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The Harvey Volcanic Area

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TRIP A-14 and B-11, by G. E. Pajari, University of New Brunswick.

THE HARVEY VOLCANIC AREA

INTRODUCTION

The Harvey Formation forms a distinctive unit along the northwestern margin of the extensive Carboniferous basin (Freeze, 1936; Laughlin, 1960; Kuan, 1970). The Harvey Formation is underlain by Mississippian red siltstones and conglomerates. The volcanic rocks are rhyolites (*sensu stricto*) in composition, plotting in and near the minima field of Petrogeny's Residua system, and are of similar composition in both members of the Harvey Formation. Flow folds in flow-layered lavas indicate a southerly source for the volcanic rocks. The Mississippian rocks unconformably overlie the Silurian strata and are overlain by the Mississippian and/or Pennsylvanian conglomerates and sandstones (Fig. 1).

The Harvey Formation has a regional dip of 10-20° southward toward the axis of the Carboniferous basin. The stratigraphic sequence is as follows:

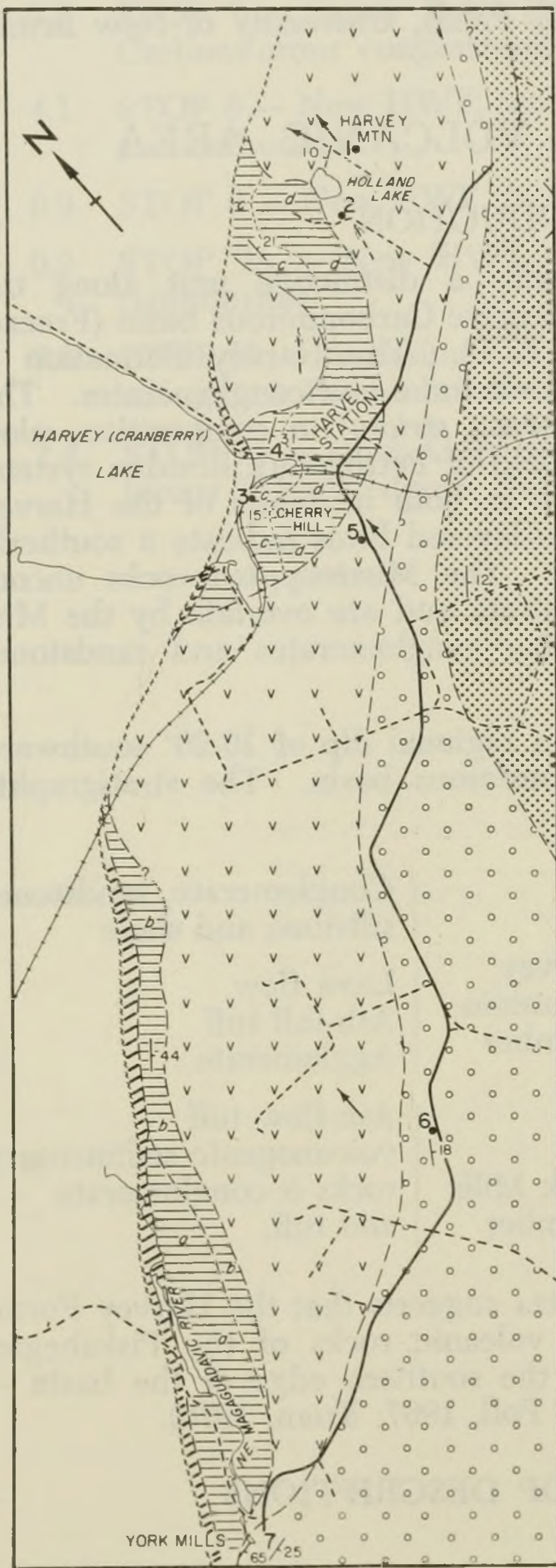
CARBONIFEROUS	Mississippian and/or Pennsylvanian	Conglomerate, sandstone, siltstone and shale
	Harvey Mountain Member	Lava flow Ash-fall tuff Agglomerate
	Mississippian Harvey Formation York Mills Member	Ash-flow tuff volcanogenic sedimentary rocks & conglomerate and tuff.

