



# Tectonic transport of rock units near Asbestos Point, Macquarie Harbour

by M. P. McClenaghan and E. Williams

## Abstract

Examination of fault-bounded rock units along a 500 m coastal traverse near Asbestos Point in Macquarie Harbour indicates considerable variations in directions of extension during the development of NNW to N-trending cleavage. Mesoscopic NNE-trending shear zones show a horizontal dextral component of movement, which may reflect movement patterns along the faults bounding the rock units in the area.

## INTRODUCTION

The geology of the 1:50 000 Macquarie Harbour map sheet (McClenaghan and Findlay, 1989) is dominated by NE to NNE-trending fault-bounded rock units, which vary in width from some tens of metres to five kilometres. A number of these contrasting fault-bounded belts are exposed at the coast near Asbestos Point on the western margin of Macquarie Harbour (fig. 1). The writers examined these belts during November 1988 for evidence of directions of tectonic transportation.

## DESCRIPTIONS OF FAULT-BOUNDED ROCK UNITS

Along the coastal traverse the most north-westerly of the rock units is of sheared serpentinite (€<sub>ss</sub>—fig. 1), which is of serpentine minerals with minor spinel. The serpentinite encloses rounded to angular blocks in which are preserved orthopyroxene, minor amounts of clinopyroxene, and spinel. Rare blocks of gabbro occur. Spaced, seamed cleavages impregnated by iron oxides are present, and in some localities display later NE-trending kinks with steep axial surfaces.

To the south-east of the sheared serpentinite and at the eastern end of the coastal traverse are NNE-trending belts of schistose pelite/arenite/rudite (€<sub>tl</sub>—fig. 1). The rock types have been derived from sequences of mudstone and lithicwacke with conglomerate horizons, which underlie most of the eastern part of the Sorell Peninsula (McClenaghan and Findlay, 1989). Regionally, the sequences include turbidites of poorly sorted but commonly graded sandstone and conglomerate beds containing angular to rounded fragments of quartzite, mudstone and acid volcanic rocks. The schistose derivatives in the coastal traverse are dominated by transposition foliations, but probable horizontal bedding was noted at a locality in the eastern belt (figs 1, 2 c). The schistose surfaces are of anastomosing ribbons of oriented chlorite-quartz-micaceous material, and these minerals form fibrous beards to clasts dimensionally aligned within the surfaces. Mineral beards (fig. 2 d), and the dimensional orientation of the clasts, indicate a present-day vertical direction of tectonic extension during schistosity development in the western belt, and a NNE-trending horizontal extension in the eastern belt (fig. 1).

Immediately to the south-east of the western belt of schistose sedimentary rocks is a unit of schists with steeply-plunging,

fine-grained felsitic pods varying in length from some 30 mm to greater than 24 m (€<sub>ti</sub>—fig. 1). The schists contain plagioclase and quartz with closely-spaced ribbons of mica-chlorite-carbonate and iron ore minerals. Some schists contain rounded patches resembling altered lapilli, which suggests an original tuffaceous rock. Mineral beard development within the NW-trending schistosity indicates tectonic extension plunging at 30° to the NW (fig. 1). The schistosity is crenulated along NNE-trending vertical surfaces at one locality, and is commonly kinked in NNE-trending bands. Near the eastern margin of the rock unit are NNE-trending surfaces along which sigmoidal drag of the schistosity indicates a notable horizontal dextral component of movement. The felsitic pods are massive, with textures indicative of lava, and consist of plagioclase laths with intergranular quartz, chlorite and opaque grains. One pod sampled contains minor amounts of pale green amphibole as well as chlorite, whereas in another pod sample a small amount of biotite occurs rimmed with chlorite. Elsewhere in the Macquarie Harbour region the fine-grained rocks have chemical compositions of andesite and rhyolite.

A fault-bounded NNE-trending belt of gabbro (€<sub>tg</sub>—fig. 1) occurs between the unit of mica-chlorite-carbonate schist with fine-grained felsitic pods and the eastern belt of schistose pelite/arenite/rudite. The bounding fault at the western margin of the gabbro is exposed at one locality but no features indicative of movement directions were observed. The normally massive gabbro contains altered plagioclase, occasionally fresh clinopyroxene, amphibole and chlorite derived from pyroxene, ilmenite altered to leucoxene, epidote, and rare opaque grains. Minor amounts of intergranular quartz and hydrogrossular garnet are present. At the eastern margin the gabbro is well cleaved with closely-spaced NW-trending surfaces of dominantly chlorite. NNE-trending shears occur (fig. 2 a, b) associated with deformation of the NW-trending cleavage into sigmoidal patterns, and rotation of detached fragments of strained quartz veins and books of chlorite (fig. 2 e). Mylonite (fig. 2 f) is present along a number of the shear surfaces. All tectonic transport indicators (fig. 2 a, b, e) indicate a horizontal dextral component of shear, and in one shear zone the movement is about an axis of plunge 65° to 190°.

