PROMONTORY HILLS
(92I/2e)

By W. J. McMillan

INTRODUCTION

Rocks of the Late Triassic Nicola Group in Promontory Hills are exposed in a subrectangular panel. They are cut off by the Guichon batholith on the north and the Coyle stock to the south, and are unconformably overlain by rocks of the Cretaceous Kingsvale and Spences Bridge Groups to the east and west respectively.

Mapping was undertaken at scale 1:12 000 in this area west of Craigmont mine for several reasons. First, at least locally and in particular at Craigmont mine, the rocks are tightly folded, and their stratigraphy is unresolved. Second, although it is a skarn body, the geometry of the mineralization at Craigmont is generally conformable with that of the host rocks. Third, regional trends of the sedimentary and volcanic stratigraphy in Promontory Hills indicate that some part of the section there should correlate with that at Craigmont. The study is not yet complete and results presented here are preliminary.

STRUCTURAL GEOLOGY

To resolve the stratigraphy it was necessary to interpret the geometrical distribution of the rocks. This was done by tracing mappable, persistent beds and zones with distinctive lithology. From sedimentary structures such as graded beds, sole markings, scouring, and rip-up clasts, stratigraphic tops were determined wherever possible. Reverse grading is common in volcanic terrains so 'tops' based on grading alone were assumed to be unreliable. One large, upright to slightly overturned, subisoclinal fold with northeast-striking axial surface and apparent low easterly plunge was delineated. Beds north of it consistently face toward the north and those to the south face south (Figs. 6 and 7), therefore the fold is an anticline. Few top determinations were possible north of Promontory Lookout or south of the fold, and in view of rapid facies changes, it is possible that other large folds exist.

STRATIGRAPHY

Stratigraphic reconstructions have been made based on the structural interpretation. The core of the major fold presumably contains the oldest exposed member of the Nicola Group. Predominantly composed of red ash tuff, volcanic sandstone, and volcanic breccia, the unit also has massive zones and layers of dark grey to red augite plagioclase andesitic lava. Bedding in the unit takes the form of colour laminations and grading in the sandy to silty zones and elongated clasts or macro-grading of clasts in the breccias. The finer grained rocks appear to be both of air fall tuffs and water-worked sandstones. Accretionary lapilli were found in breccias but only as random, sometimes broken clasts. It is probable that much of the breccia is reworked material derived from mass wastage of subaerial flow and pyroclastic debris. Andesitic lavas are thickest near the powerline (Fig. 6) and uncommon away from it. In part these rocks are concordant, but in part they appear to be discordant. The zone of the thickest andesite accumulation may have been a volcanic vent area and although crosscutting probably occurred, some of what appears to be discordance may have resulted from material flowing out onto relatively steep initial slopes.

