CANADA

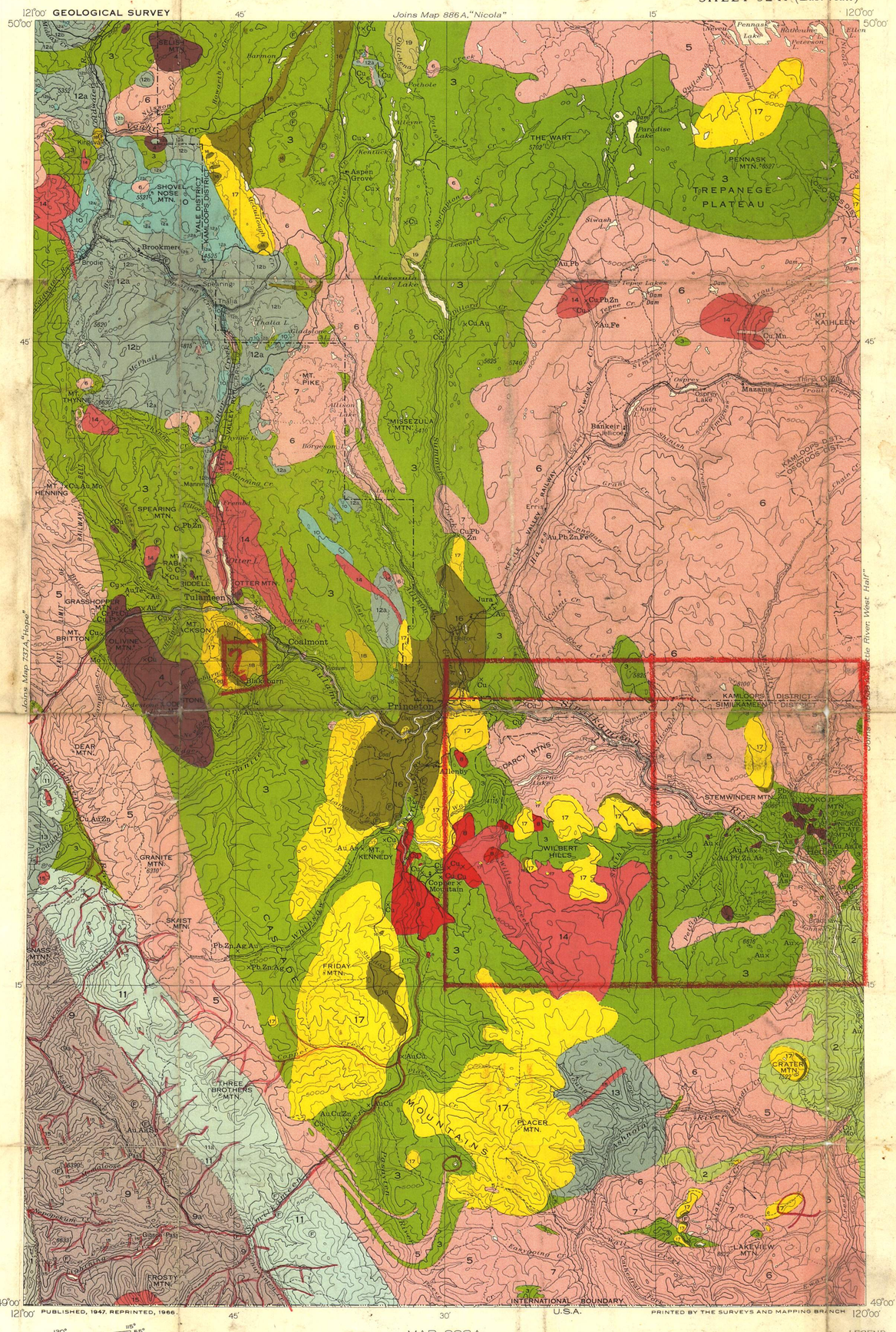
DEPARTMENT OF MINES AND RESOURCES

MINES AND GEOLOGY BRANCH

BUREAU OF GEOLOGY AND TOPOGRAPHY

GEOLOGICAL SURVEY

SHEET 92 H (East Half)



