Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

OPEN FILE MAP 1988 – 7

GEOLOGY OF THE PENNASK MOUNTAIN AREA

92H/16

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SCALE 1:25 000

Miles 1 0 1
Metres 1000 0 1000
Yards 1000 0 1000

LEGEND

Areas of extensive glacial cover

TERTIARY

PRINCETON GROUP

12 — *12 – bedded, grey dust tuff*

11 — *11 – visular to massive, maroon-coloured volcanic flows; minor arkosic sandstone*

UNCONFORMITY

LATE JURASSIC

OSPREY LAKE BATHOLITH

10 — *10 – pink, coarse-grained, massive, feldspar megacrystic granite to quartz monzonite*

EARLY JURASSIC

PENNASK BATHOLITH

9 — *9 – grey, massive to foliated, biotite-hornblende quartz diorite to granodiorite*

AGE UNCERTAIN

HIDDEN LAKE STOCK

8 — *8 – massive, hornblende granodiorite*

MINOR INTRUSIONS

7 — *7a – granodiorite; 7b – diorite*

INTRUSIVE CONTACT

LATE TRIASSIC

NICOLA GROUP

WHISTLE CREEK FORMATION

6 — *6a – massive to bedded andesitic ash and lapilli tuff; 6b – tuffaceous siltstone*

