GEOLOGY OF THE VICTORIA LAKE AREA

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Introduction

During the 1975 field season, 1:50,000 geological mapping was initiated in the Victoria Lake area of south central Newfoundland. The area mapped includes that part of the Victoria Lake sheet (12 A/6) south and east of Lloyds River and the parts of the Puddle Pond (12 A/5) and King George IV (12 A/4) sheets bordering on Victoria Lake. The Victoria Lake sheet will be completed in 1976 and mapping will begin on the Lake Ambrose sheet (12 A/10).

The area was previously mapped on a scale of 1:253,440 by the Geological Survey of Canada (Riley, 1957), and has been extensively explored for base metals by the American Smelting and Refining Company.

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General Geology

The area is underlain by the Strides Group (Riley, 1957), a northeast-trending, northwest-dipping sequence of mafic to silicic pyroclastics and volcanogenic sediments that are lithologically similar to fossil-dated Ordovician rocks along strike to the northeast (Williams, 1970). These rocks are thus considered to be of Ordovician age.

The Strides Group is bound to the north by Devonian granites (Riley, 1957) and to the south by granites and high grade metamorphic rocks of Ordovician-Silurian age (Williams, 1967).

Strides Group

The discontinuous and lensoid nature of the lithologies, rapid facies changes, and the lack of sedimentary structures make stratigraphic and structural control very difficult. The evidence available, however, indicates an overall northwest younging stratigraphic sequence. The sequence has been divided into three major units.

Unit 1 is a monotonous sequence of well-bedded, fine-grained, laminated sediments indicative of a volcanosedimentary environment. It consists of interbedded black, light green, green and white argillite, siltstone and tuff with arkosic sandstone and minor chert. Minor, rounded granitic (s.l.) pebbles occur sporadically in the coarser beds. Black shales (1b), green phyllite and rare recrystallized white limestone occur as discontinuous lenses and beds.

LEGEND

DEVONIAN

5 Quartz porphyritic and equigranular granite, quartz monzonite and granodiorite; 5a - Foliated biotite granite, granodiorite, garnetiferous granite, pink granite; minor undeformed granite; minor unseparated granite gneiss

4 Diorite, gabbro; 4a - Pyroxenite

ORDOVICIAN(?)

STRIDES GROUP (1-3)

3 Basic and intermediate tuffs, volcanic breccias, and fine-grained volcanogenic sedimentary rocks, black shales and unseparated silicic tuffs; 3a - Pillow lava; 3b - Dark green, feldsparphyric, dacitic to andesitic flows and coarse pyroclastics

2 Quartz crystal tuff: rounded to bipyramidal quartz crystals in a green dacitic to andesitic tuffaceous matrix; 2a - Green to buff, fine-grained, silicic tuff and crystal vitric tuff

1 Fine-grained, well-bedded, interbedded basic to silicic volcanogenic sedimentary rocks, black shales and rare marble lenses; 1a - Volcanic conglomerate: angular to subrounded volcanic fragments and well rounded granite and diorite pebbles in a dacitic volcanogenic sediment matrix; 1b - Carbonaceous black shales

