and the Cache Creek and Quesnel terranes.

Intermontane Belt: Quesnel Terrane

The Upper Triassic Nicola Group comprises a variety of volcanic and sedimentary facies which, with at least partly comagmatic Late Triassic-Early Jurassic intrusions, formed a west-facing magmatic arc. The Western volcanic facies of the Nicola Group consists of mafic to felsic pyroclastics, argillite, sandstone and local carbonate rocks. Central volcanic facies Nicola Group comprise intermediate, plagioclase, augite plagioclase porphyry pyroclastics and local pillowed and plagioclase porphyry flows. Felsic volcanic and intrusive rocks which occur between the Martell and Bonaparte faults, near Ashcroft, are tentatively correlated with the Permo-Triassic Kutcho Assemblage, rather than the Nicola Group. Mafic volcanic rocks assigned to the Nicola Group occur both to the east and west of the Bonaparte fault. The presence of Upper Triassic fossils implies that this correlation is valid for basaltic rocks which occur east of the Bonaparte fault. However, the age of basaltic rocks that occur west of the Bonaparte fault, in proximity to, and possibly interbedded with rhyolite tuffs, is not constrained. These basaltic rocks may be contemporaneous with Lower Triassic felsic rocks, rather than the younger Nicola lavas. The presence of rocks of Kutcho Assemblage age and affinity raises the potential for Kutcho Creek-equivalent copper-zinc volcanogenic massive sulphide mineralization.

The non-volcanic clastic Lower and Middle Jurassic Ashcroft Formation unconformably overlies the Nicola Group five kilometres northeast of Ashcroft. It has an eastern proximal facies derived in large part from the Nicola Group and associated intrusions, and a western distal facies. Ashcroft Formation lithologies include argillite, siltstone, sandstone, conglomerate and local, minor carbonate.

The Late Triassic-Early Jurassic Guichon Creek batholith is exposed within an area of 1036 square kilometres in south-central British Columbia and in shape is an elongate, semi-concordant dome. The northern third of the batholith is within the Ashcroft map sheet. Sedimentary and volcanic rocks of the Cache Creek Complex and Nicola Group are intruded by the batholith. In the few places where outer intrusive contacts are exposed, the older rocks have been metamorphosed to albite-epidote and hornblende hornfels and to epidote-chlorite skarn. Middle and Upper Jurassic sediments, Lower Cretaceous and Tertiary volcanic rocks, and sediments unconformably overlie intrusive rocks. Pleistocene glacial and interglacial deposits mantle the batholith, leaving less than three per cent of the surface of the batholith exposed. The batholith appears to be bounded on the east and west sides by faults of regional extent. Isotopic and geologic evidence indicate the batholith was emplaced approximately 198 million years ago, after Karnian stage of Upper Triassic but prior to Middle Jurassic. The batholith has undergone no significant metamorphism since that time.

The batholith is a composite, upper mesozonal to epizonal, intrusive pluton. The intrusive rocks are divided into several distinctive units based on their field relationships, texture, mineral content and mineral composition. The batholith consists of ten phases; the major phases show a nearly concentric arrangement and, in general, decrease in age inward. There are a variety of contacts between phases, including sharp intrusive contacts, intrusive contacts of dike-like bodies, and brecciated contacts. Contacts between two phases, although generally intrusive, may be gradational in some parts of the batholith. Contacts between varieties of a phase are gradational and are not observed in intrusive contact. In order to distinguish between units with intrusive contacts and those showing only gradational contacts, the terms ‘phases’ and ‘varieties’ are used, respectively. Phases are separated at least locally by sharp contacts where, generally, relative ages can be determined. A variety is a subdivision of a phase which has a gradational contact with that phase. Compositionally, phases and varieties of the batholith comprise granodiorite, quartz monzonite, quartz diorite, granite, porphyries, intrusive breccias and leucocratic dikes.

