Geological Survey of Canada

ROBERT BELL, D.Sc.(Cantab), M.D., LL.D., F.R.S., I.S.O., ACTING DIRECTOR.

1905

EXPLANATORY NOTES

The greater part of the area included in this map-sheet is more or less drift-covered and boulder clays are not common, but clays, silts, sands and gravels are widespread. Along the large valleys, where protected by the topography of the country, these are found in well marked terraces extending in some places to the tops of the hills.

The geological boundaries at many points are approximate only. On account of the covering of drift, the boundaries are frequently unattainable, and the varied nature of the rocks and the complexity of their structural relationship made it impossible to foretell the direction or extent of the formations. In addition, many of the natural boundaries of the eruptives are not distinct and clean-cut, the intrusive rock eating its way into, dyking or holding intrusions of the older rock for some distance across the contact. Many occurrences are too small to be mapped on this scale. With the exception of a few plant remains in the Tertiary tuffs, no fossils were found, so that the classification of the rocks is necessarily a lithological one.

TERTIARY.

With the exception of a group of Plutonics the only rocks known to be of this age are the Volcanic group with underlying tuffs and conglomerates. The Volcanic rocks consist chiefly of basalts and andesitic rocks with a little more acid lava. The basalts are sometimes vesicular with zeolites or chalcedony filling the amygdules. They are rarely columnar, but as a rule, partly on account of the uneven floor upon which they rest and partly owing to subsequent tilting, they present a flow structure in an inclined position. From this it is evident that some of the principal valleys existed in early Tertiary or pre-Tertiary times.

It is probable that these rocks which are sometimes pierced by plugs and dykes of pulaskite porphyry are surface flows of an alkali magma.

Underlying the volcanic rocks at several points are fine-grained white tuffs, consisting of volcanic material with a few beds of sandstone. Occasionally, coarse tuffs with volcanic fragments, small seams of lignite or bituminous coal and obscure fossil plants are met with.

On the east end of Baker Mt., a bed of coarse, probably fresh water conglomerate occurs with the white tuffs.

GREENSTONES OR GREENSTONE TUFFS.

Green augite-porphyrite, in places agglomeratic, is found at a number of points. It is frequently altered to a hornblendic or epidotic rock obscuring its original character. The later flows of it overlie the greenstone tuffs and sedimentary rocks, but some flows appear to have been contemporaneous with these. When well marked, it has been differentiated from the tuffs Some lime silicate hornfels may be included under this colour.

The greenstone tuffs and conglomerates are widespread and consist of pebbles of limestone, argillite, chert, etc., of all sizes, sometimes in alignment, but generally tumultuously arranged and cemented in a porphyritic matrix which is sometimes pyroclastic, sometimes apparently an injected magma, and, while often distinct, is frequently altered by pressure or metasomatic action to such an extent, as to be undistinguishable from altered porphyrite. With the conglomerates and tuffs are associated ashbeds and muds, while some limestone seems to be interbanded with them in a few places. These greenstones hold numerous inclusions of the older sedimentary rocks, the occurrence of which is explained in part by the uneven surface of the latter upon which the former were laid down and by subsequent erosion, in part by the folding and faulting which these rocks have undergone. They are, therefore, newer than these sedimentary rocks and are supposed to be at least of Upper Palæozoic age.

LIMESTONE.

Limestone occurs in almost all parts of the district but usually in small irregular masses, and often, as inclusions in the eruptive rocks. When little altered, the limestone is dark and carbonaceous, but usually it is altered to a white marble. In places, lime silicates, such as garnet, epidote, actinolite, tremolite, etc., are developed, and, at a few points, the limestone is wholly replaced by silica. The limestone is supposed to be of Palæozoic age, but for the most part older than the greenstone tuffs and conglomerates though often occurring with them. A few beds of limestone seem to be interbanded with the tuffs. On Hoffman ridge, bands of white crystalline limestone with occasional layers of sand and fairly large, rounded pebbles occur in the tuffs.

ARGILLITES.