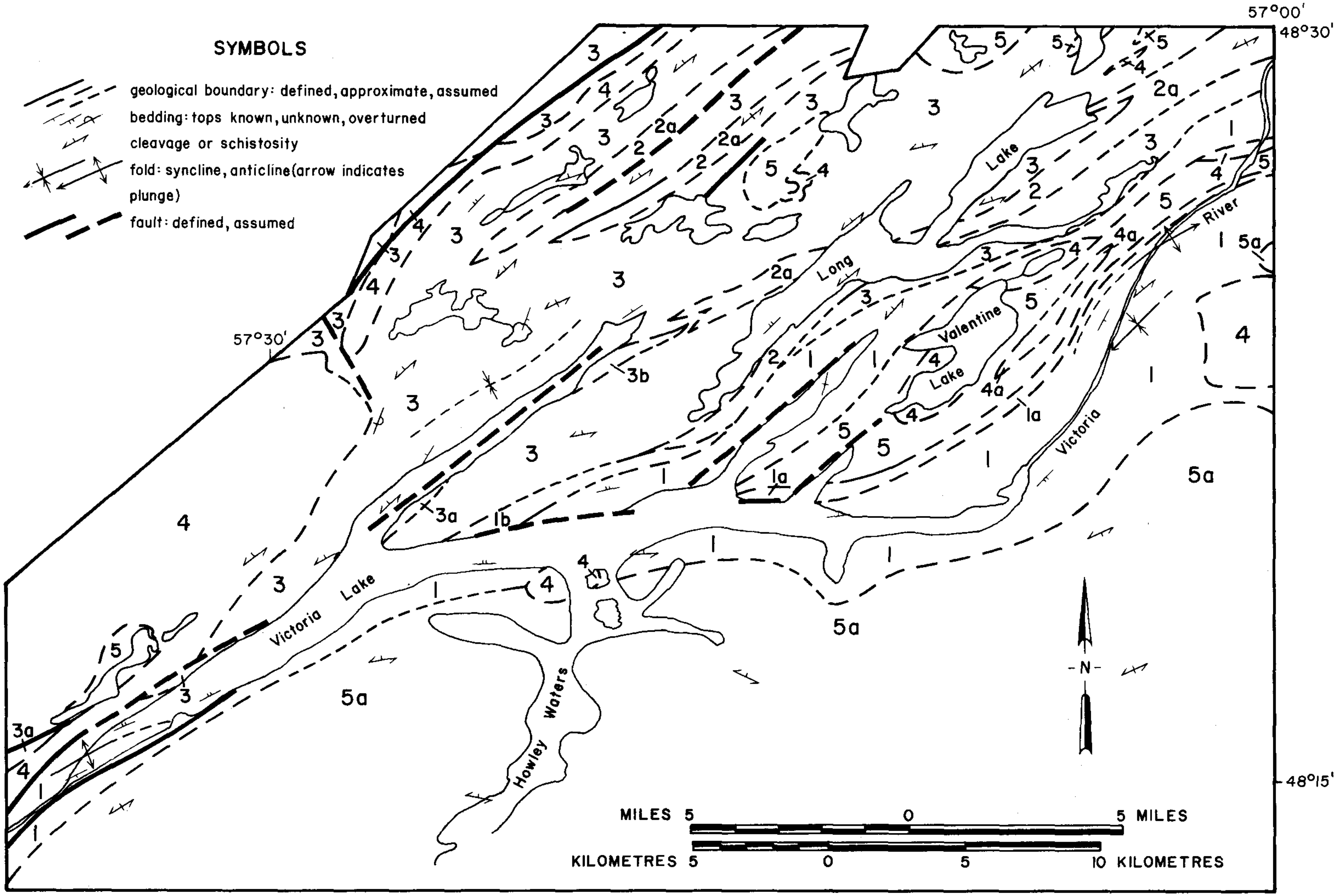

Fig. I: Geological Sketch Map of Victoria Lake Area

Interbedded with these sediments is a volcanic conglomerate unit (1a). The conglomerate is an unsorted mixture of flattened fragments and oval to rounded clasts. The flattened fragments were probably disc-shaped clasts originally and are of volcanogenic sediments, black shale, argillite, and siltstone with minor red jasper and limestone and possibly red rhyolite. The rounded clasts vary from pebble to cobble size but in places reach a maximum dimension of 0.5 m. They may comprise up to 15% of the rock and are of granite, quartz monzonite, granodiorite and diorite. The matrix is a fine-grained, green mixture of comminuted rock fragments, volcanic debris, and occasionally quartz and feldspar fragments, and has an overall dacitic composition. Within the conglomerate there are lenses of greywacke and well-bedded, fine-grained, laminated sediments similar to the fine-grained sediments comprising the bulk of Unit 1.

This conglomerate has a strike length of at least 19 km. and is traceable to the northeast into the southern extension of a belt of Silurian rocks (Williams, 1970). Some of the lithologies included in the Silurian sequence are not, however, all lithologically distinctive of Silurian rocks and are possibly Ordovician (Williams, 1970), and the conglomerate described here is probably Ordovician in age.

Unit 1 is intruded by numerous unseparated dioritic to gabbroic bodies.

With the deposition of Unit 2, important silicic volcanism began. Unit 2 has an overall dacitic composition, is generally green in color, and is occasionally marked by a green and buff compositional banding and poorly defined bedding. Quartz crystal tuff, in places with feldspar crystals and crystal fragments, predominates, with the quartz-crystals varying from bipyramidal to rounded and broken. The quartz crystals in places exceed 1 cm. in size. Facies of this unit vary from quartz-rich intermediate tuffs and breccias to fine-grained, aphanitic, green, pink and white quartz-sericite schists, sericite schists and vitric tuffs (2a). Silicic breccias and massive rhyolite flows are rare. Unit 2 is interbedded with Unit 3 and often grades imperceptibly into it.

Unit 3 consists of volcanic breccias and tuffs as well as bedded mafic and intermediate volcanogenic sediments, silicic tuffs and black shales and other lithologies similar to Unit 1. The sediments are interbedded with, and lateral facies equivalents of pyroclastic rocks. The most common pyroclastic rocks are intermediate lithic tuffs, feldspar and quartz tuffs and breccias, and interbedded, fine-grained, bedded tuffs. Quartz-rich tuffs and breccias are generally spatially associated with Unit 2 quartz-crystal tuffs. The breccias generally have a medium-grained, green intermediate tuffaceous matrix with fragments ranging from mafic to felsic. In places silicic breccias occur.