LEGEND

CENOZOIC

TERTIARY

MIOCENE OR LATER

- **19** — *Valley basalt: vesicular, varicoloured basalt*
- **18** — *Plateau basalt: amygdaloidal, brown basalt*

MIOCENE OR EARLIER

PRINCETON GROUP

- **16, 17** — 16, *Mainly shale, sandstone, and conglomerate; coal*; 17, *Varicoloured andesite and basalt*

CRETACEOUS OR TERTIARY

UPPER CRETACEOUS OR LATER

- **14, 15** — 14, *OTTER INTRUSIONS: pink and grey granite and granodiorite*; 15, *LIGHTNING CREEK INTRUSIONS: grey quartz diorite*

CRETACEOUS

LOWER CRETACEOUS

KINGSVALE GROUP

- **12a-b, 13** — 12a, *mainly volcanic breccia*; 12b, *mainly andesite and basalt porphyry*; 13, *Andesite and basalt porphyry and volcanic breccia*

PASAYTEN GROUP

- **11** — *Mainly grit and shale*; 11a, *mainly purple lava, tuff, and breccia*

SPENCE BRIDGE GROUP

- **10** — *Hard, reddish andesite and basalt*

JURASSIC (?) AND CRETACEOUS

UPPER JURASSIC (?) AND LOWER CRETACEOUS

DEWDNEY CREEK GROUP

- **9** — *Tuff, volcanic breccia, grit, argillite*; 9a, *mainly conglomerate*

MESOZOIC

JURASSIC OR LATER

- **8** — *COPPER MOUNTAIN INTRUSIONS: syenogabbro, augite diorite, pegmatite*
- **5, 6, 7** — *COAST INTRUSIONS*: 5, *grey, slightly gneissic granodiorite*; 6, *mainly reddish, coarse-grained, siliceous granite and granodiorite*; 7, *light colored granodiorite, quartz diorite and gabbro*
- **4** — *Peridotite, pyroxenite, gabbro*

TRIASSIC

UPPER TRIASSIC

NICOLA GROUP

- **3** — *Varicoloured lava; argillite, tuff, limestone; chlorite and sericite schist*

PALÆOZOIC

CARBONIFEROUS OR LATER

- **2** — *BRADSHAW, INDEPENDENCE, SHOEMAKER, and OLD TOM FORMATIONS: cherty and slaty argillite, green andesite, limestone; quartz-mica schist and gneiss*

HOZAMEEN GROUP

- **1** — *Chert, green andesite, limestone*

Fault .....

Fossil locality ..... Ⓕ

Mineral occurrence ..... ×

SYMBOLS FOR METALS

Silver	Ag
Arsenic	As
Gold	Au
Cobalt	Co
Chromium	Cr
Copper	Cu
Iron	Fe
Manganese	Mn
Molybdenum	Mo
Lead	Pb
Platinum	Pt
Antimony	Sb
Tellurium	Te
Zinc	Zn

Geology by H.M.A. Rice, 1939, 1941, 1944.

Approximate magnetic declination, 23° 19' East

For Mining Properties, see Map 889A, "Princeton"

DESCRIPTIVE NOTES

Most of the map-area lies in the Interior Plateaux, with its west and south boundaries in the Cascade Mountains. The plateau topography consists of relatively flat-topped hills and ridges, separated by deep and, in places, steep-walled valleys. The main drainage is along the east-west valley occupied by Tulameen and lower Similkameen Rivers, into which tributary streams flow from north and south. The area is heavily forested except at the northern boundary east from Aspen Grove and along lower Similkameen Valley, which are in open, sage-brush country typical of the "dry belt".

The Nicola group (3) is a large and varied assemblage consisting mainly of many-coloured volcanic rocks ranging from porphyritic and non-porphyritic dacite to basalt. Some types are similar to, and difficult to separate from, members of the Kingsvale group (12b), particularly in the northwest corner of the map-area and along Allison Creek north of Princeton, where, as a result, the identity of the two types is not wholly established. Interbedded with the lavas are belts and lenses of sedimentary and pyroclastic rocks. The largest of these, in the vicinity of Hedley, is host to the most important gold mines in the area. Most of the Nicola rocks are not strongly metamorphosed, but they are sheared into chlorite and sericite schists along a belt as much as 4 miles wide paralleling the east margin of the Eagle granodiorite body (5, in part).