In age and mode of occurrence, the dark argillites resemble the limestones; they are usually more or less altered, sometimes to phyllites and schists, but more frequently they are silicified. Quartz is deposited between the laminæ and often entirely replaces the rock.

QUARTZOSE ROCK.

Under this heading are included the few quartzites that are found, and the limestones and argillites that have been wholly replaced by silica.

ALTERED ROCKS.

Highly altered rocks, the origin of which has been wholly or almost wholly obscured by metamorphism and consisting of hornblendic, chloritic and other schists, are separated under a special heading. They include, of course, these rocks in all stages of metamorphism

GNEISSES AND CRYSTALLINE SCHISTS.

The most highly metamorphosed rocks, hornblende and mica schists and gneisses with a little interbanded limestone, are included under this heading. Pegmatite dykes are common through them. They are thoroughly crystalline and resemble the Shuswap (Archæan) series of the Kamloops district, but it is not known if they are really older than the less altered sedimentary. It is possible that they represent the latter in a thoroughly metamorphosed condition.

ALKALI-SYENITE AND ALKALI-SYENITE-PORPHYRY.

Dykes of alkali-syenite-porphyry (pulaskite porphyry) occur in almost all the mineralized portions of the district, but are particularly plentiful in the portion covered by the northern half of this sheet. A large area of pulaskite is found to the north, outside the area of the map, and bosses of the same rock merging into an area where it is intimately mixed with schists, are seen to the northeast of Eholt. Pulaskite is reddish, pinkish or pearl-grey and consists largely of feldspar with biotite, hornblende and pyroxene. Crystals of feldspar, often arranged in parallel positions, are usually conspicuous. The rock is rich in alkali, (12% and over), and often has such minerals as nepheline and sodalite developed in it. Only a few of the dykes are large enough to map, though sometimes they are so plentiful as to form a very large percentage of the country rock. When in small dykes, this rock is a typical porphyry with distinct salbands, but in large dykes and bosses its habit is granitic. It cuts all other rocks except perhaps a few of the newest lavas, but it is pre-glacial and is therefore Tertiary in age. In many of the mines, horizontal sheets of the same rock are found, sometimes such sheets are exposed on the surface. Such occurrences are denoted on the map by special markings. Some of these may represent unroofed laccolites.

VOLCANIC ROCKS.

Near Phœnix and Summit camp are volcanic rocks through which some of the lavas reach the surface, the rock plugging them is more basic than pulaskite but it is alkaline in character.

BASIC INTRUSIVES.

At a number of points lamprophyre and other basic dykes are found, but most of these are too small to be shown. They consist largely of coloured pyroxene and hornblende and have a tendency to weather to serpentine. They vary in age but most of them appear to be about the same age as the pulaskite dykes.

GRANODIORITE.

This rock occurs in all parts of the district though only in large masses in the north and apparently overlies the whole area. It is a grey rock which varies in its coloured constituents and composition, but usually consists of potash and soda-lime, feldspars in almost equal parts, mica, hornblende, pyroxene and quartz. It is, therefore, a granodiorite or tonolite. It is intrusive in the greenstone and all the older rocks, but is overlain by the tertiary tuffs and volcanics and is cut by the pulaskite. It is, therefore, pre-Tertiary in age.

It resembles the Nelson Granite of the West Kootenay sheet and is probably of the same age, that is, Jurassic or post-Jurassic. Its contacts with the older rocks are rarely well defined, it cuts and holds inclusions of them and its material is injected into them for some distance from the contacts. It appears to have worked its way up by plucking away fragments of, and digesting the country rock. Apophyses and porphyry dykes from this rock are frequently seen.