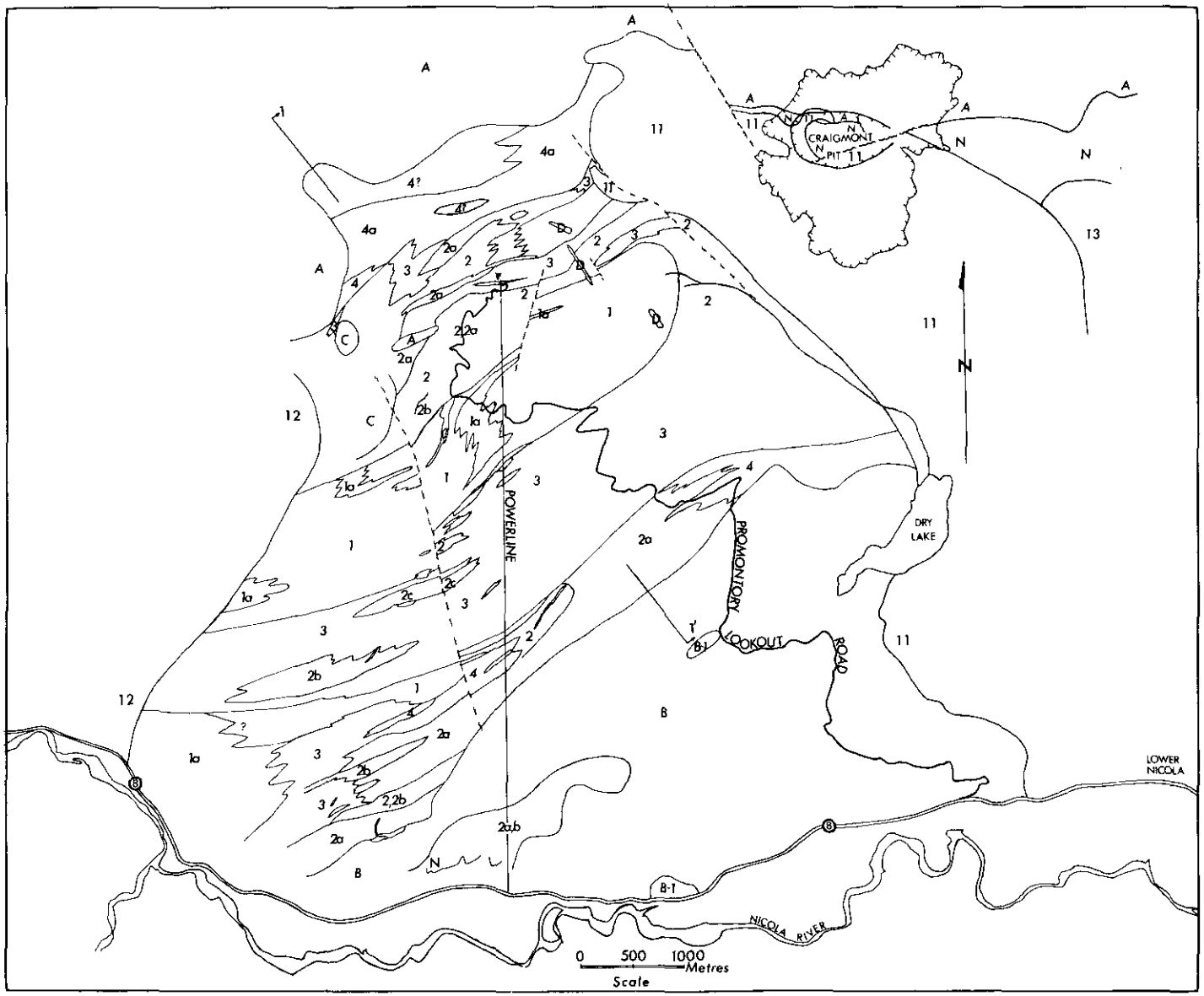

Figure 6. Geology of Promontory Hills.

LEGEND

NICOLA GROUP – UPPER TRIASSIC (CARNIAN ?)

1 VARIABLY RED SANDSTONE, RED ASH TUFF, AND RED TO GREEN TO PURPLE VOLCANIC BRECCIA; BRECCIA POLYMICTIC, OFTEN FELDSPATHIC, LOCALLY CARRIES ACCRETIONARY LAPILLI; INTERCALATED AUGITE PLAGIOCLASE ANDESITIC LAVAS (1a); EXTENSIVE QUARTZ-EPIDOTE-CALCITE VEINING WITH ASSOCIATED PYRITE OR SPECULARITE AND SOME COPPER MINERALIZATION.

2 CHERTY LOOKING QUARTZOFELDSPATHIC, OFTEN PYRITIC, FLOWS, BRECCIAS, AND TUFFS, FELDSPATHIC SANDSTONE, GREYWACKE, INTERMEDIATE TUFF (2a), ARGILLITE, LOCAL MARINE FOSSILS.

