

## GEOLOGY OF THE STAR LAKE EAST HALF SHEET (12A/11E), NEWFOUNDLAND

by B.F. Kean

### INTRODUCTION

Mapping was completed for the eastern half of the Star Lake sheet (12A/11E) during the 1977 field season. Reconnaissance studies were also conducted in the Noel Pauls Brook area.

The area was previously mapped on a scale of 1:250,000 by the Geological Survey of Canada (Riley, 1957); and parts of the area have been extensively explored for base metals by ASARCO and Terra Nova Exploration Company Limited.

### GENERAL GEOLOGY

The map area can be divided into two contrasting geological terranes. The northern half of the map area is underlain by gabbroic and granitic bodies of probably Devonian and younger age. The southern portion is underlain predominantly by volcanic rocks of the Victoria Lake Group (Kean, in press). Small sedimentary basins of Carboniferous and possibly Silurian age occur in localized outcrops along Red Indian Lake. "Units" represent a grouping of similar rock types and not a stratigraphic chronology.

### ORDOVICIAN

#### Victoria Lake Group

The Victoria Lake Group (Kean, in press) is a northeast trending, steeply dipping sequence of volcanic and associated sedimentary rocks of middle Ordovician and older age.

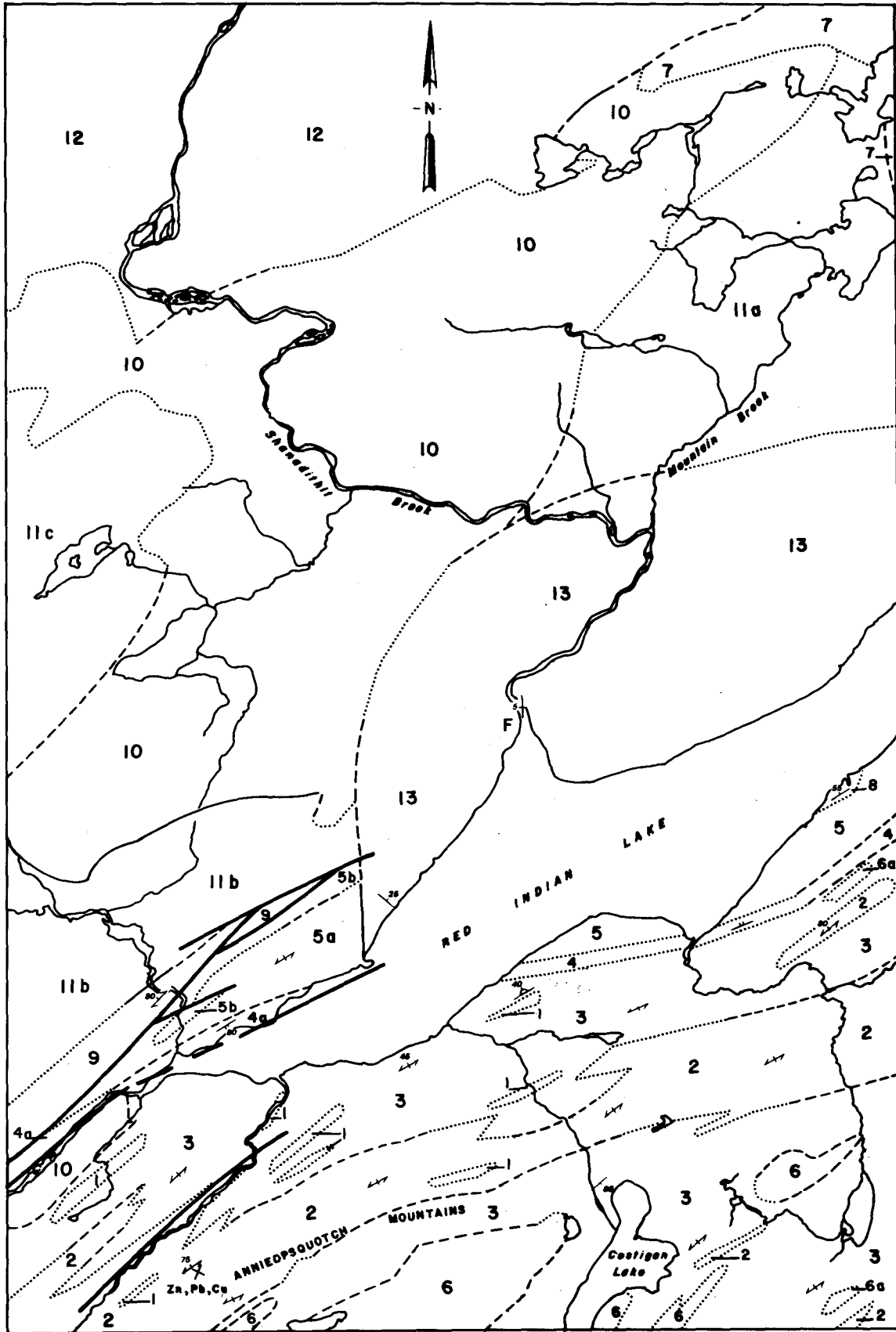
The outcrop of the Victoria Lake Group in the map