Stratigraphic and petrologic data suggests that the Harvey Formation is correlative with the volcanic rocks of the Piskahegan Group at Mt. Pleasant along the southern edge of the basin — a distance of 15 miles (van de Poll, 1967; Kuan, 1970).

LOG AND STOP DESCRIPTIONS

MILEAGE

0.0 Parking lot beside Geology Department, U.N.B. Proceed west along Highway # 2 (Trans-Canada Highway).



45°44'
66°58'

GEOLOGY OF THE HARVEY AREA, NEW BRUNSWICK

- PENNSYLVANIAN**
 [Symbol: Grey to buff conglomerate and sandstone]
- MISSISSIPPIAN / PENNSYLVANIAN**
 [Symbol: Red conglomerates, sandstones and siltstones]
- MISSISSIPPIAN**
 [Symbol: Lava flows and ashfall tuff]
- HARVEY FORMATION**
 [Symbol: Conglomerate, tuff]
 [Symbol: Sandstone, volcanigenic sedimentary rocks]
 [Symbol: Ignimbrite]
 [Symbol: Porphyritic facies]
- [Symbol: Red massive siltstone]
- SILURIAN**
 [Symbol: Grey siltstones, sandstones; greywacke]
- 5 LOCATION STOP
 [Symbol: Strike and dip of unit] 44
 [Symbol: Geological contact, gradational]
 [Symbol: Fault]
 [Symbol: Direction of lava flow, indicated]

GEOLOGY BY
 S. KUAN (1969), G. E. PAJARI JR. (1972, 1973)

0 1
 SCALE IN MILE

Fig. 1 Geology of the Harvey Area, N. B.

- 9.0 On the right, the Mactaquac Hydroelectric Power Station.
- 14.0 Turn right on Highway # 3 and proceed toward Harvey.
- 28.0 Turn right along the fire-tower access road and proceed to tower. Follow trail westward (a distance of 250 yards) to the edge of the cliff overlooking Holland Lake.

STOP 1 The field immediately to the west of Holland Lake is underlain by a porphyritic facies of an ash-flow tuff that will be seen at Stops 3 and 4. The southeasterly slope of the field reflects the dip ($10-14^\circ$) of the ash-flow sheet as determined from the attitude of columnar jointing in the woods above the field to the northwest. The sheet is overlain at the south end of the field by a layered lava flow which represents the basal unit of the interstratified ash-fall-lava flow sequence constituting the cliff below this lookout.

The cliff consists of a number of lava flows separated by a structureless aphanitic tuff which is softer and more porous than the lavas. Individual flow units are relatively constant in thickness whereas the inter-flow tuffs are extremely variable — ranging from a few inches to five feet in thickness. The lava flows are 5-30' thick and the flow layering dips consistently to the north from $4-28^\circ$ at this location. Flow folds indicate a northerly flow direction for the uppermost three flows. Return to Highway # 3 and turn right.

- 28.3 Turn right along a narrow road and proceed to wood-waste dump on the north side of hill (500 yds.).

STOP 2 The flow layering at this outcrop dips uniformly 55° to the northwest. The few flow folds that have been observed here indicate a flow direction toward the northeast and parallel to the strike of the flow layering. This suggests that the lava flowed against an escarpment at this location. In the valley immediately to the north of the outcrop the flow layering forms a series of disharmonic folds varying in amplitude from a few inches to several feet. Similar folds have been observed at the base of lava flows (e.g. Stop 5) and at locations where the dip of flow layering decreases indicating a break in the original slope. A lava flow which has been in part confined to a valley 150' wide and 40' deep, and in which the flow layering is conformable to the shape of the valley, has been observed on the cliff to the east.