3 ARGILLITE, PEBBLE CONGLOMERATE, LIMY GRIT, VOLCANIC SANDSTONE, ARGILLACEOUS SILICEOUS LIMESTONE AND VOLCANICLASTIC ROCKS (3a) NEAR PROMONTORY LOOKOUT; SOUTH OF UNIT 1, IT CONSISTS OF SANDY ARGILLACEOUS LIMESTONE WITH PODS OF REEFOID LIMESTONE AND INTERLAYERS OF VOLCANICLASTIC AND QUARTZOFELDSPATHIC FLOW ROCKS. ARGILLITES AND LIMESTONES CARRY MARINE FOSSILS.

4 MIXED FRAGMENTAL VOLCANIC ROCKS (4a) AND MASSIVE TO PORPHYRITIC ANDESITIC VOLCANIC ROCKS. THE FRAGMENTAL ROCKS ARE GENERALLY FELDSPATHIC, PYRITIC, AND DARK GREY.

N NICOLA ROCKS, UNDIVIDED; GENERALLY METAMORPHOSED OR METASOMATIZED.

INTRUSIVE ROCKS

A GUICHON CREEK BATHOLITH – GRANODIORITE, QUARTZ DIORITE.

B COYLE STOCK – DIORITE TO QUARTZ MONZONITE, LOCAL ALASKITE; QUARTZ AND CARBONATE VEINING WITH ASSOCIATED SPECULARITE, SOME CHALCOPYRITE; HYBRIDIZED ZONES (B1).

C QUARTZ PLAGIOCLASE PORPHYRY (NICOLA AGE ?).

D HORNBLENDE QUARTZ PLAGIOCLASE PORPHYRY DYKES (POSSIBLY KINGSVALE AGE).

KINGSVALE GROUP (CRETACEOUS)

11 BASALT, ANDESITE, HORNBLENDE NEEDLE PORPHYRY (DACITE ?), VOLCANIC BRECCIA, BASAL SANDSTONE AND CONGLOMERATE.

SPENCES BRIDGE GROUP (CRETACEOUS)

12 MASSIVE TO PLAGIOCLASE PORPHYRITIC ANDESITIC LAVAS, VOLCANIC BRECCIA.

COLDWATER SERIES (LATE CRETACEOUS ?)