STEMWINDER MOUNTAIN FORMATION

5 — *5a – argillite; 5b – tuffaceous siltstone; 5c – ash tuff*

4 — *4a – calcareous argillite; 4b – limestone*

3 — *3 – polymictic conglomerate*

MIDDLE TO LATE TRIASSIC

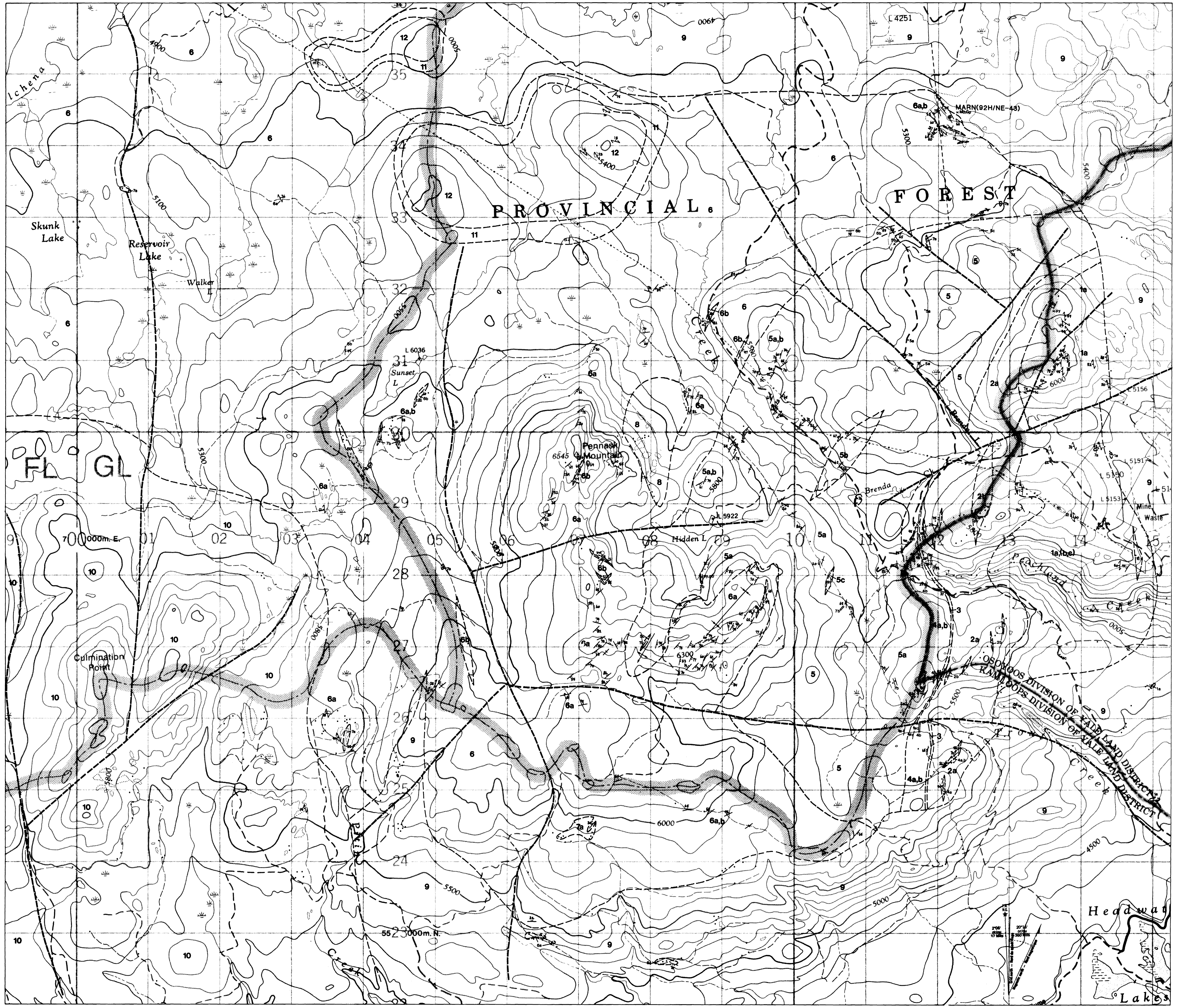
PEACHLAND CREEK FORMATION

2 — *2a – feldspar porphyry subvolcanic intrusions, felsic flows and tuffs; 2b – mafic tuff*

1 — *1a – mafic tuff and volcanic rocks; 1b – quartz-bearing mafic tuff; 1c – feldspar porphyry sub volcanic intrusions and tuffs*

SYMBOLS

Geological Contact: defined, approximate
Bedding, Top Known: inclined, overturned
Bedding, Top Unknown: inclined, vertical
Schistosity: inclined, vertical
Axial Trace and Plunge of Fold: anticline
syncline
Plunge of Minor Fold Axis — FA
Plunge of Mineral Lineation — M
Fault: approximate
Mineralized outcrop (pyrite, pyrrhotite, molybdenite, chalcopyrite, sphalerite, galena — × Py, Po, Mo, Cp, Sp, Gn
Massive, nonbedded or unfoliated outcrop: small, large
Topographical Contour (100-feet interval) — 2500



GEOLOGY OF THE PENNASK MOUNTAIN AREA

The Pennask Mountain area lies within the Intermontane Belt of the Canadian Cordillera, in the eastern part of the Paradise Lake mapsheet (92H/16), approximately 60 kilometres northwest of Penticton. Publications relevant to the mapsheet include those by Rice (1947), Little (1961) and Gabrielse and Reesor (1974).

The area is mainly underlain by a roof pendant comprising westerly younging, Upper Triassic sedimentary and volcaniclastic rocks of the Nicola Group. These are intruded and enclosed to the north, east and south by plutonic rocks of the Early Jurassic Pennask batholith and Late Jurassic Osprey Lake batholith. In the northern part of the map area, both the Nicola rocks and the Pennask batholith are unconformably overlain by Tertiary sediments and volcanics of the Princeton Group.

The oldest rocks in the area, which are informally called the Peachland Creek formation (Units 1 and 2), may represent the oldest portion of the Nicola Group yet recognized in British Columbia. It is divisible into an older, predominantly mafic tuffaceous and volcanic unit (Unit 1) to the east, and a more felsic suite of dacitic ash tuffs, flows and subvolcanic intrusions to the west (Unit 2). Unit 1 comprises mainly massive to weakly bedded basaltic ash and lapilli tuffs and volcanics that contain abundant altered pyroxene and hornblende. Locally, the tuffs are distinct in containing coarse, angular to rounded clasts of finely recrystallised quartz, as well as fine quartz fragments in the matrix and some irregular quartz veinlets. The stratigraphically overlying Unit 2 is characterised by pale, silicious rocks having a fine-grained matrix and coarse, euhedral feldspar crystals. The presence of very rare remnant fiammé textures suggests the local presence of some ignimbrites within Unit 2.

The Peachland Creek formation is overlain to the west by a predominantly sedimentary, argillite-rich sequence (Units 3, 4 and 5); this is believed to be a northerly equivalent of the Stemwinder Mountain formation present in the Hedley district (Ray *et al.*, 1988) although lateral continuity between the two areas cannot be proved due to the intrusion of Jurassic plutonic rocks. The Stemwinder Mountain formation is separable into three units on this map sheet. At the base is a locally developed, thin horizon of polymictic conglomerate (Unit 3) containing angular, elongate clasts of limestone, marble, siltstone, argillite, chert and andesitic volcanic rocks set within a tuffaceous matrix. This is overlain by a thicker sequence (Unit 4) of black, limy argillites and siltstones, interbedded with thin (1 to 10 metres) layers of black, gritty limestone that are locally conglomeratic.