Return to Highway # 3 and proceed to Harvey Station.

29.3 Turn right at road 100 yds. before railway track in village; proceed a few hundred yards and leave vehicles at the public beach on the left. Proceed a quarter mile along the lake shore on the railway track to the western end of rock cut.

STOP 3 The cut consists of massive reddish-brown siltstone at the bottom overlain by two ash-flow sheets. The bottom unit is about 6-7 yards thick and the top of this unit is marked by a reddish-brown horizon. The upper ash-flow unit is 110 yards thick and extends to the top of Cherry Hill that rises above the railway cut to the south.

The bottom of the first ash-flow contains poorly sorted fragments up to 20 cm. in diameter, some of which have been completely altered to a mixture of illite and quartz. The size of the fragments decrease and become more uniform in size upward in the sheet. The base contains well preserved axiolites — the outlines of which are destroyed by post-devitrification recrystallization a few yards above. The reddish-brown horizon marks a distinct textural change from felsitic (recrystallization texture) at the top of the lower sheet to axiolitic in the bottom of the upper sheet. The changes in fragment size and textures in the basal section of the upper sheet parallel those observed in the lower unit. Poorly developed columnar joints can be observed at the top of the rock cut.

Return to the beach and proceed 300 yards northward along the road on the east side of the lake to columnar jointed outcrops.

STOP 4 The columnar jointed ash-flow shows a well-developed eutaxitic structure perpendicular to the axes of the columns and contains rock fragments and a few phenocrysts. Textures and fragment sizes at this location (the base is not exposed along the road) are equivalent to those in Cherry Hill section 30-50 yards above the base. The plunge of the column axes is 27° to the northwest and represents the steepest dip observed in the unit.

Proceed back toward beach (down dip) stopping at the outcrops at the cabin units on east side of road. These outcrops are stratigraphically higher than those immediately to the north and consist of quartz feldspar porphyry. The phenocrysts increase in abundance upward in the sheet from one percent near the base to 20%-25% as observed at this location. The quartz feldspar porphyry represents the top of the unit and is overlain by the lava flow — ash-fall sequence of the Harvey Formation (Stops 1 and 2).

Return to the vehicles and proceed to the intersection of Highway # 3 in the village. Turn right.

29.5 Turn into first road near the top of Cherry Hill and stop.

STOP 5 The outcrop along the north side of the main highway consists of lava with flow layering dipping 50° northward overlying a pyroclastic unit. Drag folds above the base at this locality indicate a northward flow direction (approximately down dip). The base of the flow contains a large number of folds without systematic shape or orientation. The dip of the flow layering can be seen to decrease northward from the main highway.

Proceed westward along Highway # 3.

33.4 Pull into parking lot of small restaurant on right.

STOP 6 The outcrops along the road and in the field behind the restaurant are of red Mississippian sandstones and conglomerates which overlie the lava flows. The transport direction for these sedimentary rocks overlying the volcanic rocks is eastward, i.e. approximately parallel to the axis of the Carboniferous basin (van de Poll, Department of Natural Resources, personal communication). Note the paucity of Mississippian volcanic clasts in the conglomerates.

Proceed westward along Highway # 3 to York Mills.

35.9 Turn right onto dirt road 50 yards before cement bridge and stop.

Proceed by foot to stream under bridge.

STOP 7 The sedimentary rocks along the bank consist of sandstones and conglomerates which dip $50-65^\circ$ to the southeast. These rocks are stratigraphically below the red Mississippian conglomerates (seen at the last stop) which outcrop 300 yards downstream. The dip gradually decreases downstream from 55° to 15° over a distance of 500 yards. The high dips are anomalous and have been tentatively attributed to the affect of faulting.

The outcrop of lavas along the road parallel to and about 30' above the river level represents the westernmost extent of the Harvey Mountain Member.