13 LARGELY SANDY MUDSTONES.

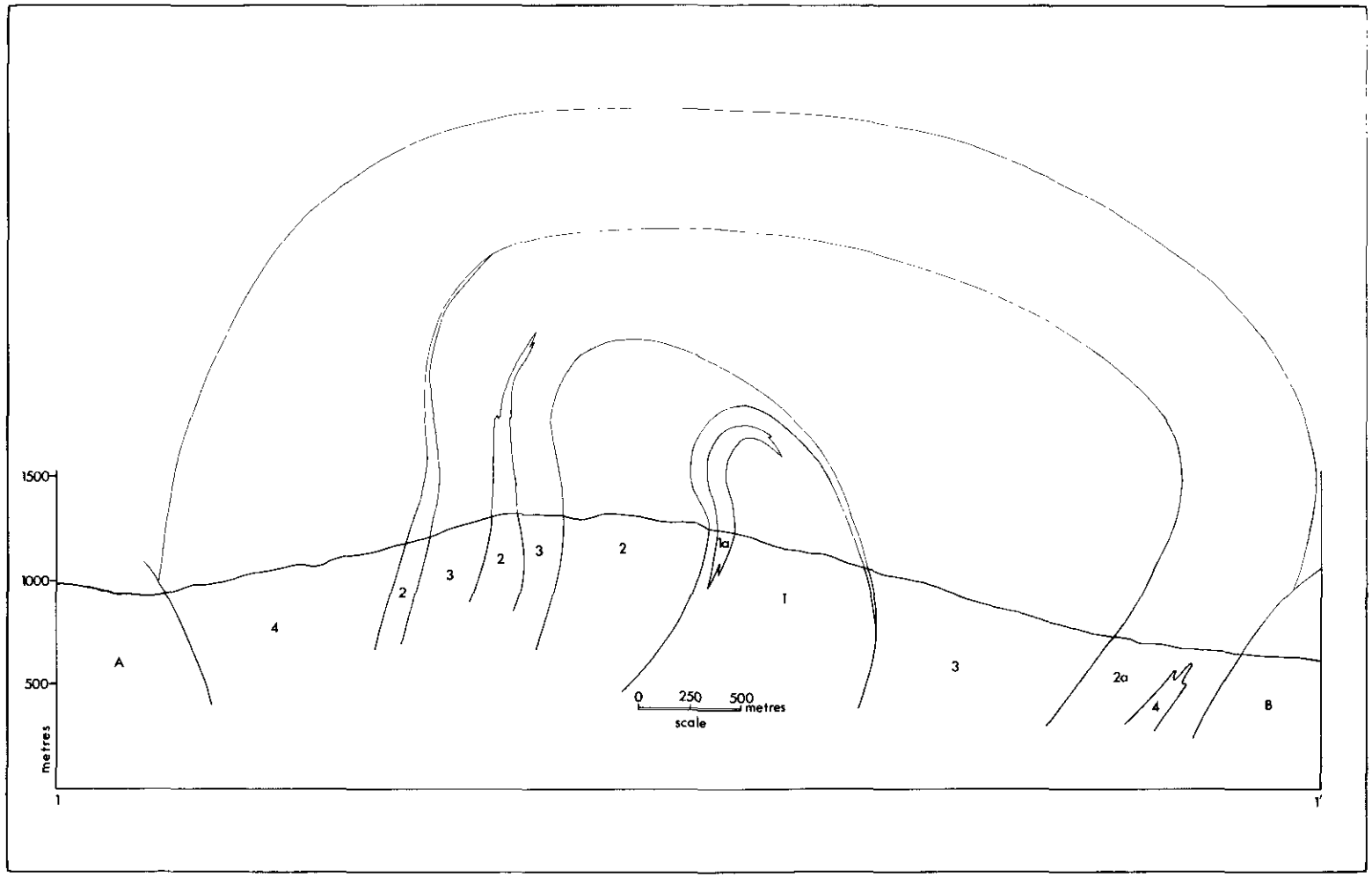

Figure 7. Interpretive geologic section, Promontory Hills (for location and legend, *see* Figure 6).

North of the Major Fold: Overlying rocks change rapidly along and across strike and are, to a degree, repeated across strike. Consequently units 2 and 3 on the map (Fig. 6) form areas which pinch out along strike and are repeated up section. North of the fold core along the powerline is a thick pile of quartzofeldspathic flows, tuffs, and breccias of rhyodacitic (?) composition with local thin black and brown argillite layers and minor impure limestone pods. Westward, along section 1-1' (Fig. 7) the same unit consists largely of quartzofeldspathic wackes, greywackes, marine black argillites, and tuff. These appear to represent mixed tuffs and sedimentary rocks derived from quartzofeldspathic igneous rocks like those along the powerline. Up section, this felsic unit is overlain by a mixed assemblage of siliceous argillaceous limestones, limy grits, volcanic sedimentary breccias, and argillites. There are few recognizable fossils in the limestone but there is much fossil debris. Argillite interbeds frequently carry marine halobid pelecypods and a few poorly preserved ammonoids were found. Tentatively these beds have been assigned a Carnian age. Apparently the limestones represent lime muds and sands deposited in an off-reef setting and the grits and sedimentary breccias represent material washed or slumped in. Continuing northward, there is a mixed assemblage of quartzofeldspathic igneous and sedimentary rocks with interlayers of volcaniclastic rock which contain angular, equant to elongated clasts that are generally less than 10 millimetres in maximum dimension. Near the top of this section are pod-like areas of limy rock which vary in composition from argillaceous and siliceous limestone to clean white marble. The uppermost exposed unit consists of black feldspathic volcaniclastic rocks and similar-looking andesitic flows. On weathered surfaces, volcaniclastic members are seen to range from fine-grained laminated siltstones to rocks with 5 to 10-millimetre-sized clasts; they are typically pyritic. Rare tuff (?) layers have alternating feldspathic and magnetite-rich laminae. Andesitic rocks vary from fine grained to porphyritic and resemble those in the basal unit. Exposure is very poor in this area and in conjunction with contact metamorphic effects from the nearby Guichon Creek batholith distinction of rock types becomes difficult.