Poorly preserved, highly altered and cleaved mafic pillow lavas (3a) outcrop in two areas. On the north shore of Victoria Lake the pillows are medium-grained, green, in places feldsparphyric, and probably andesitic. Tuffaceous sediments form the interpillow material. In the Annieopsquotch Mountains area they are massive, fine-grained and non-porphyritic with tuff and minor red jasper as the interpillow material.

Unit 3b is a distinctive unit of fine-grained, feldsparphyric, black to grey-green, dacitic to andesitic volcanic rocks. The rocks vary from massive volcanics with local flow-banding and minor intrusive phases, to coarse breccias and tuffs. The breccia-tuff zones contain massive, feldsparphyric, sometimes flow-banded, dacitic fragments in a well-cleaved feldsparphyric tuffaceous matrix. Bedding is sometimes visible in the matrix; however, the matrix is generally of similar texture and lithology to the fragments except for being more chloritic and extensively cleaved. In places, there are bulbous bodies of feldsparphyric, massive dacite up to 4 meters in size in the matrix.

Unit 3 is intruded by numerous unseparated small diorite and gabbro bodies.

Intrusive Rocks

Intrusive rocks of the map area form a differentiated sequence from gabbro, diorite (4) and minor pyroxenite (4a) to granodiorites, quartz monzonite and granite (Unit 5).

The rocks of Unit 4 vary from fine-grained diabase to medium- to coarse-grained diorite and gabbro. In places medium- to coarse-grained pyroxenite (4a) occurs as an earlier phase of this Unit. The rocks range from equigranular, through feldspar- or pyroxene-rich phases, to feldspar and/or pyroxene porphyritic. Troctolitic varieties occur locally. The coarser varieties of diorite and gabbro in places grade imperceptibly into each other. The rocks are usually massive except along shear and fault zones. A regional penetrative cleavage is sometimes discernible along the margins and in zones within the bodies.

Intruding and occurring in close association with Unit 4 are the granodiorites, quartz monzonites and granites of Unit 5. Rocks of Unit 5 are generally white, with minor pink phases and vary from medium-grained equigranular to coarsely quartz-porphyritic. The rocks consist of quartz, varying amounts and proportions of feldspars (alkali and plagioclase) and a chloritized biotite, although they are quite often mafic poor. The unit contains xenoliths of schistose country rock and has itself been affected by a regional deformation.

Granites of Unit 5a all intrude Unit 1 of the Strides Group and are tentatively included with the granites of Unit 5. Unit 5a includes foliated, white and pink, biotite granite-granodiorite, foliated garnetiferous granite, granite gneiss, minor foliated biotite feldspar-megacrystic granite, and minor undeformed to weakly deformed biotite granite. The major rock type is a foliated white to pink biotite granite. On outcrop scale, this granite intrudes granite gneiss and both are intruded by undeformed to weakly deformed, fine-grained, equigranular, biotite granite.

Structural Geology

The main period of deformation (Dm) produced an inhomogeneous, northeast trending, steeply dipping cleavage (Sm) and tight isoclinal folds. However, major structures related to this deformation are hard to delineate because of the lack of stratigraphic and structural control. This deformation affected all rocks in the area, except possibly the small, relatively undeformed granites included in Unit 5a. The schistosity forms augens around some of the larger granitic bodies and follows the contact with Unit 5a.

The Sm schistosity generally dips steeply to the northwest, but in a few places shallow dips to the northwest or steep dips to the south were observed. The schistosity is also locally affected by wavy, open, undulating folds and open, flat-lying crenulations. This indicates a minor, late deformational event.

A pre Dm event is indicated by local folding of an earlier fabric by Dm folds and by the presence of schistose xenoliths in the granites. In fact, the zone marking the intrusive contact between Units 1 and 5a gives indication of a number of regional and thermal deformational events. Because of contact metamorphism and at least partial assimilation, the significance of some of the fabric relationships, banding and folding is questionable. There is evidence, however, of at least two deformational events before the intrusion of the biotite and garnetiferous granites and their subsequent deformation (Dm).

There is a gradational increase in metamorphic grade southward across the map area from the regional lower greenschist facies in the north to biotite, amphibolite and garnet grade in the south, near the contact with granites of Unit 5a.

Northeast trending lineaments are a common feature of this area. These lineaments are often marked by steeply dipping shear zones and thus are interpreted as faults, although actual displacements are not mappable.

Economic Geology

The occurrence of extensive submarine acid volcanism is an encouraging factor in assessing the mineral potential of this area. In fact, many of the acid tuff horizons are characterized by rusty zones and pyrite mineralization. The most significant of these is the zone on Long Lake which contains abundant pyrite with minor chalcopyrite, sphalerite and galena. This zone has been extensively prospected and drilled by the American Smelting and Refining Company without encouraging results. A major acid and quartz-crystal tuff unit in this area is on strike with similar lithologies hosting the Tulks deposits, south of Red Indian Lake.

References

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