The top of the Stemwinder Mountain formation (Unit 5) is characterised by a thick, monotonous sequence of black argillite with lesser amounts of siltstone, tuffaceous siltstone and tuff. Unlike the older Unit 4, this argillite sequence contains no limestone horizons.

The youngest rocks in the Nicola Group (Unit 6) underlie the western part of the map area and are believed to be lateral equivalents to the Upper Triassic Whistle Creek formation described in the Hedley district (Ray *et al.*, 1988). They consist predominantly of bedded to massive, amphibole and pyroxene-bearing ash and lapilli tuffs of andesitic composition, and some tuffaceous siltstone and argillite.

The Nicola Group rocks are intruded by small bodies of unknown age (Unit 7) ranging in composition from diorite through quartz diorite to granodiorite, as well as the Hidden Lake stock (Unit 8) which exceeds 1.5 kilometres in length and comprises a massive, hornblende-bearing granodiorite. The massive to weakly foliated Pennask batholith (Unit 9) (Gabrielse and Reesor, 1974), is believed to be Early Jurassic in age (J.W.H. Monger, personal communication, 1987) and ranges from quartz diorite to granodiorite. The Late Jurassic Osprey Lake batholith (Unit 10) (J.W.H. Monger, personal communication, 1987) occupies the southwestern corner of the map area and is characteristically pink granite to quartz monzonite and contains megacrysts of potassium feldspar. The thermal metamorphic aureoles of the Pennask and Osprey Lake batholiths reach 0.5 kilometres in width and may be schistose and biotite-rich, with some local development of garnet (Carr, 1967; Soregaroli and Whitford, 1967) and cordierite.

The poorly exposed Princeton Group (Units 11 and 12) occupies the northern part of the map area. It contains red weathering, vesicular lavas at the base (Unit 11) which are overlain by flat-lying to gently dipping dust tuffs (Unit 12). In addition, the basal portion of the group includes sequences of poorly consolidated arkosic sandstone which are very rarely exposed. The extensive glacial-fluvial deposits in the Skunk Lake–Sunset Lake vicinity are probably locally derived from the arkosic sandstones in the nearby Princeton Group.

Structurally, the Nicola Group rocks occupy the western limb of a major, easterly closing anticline. Fold axial planes are generally northeasterly striking and the fold axes plunge gently to steeply southwest. Locally, in the finer grained sediments and tuffs, the tight small folds are accompanied by the development of an axial planar slaty cleavage.

The Brenda copper-molybdenum porphyry deposit (Carr 1967; Soregaroli and Whitford, 1976) is situated immediately east of the map sheet, north of Peachland Creek. When full production began in 1970, the deposit had proven reserves of just under 160 million tonnes grading 0.18 per cent copper and 0.049 per cent molybdenum. Mineralization is hosted within the zoned and composite quartz diorite "Brenda stock" (Carr, 1967) which forms part of the Pennask batholith. Several sequential stages of mineralization occurred, each of which was associated with specific metallic and gangue minerals and each filled a unique set of fractures to form small mineralized veins (Soregaroli and Whitford, 1976). Principal opaque minerals are chalcopyrite and molybdenite with minor pyrite and magnetite.

Molybdenum-copper mineralization is seen in the northeastern section of the map area at the Marn occurrence (MI 92H-NE/43). The sulphides are hosted within the coarse-grained, hornblende-phenocrystic granodiorite of the Pennask batholith only a few metres from its sharp, crosscutting contact with Whistle Creek formation tuffaceous siltstone and bedded ash tuff. Mineralization is mainly molybdenite with only sparse chalcopyrite; it occurs either as coarse molybdenite blebs within narrow, discontinuous quartz veinlets, or as smeared molybdenite along sets of narrow microfractures that often run subparallel to the quartz veins.

Other reported occurrences of uncertain location include the Tee (MI 92H/NE-179) copper-molybdenum mineralization within the Pennask batholith, and the Kip-Slim copper occurrence (MI 92H/NE-173) hosted within the Nicola Group.

The area is considered to have a low gold-skarn potential due to the lack of Hedley-type dioritic intrusions and the absence of major limestone units.

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