Deuteric and hydrothermal alteration is evident throughout the batholith. Widespread deuteric alteration, which probably occurred during a late magmatic stage, was followed by more localized hydrothermal alteration. Deuteric alteration is primarily propylitic and saussuritic and has affected to a varying degree older rocks at the batholith margin and all intrusive phases. In many rocks that have been deuterically altered, orthoclase and, to a lesser extent, plagioclase are red. Biotite and hornblende are chloritized and epidotized. Chlorite, epidote, tourmaline, and, to a lesser extent, potassium feldspar are widespread throughout the batholith in joints or other fractures, commonly accompanied by traces of copper sulphides.

Structural features of the batholith include foliation, joints, shear and fault zones, dikes, veins and xenoliths. Most sulphide occurrences in the batholith are associated with faults. Hydrothermal minerals associated with copper sulphide ore deposits in the batholith include epidote, tremolite, tourmaline, rutile, quartz, biotite, albite, prehnite, calcite, muscovite, clay minerals, zeolites, chlorite, orthoclase and chlorite. The relative abundance of these alteration minerals varies from place to place in the batholith.

Intermontane Belt: Cache Creek Terrane

The Pennsylvanian through Middle Jurassic Cache Creek Complex is highly disrupted and probably consists of several discrete elements, all of which probably formed in oceanic settings. The eastern belt is a melange composed of Permian and Pennsylvanian carbonate blocks, together with blocks of chert, basalt, minor gabbro and ultramafic rock, in an argillite-chert matrix of mainly Upper Triassic age. The central belt contains a large, mainly mid- to Upper Permian massive carbonate (Marble Canyon Formation), local thin-bedded carbonate, argillite, tuff, minor basalt and chert. The western belt is Permian to Middle Jurassic age and contains argillite, siltstone, chert, minor carbonate and volcaniclastic ‘Pavilion beds’. Speculatively, the eastern part of the Cache Creek Complex represents the subduction complex complimentary to the Nicola arc.

Coast Belt: Methow-Tyaughton Terrane

The Methow-Tyaughton Terrane comprises the predominantly fine-grained clastic Lower and Middle Jurassic Ladner Group consisting of argillite, slate, phyllite and tuff. Above this, partly coeval strata form the thicker, Upper Jurassic-Lower Cretaceous Relay Mountain Group consisting of argillite, siltstone, sandstone and local conglomerate. Uppermost are thick upper Lower Cretaceous-lower Upper Cretaceous fine to coarse clastics of the partly coeval Jackass Mountain Group consisting of sandstone, argillite and conglomerate.

