GEOLOGY OF THE LAKE AMBROSE MAP AREA, EAST HALF (12A/10E), NEWFOUNDLAND

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INTRODUCTION

During the 1977 field season mapping was completed for the east half of the Lake Ambrose map area. Much of the area is accessible by a network of logging roads owned by Price (Newfoundland) Pulp and Paper Limited. The area was previously mapped on a scale of 1:250,000 by the Geological Survey of Canada (Williams, 1970), and has been explored for base metals by several mineral exploration companies.

GENERAL GEOLOGY

The northern part of the map area is underlain by the Middle Ordovician (and earlier?) Victoria Lake group (Kean, 1977). This is a northeast trending, steeply dipping sequence of volcanic and sedimentary rocks. Rocks similar to the Silurian Buchans Group were noted in the Red Indian Lake area. The southern section of the map area is underlain mainly by the Tally Pond group. This name is proposed for a northeast trending, moderately dipping sequence of presumed Middle to Upper Ordovician age volcanic and sedimentary rocks and their metamorphic equivalents. The volcanic rocks of the Tally Pond group are overlain in places by a thick red-gray polymictic conglomerate and sandstone unit possibly of late Ordovician or early Silurian age. In the extreme south, the map area is underlain by granites of presumed Devonian age and metamorphic rocks of unknown age. Plugs and small plutons of diorite and gabbro are present throughout the map area.

STRATIGRAPHY

The lack of outcrop and poor stratigraphic and structural control make geological mapping of most of the rock units in this area difficult. Ten lithological units have been recognized; however, the units do not necessarily indicate a stratigraphic sequence, but only lithological groupings.

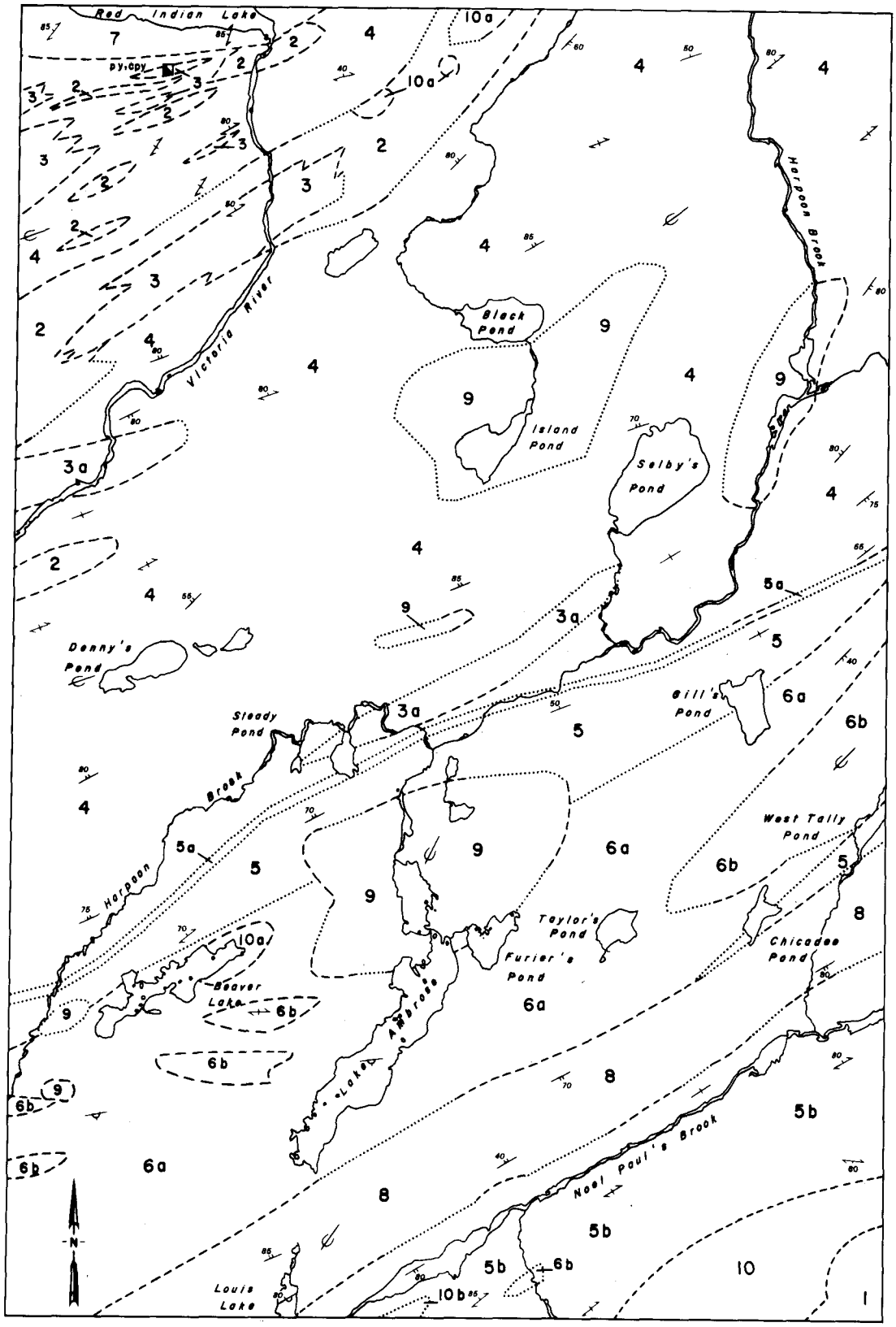
Schist and Gneiss (Unit 1)