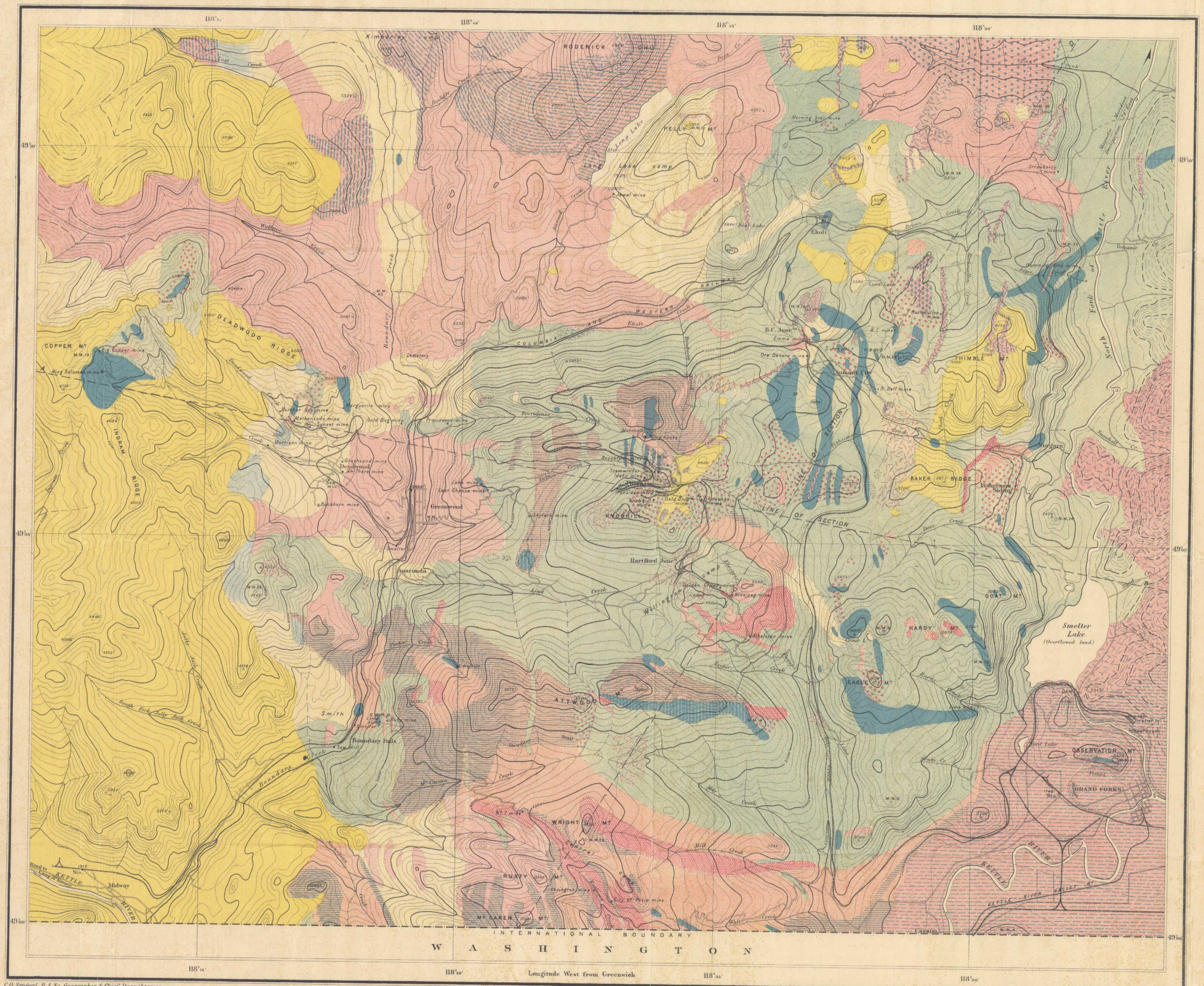
SERPENTINES.

Serpentines are not uncommon in this area. They are green or yellowish when fresh, but weather to an aggregate of brown or ochre carbonates and white quartz veinlets. At a few points, as at the head of Koomoos creek, they are fibrous in places but usually they are massive. At one point, at the head of this creek they become an almost pure soapstone; the outline of the original crystals which occasionally can be detected, shows that the serpentine is formed from the alteration of basic igneous rocks. These rocks were intrusive in the greenstone and older rocks, sometimes producing contact metamorphism. These serpentines are classed with the Upper Palæozoic serpentines found to the west, having similar characteristics and the same relationship.

ORE DEPOSITS.