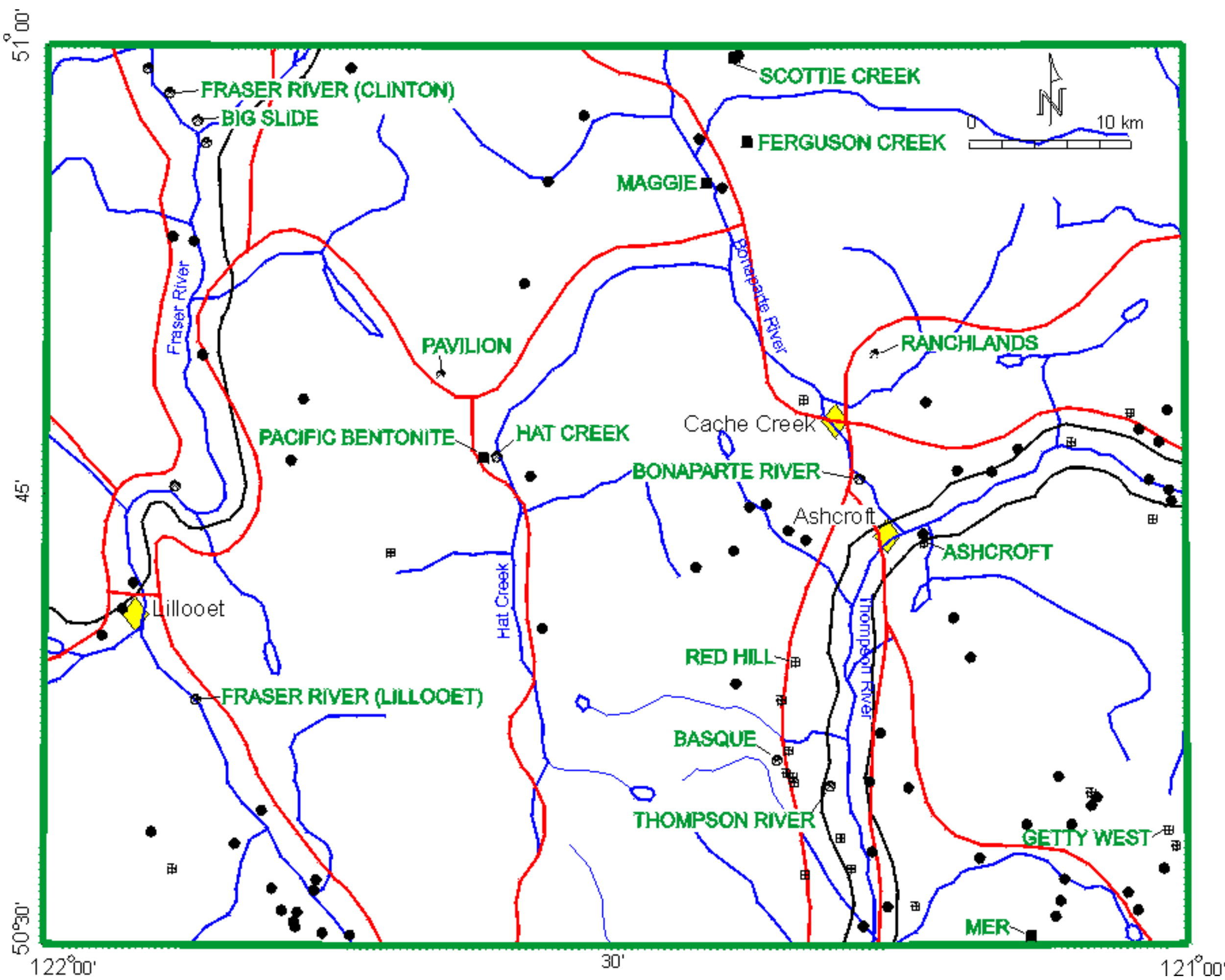
Coast Belt: Bridge River Terrane

The Permian? to Middle Jurassic Bridge River Complex resembles the largely coeval Cache Creek Complex in their disrupted nature and probable deposition in an ocean basin, but differs from the Cache Creek mainly in the absence of large carbonate bodies. The Bridge River Complex consists of radiolarian chert, argillite, basalt, pillow basalt, local carbonate, gabbro and serpentinite. The lower greenschist facies part of the complex comprises phyllite, quartzose phyllite, and siliceous and chlorite schist. The upper greenschist-lower amphibolite part of the complex comprises siliceous schist, actinolite schist, local biotite garnet schist, commonly containing concordant and crosscutting Eocene felsic dikes and sills.

Post mid-Cretaceous stratified units are entirely continental and preserved mainly in structural depressions. They include mid- to early Upper Cretaceous arc volcanics of the Spences Bridge Group, Eocene arc volcanics of the Kamloops and Princeton groups, Eocene sedimentary rocks (Hat Creek Formation), and the Miocene-Pliocene 'Plateau basalts' and Deadman River Formation. With the exception of the younger basalts, granitic intrusions accompany the volcanics. Spences Bridge Group rocks consist of intermediate, locally felsic and mafic flows and pyroclastics, sandstone, shale and conglomerate. Kamloops Group rocks comprise mainly basalt and andesite, local rhyolite, breccia, tuff and sandstone. 'Plateau basalts' comprise basalt and olivine basalt with minor tuff. The Deadman River Formation consists of poorly consolidated tuff, breccia, diatomite, sandstone and conglomerate.