The age of the Dewdney Creek group (9) and its relation to the Pasayten group (11) are not definitely established. Fossils of Lower Cretaceous age have been found in Dewdney Creek beds, but the group may be, in part, as old as Upper Jurassic. The two groups are in fault contact, and although the Pasayten is relatively younger it is not known whether or not it grades downward into Dewdney Creek strata. There is, however, a considerable difference in lithology between the groups, and no marine fossils have been found in the Pasayten.

The Spence Bridge group (10) has a very limited development in the area. Along Nicola River to the west it appears to underlie the Kingsvale group conformably, but in Princeton map-area there is evidence of an erosional unconformity between the two.

The Kingsvale (12) is a thick series of volcanic rocks, with discontinuous patches of greywacke, volcanic breccia, and conglomerate at the base. Fossil plants found near Kingsvale are considered to be of uppermost Lower Cretaceous age, and somewhat younger than those found in the Spence Bridge group near Spences Bridge. Two isolated bodies (13), one on Podunk Creek and one on Young Creek, are correlated with the Kingsvale on lithological grounds. They may, however, be correlative with the Spence Bridge, to some members of which they bear resemblance.

Tertiary sedimentary rocks (16) occur mainly in Princeton and Tulameen coal basins. They are overlain and underlain conformably by lavas (17) that elsewhere occupy considerable parts of the map-area. Together they form the Princeton group, which is correlative with much at least of the Kamloops group of Nicola map-area to the north. Fossil plants are plentiful in the sedimentary measures, and their age is believed to be Lower Miocene. The group may, however, be in whole or in part somewhat older.

Flat-lying basalts are found along benches (18) and valleys (19). They are younger than the Princeton group, and the valley basalts are believed to be the youngest consolidated rocks in the map-area. Outcrops of the latter have been glaciated, but in Nicola map-area to the north they have been found overlying unconsolidated sediments, so that they may be of interglacial age.

The ultrabasic rocks (4) are believed to be the oldest intrusive bodies of any size in the map-area; they are, however, probably closely related to, and may be an early phase of, the Coast intrusions. The principal body, in the vicinity of Olivine Mountain, is composed of several distinct rock types, but it was not found possible to map these separately.

The Coast intrusions (5, 6, 7) are believed to represent a protracted and, in part, intermittent period of intrusion continuing possibly from Middle Jurassic to Upper Cretaceous time. Three types are recognized and have been mapped separately. In places they cut one another, but in other places the contacts appear to be gradational. All three types are characteristically acidic, with plenty of visible free quartz, and the composition of granodiorite or quartz diorite.

The age of the Copper Mountain intrusions (8) is uncertain. All that has been determined definitely is that they cut the Nicola group and are overlain by the Princeton group. Accordingly they may belong with either the older or the younger series of intrusive rocks, but differ markedly from both in the almost entire absence of free quartz.

The Otter intrusions (14) appear very different from the Coast intrusions. For the most part they resemble syenites, with a pink to liver colour, and with quartz, if visible, restricted to well formed phenocrysts. Actually they have the composition of granodiorite or granite, but the quartz of the groundmass is in microscopic intergrowths with feldspar and is rarely visible to the naked eye. Everywhere they, or feldspar porphyries abundantly associated with them, cut the Lower Cretaceous formations, but not the Princeton group, so that their age is either Upper Cretaceous or early Tertiary.

The Lightning Creek intrusions (15) are also younger than the Lower Cretaceous rocks, and although they resemble certain phases of the Otter intrusions they are less clearly distinguishable from the Coast intrusions. Except for the Castle Peak stock on the south edge of the map-area most of the Lightning Creek intrusions are in the form of dykes and sills many of which carry needle-like amphibole crystals.

Rocks of the Nicola group and older formations have been folded into tight, north- to northeast-trending anticlines and synclines. The Cretaceous rocks in the southwest have a similar trend, but to the northwest they show open folds and strike easterly. From the vicinity of Princeton a spray of three or more faults radiates to the north, but could not be traced to the south. Another series of large faults, with a northwest trend, crosses the southwest corner of the area, and several small but economically important faults have been recognized in the vicinity of Hedley. The faults seem to have originated before the Coast intrusions were emplaced, but later movements along them have fractured these intrusive rocks and even members of the much younger Otter group. No evidence, however, is available to indicate that the faults have affected the known Tertiary formations.