area lies to the south of Red Indian Lake and strikes northeasterly into the Lake Ambrose map area (Kean, 1977) and southwesterly into the Victoria Lake map area (Kean, in press).

Basic volcanic rocks (map unit 1) are subordinate to other lithologies and occur as discontinuous lenses and intercalated beds within the fine grained pyroclastic rocks, epiclastic rocks and sedimentary rocks and locally within the silicic volcanic rocks. The lithologies of this unit are predominantly dark green, massive, unpillowed flows and sills, and cleaved, fine grained, green tuffs. Minor basic agglomerate, pillow lava and breccia, locally containing limestone clasts, are present in places. The upper lenses of Unit 1 locally have a calcareous matrix.

Unit 2 consists of silicic and minor intermediate, green, white and buff to pink tuff and pyroclastic breccia. The breccia clasts are generally angular, up to 30 cm in size, and of the same color and composition as the matrix; however, in places the matrix may be more intermediate than the clasts. The matrix is generally fine grained and varies from lapilli tuff to sericite schist. The breccia grades laterally and upwards into green, white and buff silicic and intermediate tuff. Quartz is a common constituent of these silicic rocks and in places the rocks may be called quartz crystal tuffs. Feldspar phenocrysts are also locally present. In places the massive units show flow banding. Unseparated from these lithologies are light green basic and intermediate tuffs, particularly in the Tulks Hill area, and basic flows. All of these rock types are generally well cleaved but may be massive in places. Disseminated pyrite is extensive in this unit, which also hosts the zinc-lead-copper prospect of the Tulks Hill area.

Map unit 3 underlies most of the map area. The lithologies consist of waterlain tuffs, tuffaceous epiclastic sediments and other volcanoclastic rocks. The tuffs are



Kilometres 1 0 1 2 3 4 5 Kilometres



Scale

## LEGEND

### CARBONIFEROUS

13 Poorly indurated, red and gray siltstone, sandstone and conglomerate; minor limestone.

### DEVONIAN

12 Fine to medium grained, pink to red, alaskitic granite.

11 **11a**, Medium to coarse grained, biotite-hornblende adamellite; **11b**, medium to coarse grained, white to pink, biotite-muscovite-hornblende granite; **11c**, medium to coarse grained hornblende granodiorite.

10 Fine to medium grained gabbro and diorite.

9 Foliated granite; may, in part, be foliated margin of unit 11.

### SILURIAN

8 Fine grained, green sandstone, siltstone and graywacke.

7 **BUCHANS GROUP:** Mafic pillow lava, massive lava, breccia and minor red chert.

6 Medium grained, quartz-porphyritic granodiorite, quartz diorite; **6a**, gabbro.

### MIDDLE-ORDOVICIAN OR LATER (?)

5 Mafic volcanic rocks; **5a**, tuffs and volcanic sedimentary rocks; **5b**, basic lava (locally pillowed) and agglomerate.

4 Fine grained, finely bedded and laminated, green and minor red siltstone and minor red chert; **4a**, predominantly interbedded black argillite, siltstone and graywacke.

### MIDDLE ORDOVICIAN OR EARLIER (?)







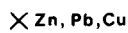
#### VICTORIA LAKE GROUP

3 Intermediate to mafic tuffs and volcanic sedimentary rocks (sandstone, siltstone and graywacke); minor black shale, chert and argillite; minor unseparated basic and silicic volcanic rocks.