Unit 1 consists of fine grained to coarsely crystalline biotite-quartz-feldspar gneiss and schist, and muscovite-biotite gneiss and schist. Granite gneiss and schist are present locally. The rocks of this unit outcrop only in the southeastern section of the map. They have a southeasterly trend and are steeply dipping. They are intruded by undeformed Devonian(?) granites and are believed to be Ordovician or earlier in age.

Victoria Lake group (Units 2,3,4)

Unit 2 contains most of the mafic to intermediate volcanic rocks in the area. The rock types include fine grained, dark green and gray-green, mafic pillow lava and massive flows (in places feldsparphyric), agglomerates, fine grained mafic tuffs, and chlorite schists. Similar rock types also occur as discontinuous lenses within and interbedded with lithologies of units 3 and 4.

Unit 3 consists mainly of acidic volcanic rocks. These include massive to schistose, gray to white, dacite and rhyolite flows, quartz crystal tuffs, quartz-feldspar porphyry, tuff and distinct units of gray-green silicic breccia (3a) containing fragments up to 15 cm long. The breccias consist of angular silicic volcanic clasts in a matrix varying from silicic to intermediate in composition. The tuffs are fine grained equivalents of the



LEGEND

DEVONIAN

10 — *Fine to medium grained, pink granite and muscovite-biotite granite;* **10a,** *granodiorite;* **10b,** *micropegmatite.*

9 — *Diorite, biotite diorite and gabbro; minor tonalite and granodiorite.*

SILURIAN

8 — *Purple to gray, pebble conglomerate and sandstone; minor siltstone and argillite.*

MIDDLE ORDOVICIAN OR LATER (?)

7 — *Contorted gray and green siltstone, slate and interbedded graywacke; unseparated mafic volcanic rocks* **BUCHANS GROUP.**

TALLY POND GROUP

6 — *Silicic to intermediate and mafic volcanic rocks;* **6a,** *green, vesicular and amygdaloidal (calcite), locally pillowed, mafic lava; silicified and sheared, altered green agglomerate and tuff; minor green cherty siltstone, shale;* **6b,** *gray, green and buff silicic lava (locally flow banded and quartz porphyritic), silicic tuffs,and quartz-feldspar porphyry; coarse silicic breccias.*

5 — *Well bedded, gray and green siltstone, cherty siltstone, shale, minor tuff, sandstone and graywacke;* **5a,** *black, pyritized shale;* **5b,** *metamorphosed gray and green siltstone, argillite and sandstone; slate, phyllite and quartzite; minor unseparated 6b.*

MIDDLE ORDOVICIAN AND EARLIER

VICTORIA LAKE GROUP

4 — *Volcanic sediments, tuffaceous graywacke, black slate, siltstone and minor intermediate tuffs.*

3 — *Gray to white dacite and rhyolite, quartz crystal tuff, quartz-feldspar porphyry, minor silicic gray breccia and tuff; minor unseparated rocks of units 2 and 4;* **3a,** *gray to white silicic agglomerate and tuff, minor acidic lava flows.*

2 — *Intermediate to mafic, green lava (locally pillowed), agglomerate and minor tuffs; minor unseparated rocks of unit 3.*

LOWER ORDOVICIAN OR EARLIER (?)