South of the Major Fold: South of the fold, the basal unit is overlain by a thin discontinuous veneer of massive to brecciated quartzofeldspathic igneous rock (rhyodacite ?). Above are pods of reefoid limestone with abundant corals, bryozoa, crinoid columnals, brachiopods, and gastropods. In places the reefoid bodies directly overlie the basal unit. Quartzofeldspathic rocks, which tend to be finely spherulitic flows here, comprise only scattered lenses within a dominantly calcareous section. There are also lenses of volcanic sandstone, greywacke, and tuff (?). Exposures are abundant west of the powerline in this area but very poor east of it. Limestones tend to be granular and some consist in large part of fossil debris. Along the powerline, the overlying unit is a mixed assemblage of volcaniclastic rocks and greywackes, with layers of limestone, andesitic flows, and layers of red volcanic breccia. Eastward, volcaniclastic rocks diminish and andesitic flows dominate. These are generally olive green and amygdaloidal; flow breccias are common. West of the powerline, the calcareous section is thicker and seems to be thickening westward. Near the top of the calcareous zone west of the powerline, there is a red breccia zone with minor associated andesitic flows which resembles the basal unit. Above it, to the south, is a mixed assemblage of limestones and volcaniclastic rocks; many of the volcaniclastic layers pinch out westward. The Coyle stock cuts off the section at this level but inliers (roof pendants ?) of volcaniclastic rocks in the stock exposed along the powerline suggest that volcaniclastic sedimentation continued.

FAULTS

Faults inferred from the mapping have north-northwest to northwest and northeast trends. It is likely that considerable syn-volcanic faulting occurred. One northeast-striking fault near Promontory Lookout is

inferred to have been active during the felsic volcanic activity because there is a marked change in thickness of the lower quartzofeldspathic unit across it. The overlying limy unit does not seem to be offset, but the upper contact of the underlying unit is. Southward, the fault swings round into the bedding plane and dies out. Several other faults have apparent minor offset of some units but marked changes in thickness of others across them. It seems likely that these too were initiated during volcanism and later reactivated. Reactivation likely occurred during a post-Cretaceous episode of block faulting. Kingsvale Group rocks west of Craigmont mine are cut by northwest-striking faults, and northwest-trending Kingsvale (?) dykes cut Nicola rocks east of Promontory Lookout.

INTRUSIVE ROCKS

The panel of Nicola Group rocks in Promontory Hills is bounded on the north and south by granitic intrusions. On the north, the succession is cut and metamorphosed by the Late Triassic Guichon Creek batholith. Near its contacts the batholith ranges from quartz diorite to granodiorite in composition. To the south, Nicola rocks are cut and metamorphosed by the Coyle stock. The stock varies from diorite to quartz diorite to quartz monzonite in composition and has small areas which are alaskitic. No ages are available for the Coyle intrusion, but it has a marked northeast elongation like that of the country rock, has similarly elongated inliers or roof pendants of Nicola strata, and has diffuse, hybridized contacts. It cuts rocks interpreted to be the youngest Nicola rocks exposed and is in turn cut by dykes of Kingsvale (?) age. Presumably it is a Late Triassic subvolcanic pluton intruded during the waning stages of Nicola volcanism.

Cretaceous Rocks: The older rocks are unconformably overlain by sedimentary and volcanic rocks of Cretaceous age. To the west, these are largely basaltic andesites and fragmental volcanic rocks of the Spences Bridge Group. To the east are dacitic to basaltic flows, coarse to fine sedimentary rocks, and fragmental volcanic rocks of the Kingsvale Group.