The area first became important when, in the early 'sixties, gold and platinum placer deposits were discovered along Tulameen and Similkameen Rivers and their tributaries. In later years placer mining has dwindled in importance with the exhaustion of the easily discoverable deposits.

Gold ore is being mined at Hedley. The orebodies are chiefly deposits of arsenopyrite and lesser amounts of other sulphides occurring in beds of highly altered limestone. The principal ore deposits are those being mined by Kelowna Exploration Company, Limited, and Hedley Mascot Gold Mines, Limited.

Bornite-chalcopyrite deposits occur mainly at four localities. The most important is Copper Mountain, where many orebodies are known and some are being actively mined by the Granby Consolidated Mining, Smelting and Power Company. Copper deposits also occur within a belt running south from the edge of the map-area, north of Aspen Grove, to the foot of Missezula Lake; in a group of prospects at Law's camp, north of Grasshopper Mountain; and at the Independence mine, close to the edge of the map-area north of Mount Henning, where molybdenite is also an important constituent. Bornite and chalcopyrite are the principal ore minerals, although chalcocite ore was mined at one prospect near Missezula Lake. Pyrite and, much more rarely, galena and sphalerite occur in some of the deposits. The sulphides replace Nicola volcanic rocks in zones of considerable shearing and alteration. Quartz is not prominent as a gangue mineral. At Copper Mountain the ore is believed to be related to the Copper Mountain stock, a composite intrusion ranging from gabbro to syenite. The source of the ore at Aspen Grove is not so clearly indicated. It is perhaps significant that the Copper Mountain camp lies near the point of convergence of a radiating group of faults, and that the Aspen Grove camp is situated along the line of two northerly branches of this group.

Gold-telluride deposits have been found on Grasshopper Mountain; the two principal occurrences consist of brecciated zones in sheared Nicola rocks partly occupied by quartz and irregularly mineralized with small amounts of chalcopyrite and pyrite. Native gold and gold telluride have provided high but erratic assays.

Lead-zinc deposits have been found on Similkameen River and Whipsaw Creek near the northeastern edge of the Eagle granodiorite. They occur as quartz veins carrying galena, sphalerite, pyrite, and minor amounts of other sulphides in the belt of highly sheared Nicola rocks that borders this granodiorite. Galena and sphalerite also occur in sheared Nicola volcanic rocks west of Otter Lake.

Lead-zinc deposits occur in a series of parallel shear zones in or close to the small stock of Otter granite on Siwash Creek.

The principal non-metallic deposits in the area are the coal seams in Tertiary sedimentary rocks of the Princeton group, particularly those in the Tulameen and Princeton basins. The name of Vermilion Forks, by which the settlement of Princeton was originally known, was given in reference to a small but conspicuous deposit of ochre that occurs in the same rocks near the railway about 2 miles west of Princeton. Beds of bentonite are also found in these Tertiary rocks near Princeton.

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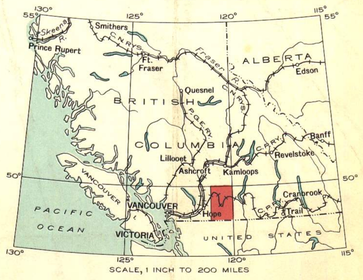

MAP 888A

PRINCETON

YALE, KAMLOOPS, SIMILKAMEEN, AND OSOYOOS DISTRICTS

BRITISH COLUMBIA

Scale, 1/253,440 or 1 Inch to 4 Miles

Miles 4 0 8 12

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inches 0 1 2

0 1 2 3 4 5 centimetres

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

LEGEND

Road	
Road not well travelled	
Trail	
School	
Post Office	
Land District boundary	
Limit of Railway belt	
Indian Reserve boundary	
Stream (flow disappearing in places)	
Contours (interval 500 feet)	2500
Height in feet above mean sea-level	8622

Base-map compiled by the Topographical Survey, 1937, from information supplied by the British Columbia Department of Lands. Cartography by the Drafting and Reproducing Division, 1946.

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