1 — *Fine to coarsely crystalline biotite-quartz-feldspar gneiss and schist; muscovite-biotite gneiss and schist; minor granitic gneiss and schist.*

SYMBOLS

Geological boundary (defined, approximate, assumed) .....

Bedding; tops known (inclined, overturned) .....

Bedding; tops unknown .....

Pillow bedding; tops known (inclined, overturned) .....

Cleavage or schistosity (inclined, vertical) .....

Glacial striations .....

Shaft (abandoned) .....
(py = pyrite, cpy = chalcopyrite)

breccias. Rocks of unit 3 also occur interbedded with lithologies of units 2 and 4.

Unit 4 consists of bedded, locally well cleaved, marine clastic sedimentary rocks with minor subaqueous mafic volcanic rocks (unseparated). Gray to black, well bedded siltstone, argillite, slate and volcaniclastic rocks with intercalations of gray to green intermediate to basic lavas and tuffs outcrop in the Victoria River area. Few sedimentary structures are developed in this region except for local small scale cross-bedding within the siltstones. Fine grading is present in places.

The facies of these rocks changes along strike to the northeast. Volcanic rocks (flows and tuffs) and related fine grained sedimentary rocks decrease in abundance and a thick alternating sequence of massive gray-green graywacke, sandstone, minor siltstone, mudstone and shale increases in abundance. To the northeast sedimentary structures are more common and are well preserved in areas of weak deformation. The graywacke beds, which vary from centimetres to metres in thickness, are generally fine to medium grained (locally coarse grained) and unsorted; they contain abundant feldspar, siltstone, sandstone and shale clasts and minor feldspar porphyry fragments. These clasts vary up to 15 cm in diameter in the coarse beds.

A typical exposure of this repetitive sequence consists of a massive graywacke bed (6 cm to 3 m thick) with a coarse erosional base overlying a thin bed of shale or mudstone (2 cm to 12 cm) in which sedimentary structures have been developed, including load casts, flute casts, and scour and fill. This generally grades upwards into fine, locally cross-bedded, sandy layers which are overlain by a siltstone bed (2 cm to 15 cm) and a finely laminated (convolute bedding locally developed) thin mudstone or shale bed (2 cm to 12cm). The locally developed coarse unsorted graywacke-conglomerate beds (6 cm to 2 m) show channel fill structures, rip-ups, scour and fill and slumping.

Some of the lithologies within this unit may be correlative with parts of unit 5.

Tally Pond group (Units 5 and 6)

Unit 5 consists of generally well bedded gray to green siltstone, green siliceous siltstone, argillite, black shale (5a, the most significant shale layer, could be part of Unit 4), tuffaceous siltstone and minor chert. The tuffaceous bands occur as thin interbeds. Rocks similar to unit 5 occur intercalated with units 6 and 4 in the southern and central sections of the map area. Metasedimentary rocks (5b; argillite, slate, phyllite) outcrop in the southern section of the map area and are interpreted to be equivalent to unit 5 elsewhere.

Unit 6 consists of a long lenticular belt of moderately dipping, fresh looking, unmetamorphosed volcanic rocks, the Tally Pond volcanics, which extend from Lake Ambrose to the Tally Pond region. Gray to green vesicular and amygdaloidal, locally pillowed, mafic flows, tuffs and agglomerates (6a) are the main rock types. They are locally sheared, mineralized and silicified with minor chlorite and sericite alteration.

The silicic volcanic rocks (6b) consist of mildly deformed, creamy gray to green, rhyolite flows and minor tuffs. Quartz feldspar porphyry is also abundant; it may represent high level intrusive feeders or coarse flows and crystal tuffs. Many of the rhyolite flows contain quartz phenocrysts. Flow banding was also noted in similar flows in the Lake Ambrose region. These acidic volcanics contain disseminated pyrite, chalcopyrite, galena and sphalerite.

Distinct zones of gray to black coarse acidic breccia and agglomerate are mappable in places. These rocks consist of fragments up to 15 cm in diameter in an acidic to intermediate matrix.

Unit 6 contains unseparated well laminated gray-green siltstone, green and minor red chert, numerous thin black carbonaceous shale lenses and other lithologies similar to those of unit 5. Many of the black shale lenses are interpreted to be carbonaceous tuffs since they locally contain abundant volcanic fragments and, rarely, minor sulphide fragments.