2 Silicic and minor intermediate volcanic breccia, tuff and quartz crystal tuff.

1 Mafic lava, pillow lava, agglomerate and tuff.

## SYMBOLS

Geological boundary (defined, approximate, assumed) .....	
Bedding; tops known, tops unknown .....	
Pillow bedding (inclined) .....	
Cleavage or schistosity (inclined, vertical) .....	
Fault (defined or approximate, assumed) .....	
Fossil locality .....	
Mineral prospect (zinc, lead, copper) .....	

fine to medium grained, dark to light green, and generally basic to intermediate in composition. Lapilli tuffs containing white silicic volcanic rock fragments are present in places. The tuffs may locally contain quartz and rare feldspar crystals. Agglomerate and breccia are locally present; and grade into the tuffs. Bedding varies from thin to thick but is generally developed on a fine scale. It is commonly obscured or destroyed by a well developed cleavage and/or schistosity. Grading and small scale cross bedding are present in a few places. Tuffaceous graywacke, sandstone, siltstone, epiclastic rocks and volcanic derived siltstone, sandstone and graywacke as well as thin black shale lenses are interbedded with and lateral equivalents of the tuffs. Minor basic breccias, flows and silicic rocks occur throughout the unit.

#### Harbour Round Formation

Unit 4 is referred to the Harbour Round Formation (Kean, in preparation). It consists primarily of finely bedded and laminated, white weathering, gray-green siltstone. Minor beds and lenses of red siltstone and red chert are present locally. In places there are also basic sills and minor basic tuffaceous rocks. Conglomeratic graywacke is also present in this unit on the western side of the mouth of Roebucks Brook. Near Star Brook on the northside of Red Indian Lake rocks of this unit become interbedded with and subordinate to black argillite, siltstone and fine graywacke (4a), and the sequence is highly deformed and sheared.

#### Unit 5

Map unit 5 conformably overlies unit 4 along the south side of Red Indian Lake. The unit is poorly exposed in the map area. Massive basaltic lava and minor agglomerate and tuff are the principal lithologies. The unit consists of basic pillow lava, pyroclastics, and intraformational breccias to the northeast along strike (Kean, 1977). The breccias consist of clasts of angular red chert, vesicular basalt bombs and blocks (6mm to 15 cm), minor red siltstone and rare dacite in a matrix of finely comminuted rock. In places the breccia zones grade into fine grained red siltstone and chert. The unit consists of well foliated, dark green flows (locally pillowed) and tuffs on the north side of Red Indian Lake.

The rock types comprising this unit are different from those of the Victoria Lake Group but resemble lithologies of the Buchans Group.

## SILURIAN

### Buchans Group (Unit 7)

The Buchans Group underlies the extreme northeast corner of the map area, where some of the outcrops appear to be roof pendants in the surrounding intrusive rocks. The unit consists of basaltic pillow lava and minor pyroclastic breccia, chert and possibly massive flows.

#### Unit 8

Thin discontinuous lenses of fine grained, green massive sandstone with thin interbeds of green siltstone and rare coarser graywacke lenses outcrop along the south shore of Red Indian Lake near the map boundary. Because of their resemblance to Silurian (?) age rocks in the Millertown area and their more massive nature than the surrounding rocks, this unit has been tentatively referred to the Silurian. The contact relationships in the map area are not known but extensive shearing indicates that the contacts may be faulted.

## INTRUSIVE ROCKS

#### Unit 6

Rocks of map unit 6 are considered to be comagmatic with the silicic volcanic rocks of map Unit 3. The unit is generally altered and has been deformed with the country rocks. The unit consists of quartz diorites and granodiorites (6) with minor basic rocks of gabbroic and dioritic composition (6a). The quartz diorites and granodiorites are generally quartz porphyritic with a medium grained matrix of plagioclase and chloritized mafic minerals. The more mafic phases are fine to medium grained and composed essentially of plagioclase and altered pyroxene.

#### Unit 9

This unit underlies the area between map units 11 and 5. It consists of inhomogeneously foliated biotite granites which generally have cataclastic textures. The contact with the layered rocks of units 4 and 5 is not exposed but shearing and slickensiding indicate that the present contact may be faulted in places. These intrusive rocks and the rocks of units 4 and 5 in this area were probably deformed together.