Economic Geology

Gold, copper, silver, lead, chromite, pyrophyllite, magnesium sulphate (epsomite or Epsom salt) and coal have historically been produced in the Ashcroft map area. Limestone and zeolite are currently being mined from the **Pavilion** (092INW081) and **Ranchlands** (092INW095) deposits, respectively. Click mineral occurrence number in text or labels on the following map to view Capsule Geology and Bibliography.



Early in the history of the Ashcroft area, placer miners swarmed over the rivers and tributary streams on their way to the Cariboo district. About 3.1 million grams of gold were produced from the gravels and sands along the **Fraser**, **Thompson** and **Bonaparte** rivers (092INW063, 66, 73, 91) between 1875 and 1945; almost all of the production was from the Fraser River. The Big Slide mine (092INW036), one of the earliest lode mines in British Columbia, and the first in the Ashcroft map area, was discovered in 1872. Between 1899 and 1905 the important deposits of the **Highland Valley** copper camp (092ISW012) were found. Between 1918 and 1938, about 6900 tonnes of epsomite or Epsom salt (magnesium sulphate) had been mined from the **Basque** deposit (092INW043). The **Hat Creek** coal deposits (092INW047) have produced about 10,800 tonnes of coal intermittently from 1924 to 1977 and contains approximately 739 million tonnes of proven and probable reserves in the No. 1 deposit.

There is a significant indicated copper-molybdenum resource of about 181 million tonnes grading 0.28 per cent copper and 0.029 per cent molybdenum at the **Maggie** (092INW015) deposit. Drilling in 1965 indicated 580,544 tonnes of 0.327 per cent copper at the **Mer** (092INW028). The **Getty West** (092INW040) property, part of the larger **Getty** (092INE042) property of Getty Copper Corp., is currently being explored for its porphyry copper potential. Teck Exploration drilled five holes totalling 750 metres on the **Red Hill** (092INW042) Noranda/Kuroko massive sulphide-type prospect.

Industrial minerals continue to attract exploration. The Ashcroft (092INW104) occurrence has been tested for its aggregate potential in 1998 when a small bulk sample was extracted. I.G. Machine & Fibers Ltd. (a subsidiary of IKO Industries Ltd.) has applied for a permit to mine 24,900 tonnes per year of volcanic rock to produce roofing granules. There are inferred reserves of 30 million tonnes of bentonite at the **Pacific Bentonite** (092INW084) deposit in the Hat Creek Valley. In 1942, a resource potential of 'reasonably assured' material totalled about 18,000 tonnes grading 10.2 per cent chromium at the **Ferguson Creek** (092INW035) deposit. Some interest has also been shown for platinum potential at the **Scottie Creek** (092INW001) chromite showings.

Nearly one-half (42) of the documented occurrences on the map sheet are hosted in Quesnel Terrane lithologies and are represented by ten deposit types of which porphyry Cu+/-Mo+/-Au and veins constitute the majority; other important types include skarns and volcanogenic massive sulphides. Thirty-one occurrences are hosted in the Cache Creek Terrane where the industrial minerals limestone, chromite, and magnesium and sodium sulphate predominate; porphyry Cu+/-Mo+/-Au and veins are also important. Twelve occurrences are in Bridge River Terrane rocks where porphyry Cu+/-Mo+/-Au deposit types predominate; placer showings are also important. The remaining 19 occurrences are in the Overlap Assemblage and Methow Terrane and are represented by occurrences containing jasper, agate, bentonite, zeolite and coal; placer showings are also significant.

SELECTED REGIONAL REFERENCES (NTS 092INW - ASHCROFT)

Duffell, S. and McTaggart, K.C. (1952): Ashcroft Map Area, British Columbia; Geological Survey of Canada, Memoir 262, 122 pages.

Monger, J.W.H. and McMillan, W.J. (1989): Geology, Ashcroft, British Columbia (92I); Geological Survey of Canada, Map 42-1989, sheet 1, scale 1:250 000.

Northcote, K.E. (1969): Geology and Geochronology of the Guichon Creek Batholith; B.C. Department of Mines and Petroleum Resources, Bulletin 56, 73 pages.