Very large magnetite deposits with iron and copper sulphides having gold values, occur at many points and are extensively mined.

These deposits which have the character of "contact deposits" are found near the contact of intrusive rocks and are formed by the after-action attendant upon the intrusion of igneous rocks. They are found in all the older rocks, but are most frequent in the contacts between limestone and the greenstone and the greenstone tuffs. The ore either replaces the country-rock, which is generally altered to garnet, epidote, actinolite, quartz and calcite, or is disseminated through it. Dykes of the alkali-syenite prophyry are usually very plentiful in the neighborhood of the deposits. At the head of Copper creek, chalcocite, bornite, native copper, cuprite and copper carbonates occur as enrichments of iron and copper sulphides. Quartz veins carrying blende, galena, iron and copper sulphides with some rich silver sulphides and occasionally tellurides, native silver and gold, sometimes with high values, occur at several points. They are particularly numerous in the neighborhood of Greenwood and near Long Lake.

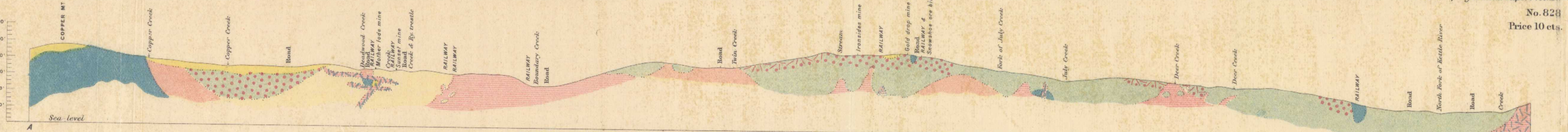


C.O. Senécal, B.A.Sc., Geographer & Chief Draughtsman.

To Accompany Annual Report Vol. XV.

No. 828

Price 10 cts.



CROSS-SECTION ALONG LINE A-B (Underground geological boundaries, diagrammatic.)

CROSS-SECTION ALONG LINE C-D (Underground geological boundaries, diagrammatic.)

Explanation of Colours and Signs

Sedimentary and Volcanic

Tertiary:
- Volcanic group. (basalts and other lavas.)
- Tuffs and conglomerates.

Palæozoic:
- A. Augite porphyrite and agglomerates.
- B. Porphyrite tuffs, conglomerates and ash beds.
- A and B. not differentiated.
- Limestones.
- Altered limestones.
- Argillites.
- Altered argillites.
- Quartzose rocks, quartzites and rocks wholly replaced by silica.
- Highly altered rocks, chloritic hornblendic schists. Origin uncertain.
- Gneisses.

Plutonic

Tertiary:
- Alkali syenite (Pulaskite) and alkali syenite porphyry (pulaskite porphyry)
- Sheets and laccolites of same pulaskite and pulaskite porphyry.
- Pulaskite bosses and dykes with schist inclusions.
- Basic alkali dykes and volcanic necks.
- Basic intrusions.

Granodiorite .... Jurassic or Post Jurassic

Serpentine .... Palæozoic

.... Geological boundaries.

... ... do do undefined or obscure.

Triangulation stations. M.M.39 Mineral monuments.

1746' Heights of railway grade, in feet above sea-level.

2750' Heights in feet above sea-level.

Contour interval, 100 feet.

Broken contours approximate only.

Roads. Trails.

Scale - 1 mile to 1 inch - $\frac{1}{63,360}$

1 ¾ ½ ¼ 0 1 2 3

Magnetic Declination about 24° East.

Geological and Topographical Map of BOUNDARY CREEK MINING DISTRICT, BRITISH COLUMBIA.

Geologically coloured by
REGINALD W. BROCK, M.A.

SOURCES OF INFORMATION

Geology by R.W. Brock.
Topography and compilation by W.H. Boyd. Supplemental traverses by R.W. Brock.
The area to the East of the North Fork of the Kettle River by W.W. Leach.
Railways from plans fyled in the Department of Railways and Canals.
The longitude of this sheet depends upon the position of Midway Station as determined astronomically by O.J. Klotz and F.W. Werry, Department of the Interior.