## DEVONIAN

#### Unit 10

Map unit 10 consists of dark green to black, fine to medium grained, dioritic and gabbroic intrusive rocks.

The gabbroic phases are generally feldspar poor. Plagioclase and pyroxene are the only minerals recognized in hand specimens.

### Unit 11

This unit is intrusive into the rocks of map units 10 and 7. Its contact with map unit 9 is not exposed. East of Star Brook there appears to be a gradational contact between the two rock units, but for the most part there is a sharp contrast, over a short distance, in the intensity of deformation in the units. Unit 11 is undeformed to weakly deformed in places while unit 9 is well foliated and deformed. This indicates that map unit 11 is younger and was emplaced after the deformation of unit 9. Unit 11a is a medium to coarse grained adamellite. Unit 11b is a medium to coarse grained granite, commonly containing biotite. Both hornblende and muscovite may also be present. The proportion of K-feldspar to plagioclase is variable and the color varies from pink to white. Unit 11c is medium to coarse grained granodiorite.

Rocks of unit 11b in places show a weak foliation along their southern margin.

### Unit 12

The northern part of the map area is underlain by unit 12. This is a fine grained, equigranular, red to brick-red, alaskitic granite. Its contact with unit 11 is not exposed but on the basis of mineralogy and texture it is considered to be a distinct, and younger, intrusive complex. To the northeast, in the Buchans area, it is considered to have been emplaced later than rocks of unit 11 on the basis of stratigraphic relationships (Kean and Thurlow, 1975). Within the map area it is intrusive into map unit 10. Xenoliths and roof pendants of rhyolite and crystal tuff were noted in a few places.

## CARBONIFEROUS

### Shanadithit formation (Unit 13)

The main outcrop of Carboniferous age rocks is in the Shanadithit Brook area on the north side of Red Indian Lake. The name Shanadithit formation is proposed for this sequence of rocks. Carboniferous rocks also outcrop on the west side of Roebucks Brook and to the north of unit 8. The rocks are poorly indurated and the strata vary from horizontal to dips up to 25 degrees east and west due to gentle folding and possibly faulting.

In the Shanadithit Brook area, isolated and scattered beds of poorly indurated, red pebble and cobble conglomerate and sandstone outcrop in the river bed north from the bridge to the contact with the intrusive rocks. Only at the mouth of Shanadithit Brook can a stratigraphic section be measured. Here the section is

approximately 30 m thick with coarse red conglomerate at the base, overlain by gray, green and rare red sandstone, siltstone and thin conglomerate beds. Two pale gray limestone beds are present; they are commonly nodular and are probably caliche deposits. Red and gray sandstone exposed southwest of Shanadithit Brook are extremely micaceous and are trough cross-bedded. Pebbles in the conglomerate were all derived locally from the volcanic and plutonic basement rocks.

Megafossils of plants indicate a Carboniferous age (Newhouse, 1931). Miospores indicate a "Horton age" (Belt, 1969).

## STRUCTURE

All the map units except 10-13 have a strong, but inhomogeneously developed, northeast trending and steeply dipping schistosity. Bedding-cleavage intersections and geopetal structures indicate that the sequence is tightly folded. The map area is characterized by northeast trending ridges bounded by steep valleys that often show shearing. Faulting is indicated in the Lloyds Valley - Star Brook area by extensive shearing and slickensides. Actual displacements are hard to recognize since the stratigraphy parallels the ridges.

The Carboniferous strata and map units 10, 11 and 12 are essentially undeformed and have no penetrative fabric. A weak foliation is developed locally in the margins of 11b; the Carboniferous strata are gently folded and warped and have been affected somewhat by faulting.

## MINERALIZATION

The most significant mineral showing within the map area is the Tulks Hill prospect located in map unit 2 of the Victoria Lake Group. The prospect consists of three zones and lenses of disseminated and massive sphalerite-galena-chalcopryrite (with trace gold and silver) mineralization in silicic tuffs and breccias. Disseminated pyrite and minor chalcopryrite occur throughout unit 2 and to a lesser degree unit 1.

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