THE PROVENANCE OF TILLS OVERLYING THE EASTERN PART
OF THE SOUTH MOUNTAIN BATHOLITH, NOVA SCOTIA

R.M. Graves and P.W. Finck
Nova Scotia Department of Mines and Energy
P.O. Box 1087, Halifax, Nova Scotia B3J 2X1

Date Received October 20, 1987
Date Accepted April 29, 1988

Mapping of quaternary deposits on the South Mountain Batholith (SMB) has resulted in a four-fold subdivision of tills, divided primarily on the basis of clast lithology, texture, stratigraphic position and morphology.

Three tills have clast lithologies characterized by granites eroded from the South Mountain Batholith. The oldest granite till is a compact till of restricted distribution, mainly observed in drumlin cores. Two younger granite tills dominate the surficial deposits of portions of the SMB and have textural properties ascribed to melt-out tills. The fourth till represents a farther-travelled till with a variable clast provenance typified by pebbles derived from both the SMB and regions to the north. Clast dispersal evidence suggests that all tills were transported in a general southward direction.

Detailed clast examinations allow reliable conclusions concerning direction of ice flow and lithologic relationship between till and bedrock of the SMB. The SMB is an area of multiple glaciation where till prospecting cannot be successful unless the direction of till transport and source areas are established.

Un levé cartographique des dépôts quaternaires recouvrant le Batholite de South Mountain a permis de mettre en évidence quatre variétés de tills en fonction de la lithologie des clastes, la texture, la position stratigraphique et la morphologie.

Dans trois tills, les clastes montrent des lithologies caractérisées par des granites arrachés au Batholite de South Mountain (BSM). Le plus vieux till de granite est un till tassé, de faible étendue, observé surtout dans les noyaux de drumlins. Dans certaines portions du BSM, les dépôts de surface sont dominés par deux tills de granite plus récents qui possèdent des caractéristiques texturales rapportées aux tills d’ablation. Le quatrième till a parcouru une plus grande distance; la source de ses clastes est variable et comprend typiquement des galets provenant tant du BSM que des régions plus au nord. La dispersion des blocs suggère un direction générale de transport des tills vers le sud.

Un examen approfondi des clastes permet de tirer de solides conclusions à propos de la direction de l’écoulement glaciaire et de la relation lithologique entre le till et le socle du BSM. Le BSM a subi de multiples glaciations et la prospection du till n’y est donc guère profitable à moins de déterminer la direction de transport et la source du till.

PREVIOUS WORK

The glacial geology of the South Mountain Batholith has been influenced by four ice flow phases (Finck and Graves, 1987a). Each ice flow has formed (or modified pre-existing tills to form) a till with lithic and chemical properties related to the source rocks. It is essential that tills deposited by different ice flows be distinguished so that interpretations of geochemical and clast dispersal data from the different flows are not confused. Podolak and Shilts (1978) and Stea and O’Reilly (1982) have confirmed the importance of this concept by showing that till geochemistry is strongly controlled by clast geology and, hence, provenance.

This paper describes surficial deposits overlying the eastern part of the South Mountain Batholith (Fig. 1). Till classification and division is accomplished using directions of clast transport, clast lithology, stratigraphic position, color, texture and morphology. Emphasis will be placed on describing the directions of clast transport from till lithology and the spatial relationship between till and bedrock source. Physical properties of the tills such as color, texture and morphology will be presented so that these may be utilized during field mapping.

INTRODUCTION

The glacial geology of the South Mountain Batholith has been influenced by four ice flow phases (Finck and Graves, 1987a). Each ice flow has formed (or modified pre-existing tills to form) a till with lithic and chemical properties related to the source rocks. It is essential that tills deposited by different ice flows be distinguished so that interpretations of geochemical and clast dispersal data from the different flows are not confused. Podolak and Shilts (1978) and Stea and O’Reilly (1982) have confirmed the importance of this concept by showing that till geochemistry is strongly controlled by clast geology and, hence, provenance.

This paper describes surficial deposits overlying the eastern part of the South Mountain Batholith (Fig. 1). Till classification and division is accomplished using directions of clast transport, clast lithology, stratigraphic position, color, texture and morphology. Emphasis will be placed on describing the directions of clast transport from till lithology and the spatial relationship between till and bedrock source. Physical properties of the tills such as color, texture and morphology will be presented so that these may be utilized during field mapping.

Previous work

In mainland Nova Scotia, the succession of glacial movements as interpreted from till deposition is well documented. A compact till of restricted occurrence, mapped at the base of drumlins, is the oldest till in the Meguma Zone. Stea and Fowler (1979) designated this till the Hartlen Till where it overlies Meguma Group rocks, and discovered the clasts to be dominated by Meguma Group lithologies. They concluded that the Hartlen Till is 90-95% locally derived with 5-10% foreign clasts. Grant (1963) had also described it as being locally derived with only minor dilution by exotic pebbles. It was termed a lodgment till by Nielsen (1976), deposited during an uninterrupted glacial sequence that occurred during Mid-Late Wisconsinan glaciation. The Hartlen Till is correlative with the McCarron Brook Till of Stea et al. (1985) and was formed by an east-southeastward ice flow (phase one of Stea and Finck, 1984).

The Hartlen Till is succeeded by the Lawrencetown Till (Grant, 1963; Grant, 1975) which was deposited...