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1982/20. Supplementary report on sandstones from Linden sandstone quarry, New Norfolk.

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Abstract

Additional thin sections from quarried blocks and X-ray diffraction scans of clays were made from five sandstone samples.

INTRODUCTION

The present report provides additional information to that contained in Green, 1982. Four additional sections, collected from quarried blocks, have been examined and X-ray diffraction scans have been made of clays (<2μm fraction) from five sandstone samples. Descriptions of two samples, Core 3 and Core 4, from the above mentioned report are repeated here. Three (B92, B50 and C5) are from quarried blocks, chosen to be representative of the sandstone already produced.

THIN SECTION DESCRIPTIONS

Sample 'A' (A block containing amorphous manganese staining)

This sandstone consists of moderately well sorted, sub-rounded quartz fragments (85%), with subordinate metamorphic rock fragments (5%), occasional K-feldspar and a clay matrix (8-10%). The matrix is iron stained, poorly crystallised and of medium first order birefringence in crossed nicols (?kaolinite). The range of quartz fragments lies between ∿100 and ∿500 μm (average ∿200 μm) - a fine-medium-grained sandstone.

Sample 1 (Core 4), samples 3, 4 (Core 3)

Sandstone-quartz arenite, predominantly subangular-subrounded quartz (85-88%), minor feldspar (microcline), lithic fragments, trace muscovite and biotite. The accessory minerals form 2-5% of the rock. Diameter of quartz grains average ∿200 μm, fine-medium-grained sandstone. Matrix is of clay minerals, probably mixed layer illite-montmorillonite, often iron stained and forming between 8 and 10% of the rock. The matrix also contains small plates of hematite-goethite and occasional zircons. Quartz types are largely of recycled igneous origin, very minor chert, some metamorphic quartz, or opaline quartz was seen. Many quartz grains are in contact with the development of overgrowths. The rock would have fair to good porosity and appears rather friable.

Sample 2 (Core 4)

Sandstone-quartz arenite, predominantly subangular quartz (80%) with minor feldspar, lithic fragments. The accessory minerals form 2-5% of the rock. Diameter of quartz grains average ∿175 μm, fine-medium-grained sandstone. Matrix (about 15%) generally of iron stained clay minerals with small fragments of goethite. Quartz types are largely of metamorphic origin with composite, strained extinction on individual domains of ∿20 μm diameter, commonly outlined by trains of <1 μm material (probably an iron oxide). The rock is distinctive in this property which may be a means of correlation within the quarry. A few small rounded zircons were seen. The rock is of fair porosity and is somewhat friable in character.

Sample B50

This sandstone consists of moderately well sorted, subrounded quartz fragments (80%), K-feldspar (∿10%), a small number of metamorphic rock fragments (∿2%) and a clay matrix (5-8%). The quartz fragments are essentially unstained, largely of igneous origin and in one case containing distinctive fine rutile needles. The matrix is iron stained, poorly crystallised and probably a mixture of mixed layer montmorillonite-illite and kaolinite. The quartz fragments range between ∿200 and ∿600 μm in diameter (average 275 μm) - a medium-grained sandstone.

Sample B92

This sandstone consists of moderately well sorted, subrounded to subangular quartz fragments (80%), largely of igneous origin, a small amount of K-feldspar and rock fragments (<5%) and up to 15% iron stained clay matrix. The iron stained matrix contains a mixture of poorly crystallised kaolinite with a mixed layer illite-montmorillonite that shows some trace of original parentage via vermiculite from acid volcanic fragments similar to those described recently by Bacon and Everard from East Coast Triassic rocks. The range of quartz particles is from 150-350 μm (average 225 μm) - a fine-medium-grained sandstone.

Sample C5

This sandstone consists of moderately well sorted, subrounded to rounded quartz fragments (85%), largely of igneous origin, some siliceous metamorphic fragments (7%) and up to 8% of somewhat iron stained clay matrix. The matrix is of mixed layer illite-montmorillonite, poorly crystallised with some kaolinite of medium first order birefringence. The range of quartz fragments is from 75 to 250 μm (average 175 μm) - a fine-grained sandstone.