Harbour Round formation (Unit 7)

Unit 7, which outcrops in the Red Indian Lake region of the map area, resembles in part the Harbour Round formation, a name proposed by Kean (personal communication) for a thick sequence of siltstones with its type section in the Harbour Round area of southern Red Indian Lake. This unit consists mainly of white weathered, contorted siltstone and black shale; graywacke and minor unseparated sheared and chloritized volcanic rocks increase to the northeast. Red chert and limestone lenses in basic volcanic rocks that are probably Buchans Group equivalents and red graywacke beds containing abundant chert clasts are common in the Victoria River area. To the northeastwards, this unit becomes essentially unseparable from rocks of unit 4.

Unit 8

This unit consists mainly of purple to gray volcanic-pebble conglomerate and sandstone, possibly of Silurian age, with interbeds of gray-green argillite and calcareous siltstone. The conglomerates contain angular to subangular clasts up to 12 cm in size which resemble Tally Pond volcanics; fragments of granite and quartz-feldspar porphyry are also common. Other clasts include shale, graywacke, siltstone, red chert and volcanic rock

fragments. Local scour and fill structures, trough cross-bedding and cannibalistic sedimentation, all indicative of shallow water deposition, are common sedimentary features.

This unit appears to conformably overlie the Tally Pond group; however, locally, it unconformably overlies the silicic volcanics of the Tally Pond group which may have formed topographic highs and been eroded at the same time.

INTRUSIVE ROCKS (UNITS 9 AND 10)

Unit 9 consists of fine to coarse grained plugs and plutons of diorite and gabbro (9) which intrude the central part of the map area. Granitic rocks comprise unit 10 and are restricted mainly to the southern section of the map area although small altered granitic plugs do outcrop throughout the map area. The pluton to the south is a fresh looking, orange colored, medium grained biotite granite. The small plugs of granitic material are altered, medium grained feldspar porphyry (10a) and pegmatite (10b).

All these intrusive rocks crosscut the regional schistosity and, locally, contain clasts of country rocks. They are undeformed and are interpreted to be posttectonic and of Devonian age. They are probably the youngest rocks in the map area.

STRUCTURAL GEOLOGY

The map area has a northeasterly trending structural grain that is characterized by a heterogeneously developed, steeply dipping schistosity that is parallel to subparallel to the bedding. On the basis of relationships in the Victoria Lake map area to the southwest, this schistosity may be interpreted as a composite fabric (Kean, 1975a, b). Small scale folds related to the regional schistosity were noted in the Victoria River area and large scale isoclinal folds within the Victoria Lake Group can be delineated based on stratigraphic tops. Folding in the Tally Pond group is more open, except in the metasediments, where folding and deformation are more intense due to proximity to granite intrusions. In general, the Tally Pond group appears to be less deformed and metamorphosed than the Victoria Lake group. Deformation is much more intense in the northwest section of the map area where shear zones and slickensides indicate faulting in the Red Indian Lake region.

MINERALIZATION

The Victoria Lake group contains one significant mineral showing in the map area, namely the Victoria mine prospect situated in the northwest corner. Bedded, stratabound volcanogenic massive sulphides occur in close spatial association with felsic tuffs that are interbedded with intermediate flows, tuffs and pyroclastics and carbonaceous shales. Mineralization consists of copper (up to 10 percent), pyrite, and minor lead and zinc. Disseminated pyrite and chalcopyrite is associated with units 2 and 3 of the group.

Disseminations and fracture fillings of pyrite, chalcopyrite, galena, and sphalerite occur within the silicic and mafic volcanic rocks of the Tally Pond group. Pyrite and pyrrhotite occur within felsic tuffs and flows (6b) intercalated with unit 5b south of Noel Paul's Brook. Narrow veinlets (1 cm to 30 cm in length, 1 cm in width) of (serpentine) asbestos were noted in unit 9 near Harpoon Brook dam.

The volcanic rocks within the map area have good mineral potential. Rocks of high potential include:

(1) Victoria Lake group volcanic rocks (units 2 and 3);

(2) Tally Pond group volcanic rocks, including acidic and basic units (units 6a and 6b) and breccia and agglomerates zones (unit 6c); and

(3) acidic volcanics (6b) intercalated with rocks of unit 5b south of Noel Paul's Brook.

The sulphides are closely related to acid volcanism and mineralized zones are commonly intercalated with and overlain by lenses of carbonaceous shale and possibly carbonaceous tuffs.

Acknowledgements: *The author is grateful to Lewis Wheaton for capable assistance during the field season.*

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