X-RAY DIFFRACTION RESULTS

The results (fig. 1, 2) are tabulated below:

Sample	*XRD peaks*	*Clay content*
Core 3	Illite >Montmorillonite* >Kaolinite	Low-medium
Core 4	Illite=Montmorillonite* >Kaolinite	Low
B50	Kaolinite=Illite >Montmorillonite	Low
B92	Kaolinite >Illite >Montmorillonite*	Low
C5	Illite=Kaolinite >Montmorillonite	Low-medium

* Confirmed by glycolation

The content of probable mixed layer illite-montmorillonite in all these samples is a cause of some concern as sandstones containing these clays have been shown to be sensitive to wet-dry cycle testing (Green and Woolley, 1981) and responsible for rock failure under severe environmental conditions (*e.g.* old Department of Mines building). However, as the stone from Linden is reported to stand up well in short-term tests, it is probably in the long term - *i.e.* >10 years, and under conditions of poor construction (*e.g.* no damp course) that problems could occur. The clay content (low to low-medium) is a purely descriptive measure based on some 50 Triassic sandstones processed during 1981-82. Any stone with clay content above low is unlikely to be suitable for extensive construction.

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[27 May 1982]

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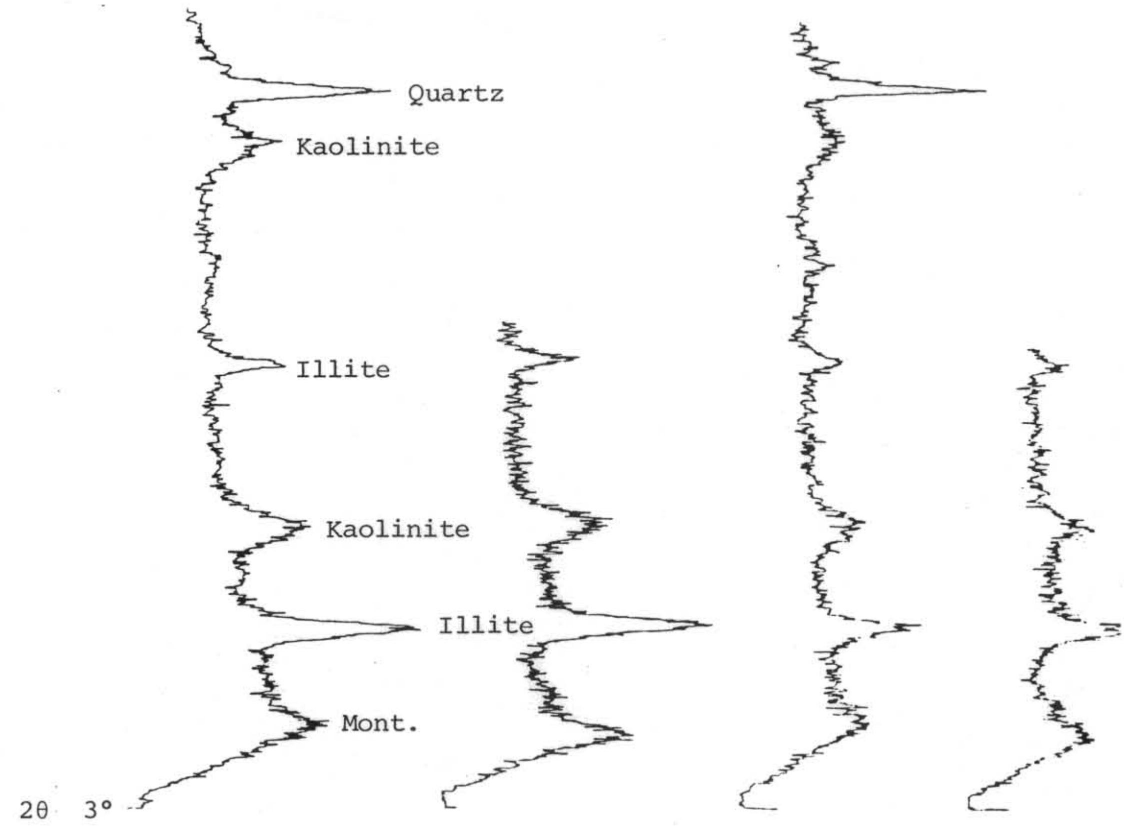


Figure 1. *Diffractograms of (a) Core 3, (b) Core 3 - glycolated, (c) Core 4, (d) Core 4 - glycolated. Mont. = Montmorillonite.*

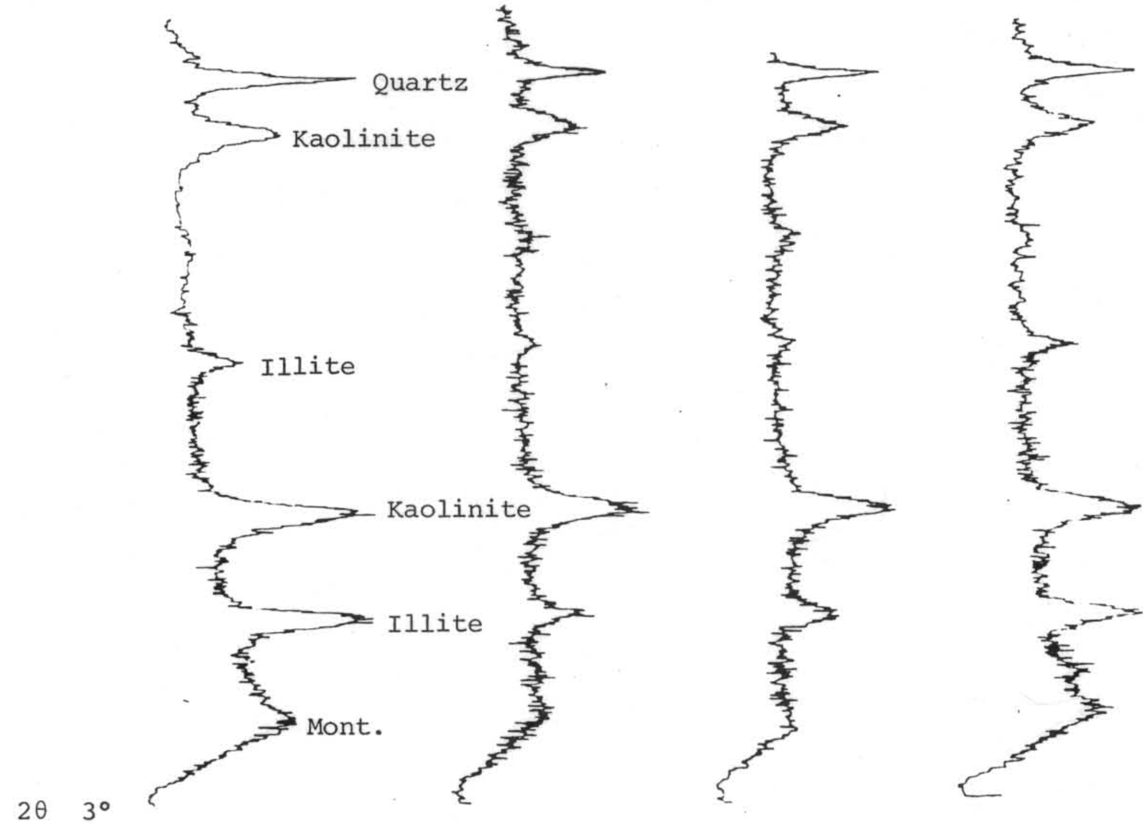
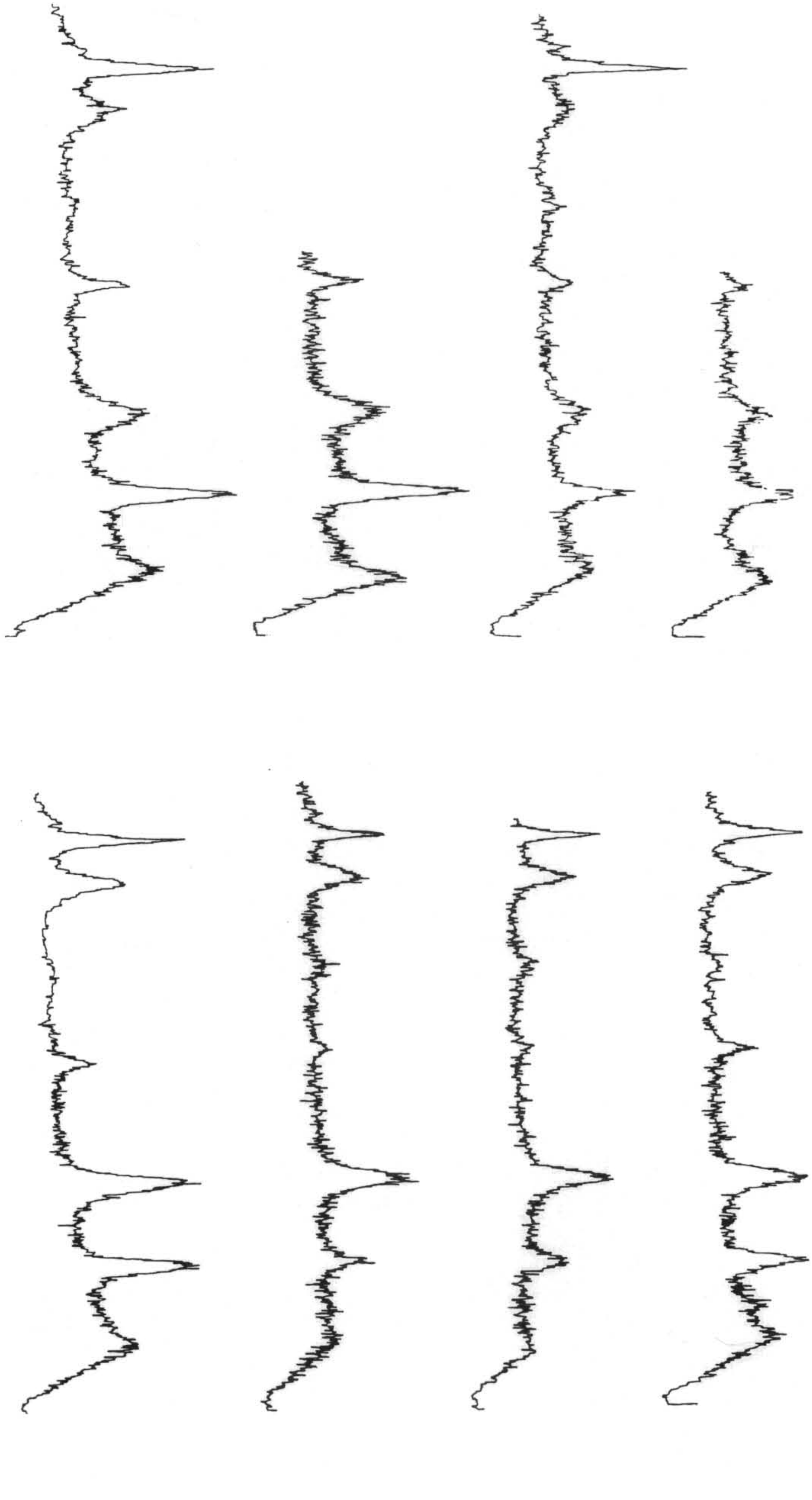


Figure 2. *Diffractograms of (a) C5, (b) B92, (c) B92 - glycolated, (d) B50. Mont. = Montmorillonite.*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