## CONCLUSIONS

Within the NNE-trending fault-bounded rock units examined in a 500 m coastal traverse near Asbestos Point, the general cleavage is NNW to N-trending. In one unit, extension during the general cleavage formation is vertical, whereas in another unit of similar rock types the direction of extension is horizontal. Such variations suggest large bodily rotations between the fault-bounded rock units.

Other structures include NNE-trending crenulations at one locality, common kink bands, and steep NNE-trending shear zones near the fault boundaries of the gabbro unit. Tectonic transport direction indicators show notable horizontal dextral

shear components along the shear zones, which commonly contain mylonite. At one locality the dextral shear is about an axis of plunge  $65^\circ$  to  $190^\circ$ .

The mesoscopic shear zones may reflect movements along the nearby faults bounding the rock units in the Asbestos Point area.

REFERENCE

McCLENAGHAN, M. P.; FINDLAY, R. H. 1989. Geological Atlas 1:50 000 series. Sheet 64 [7913S]. Macquarie Harbour. Department of Mines, Tasmania.

[10 May 1989]

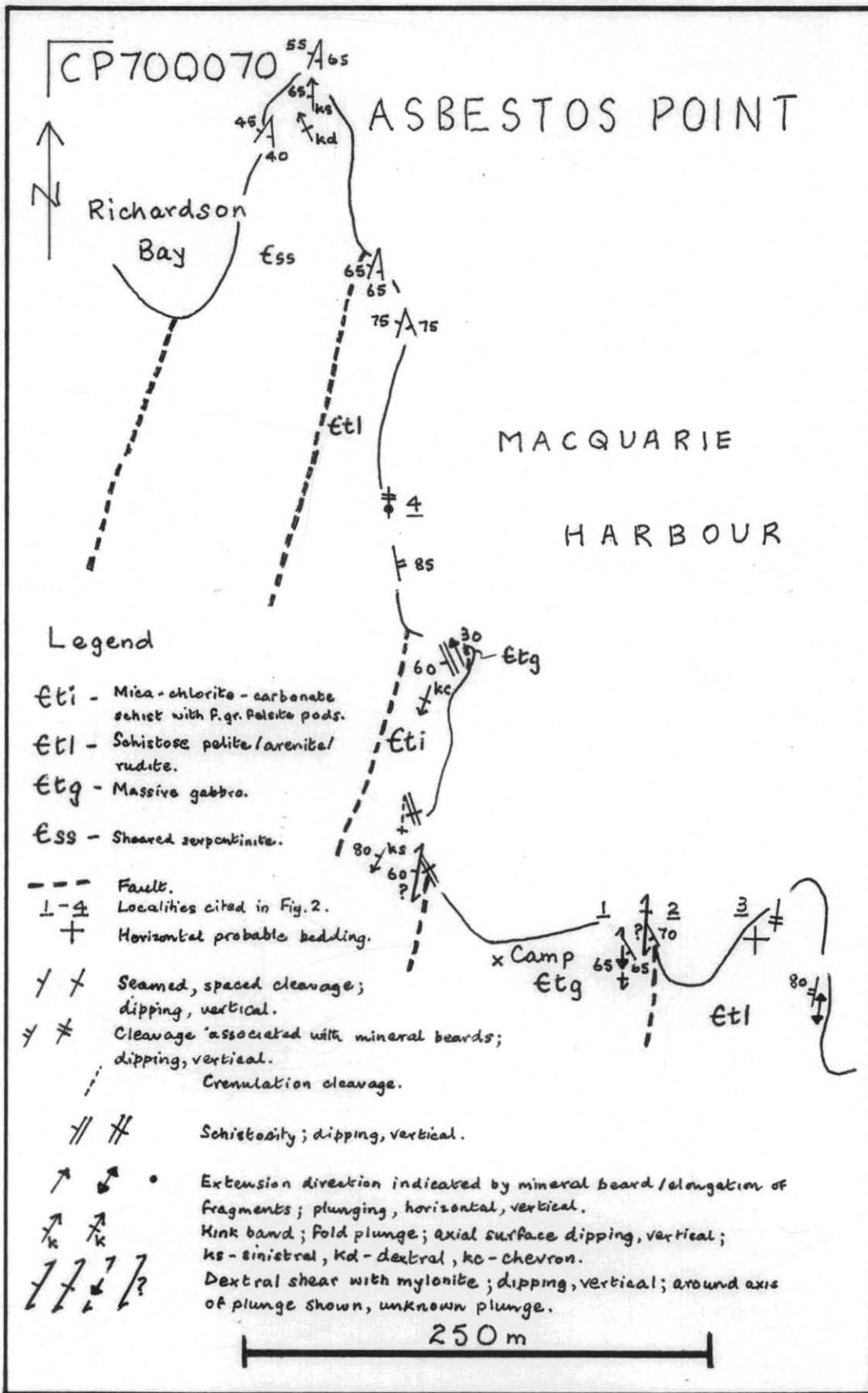


Figure 1. Geological map of Macquarie Harbour foreshore near Asbestos Point.

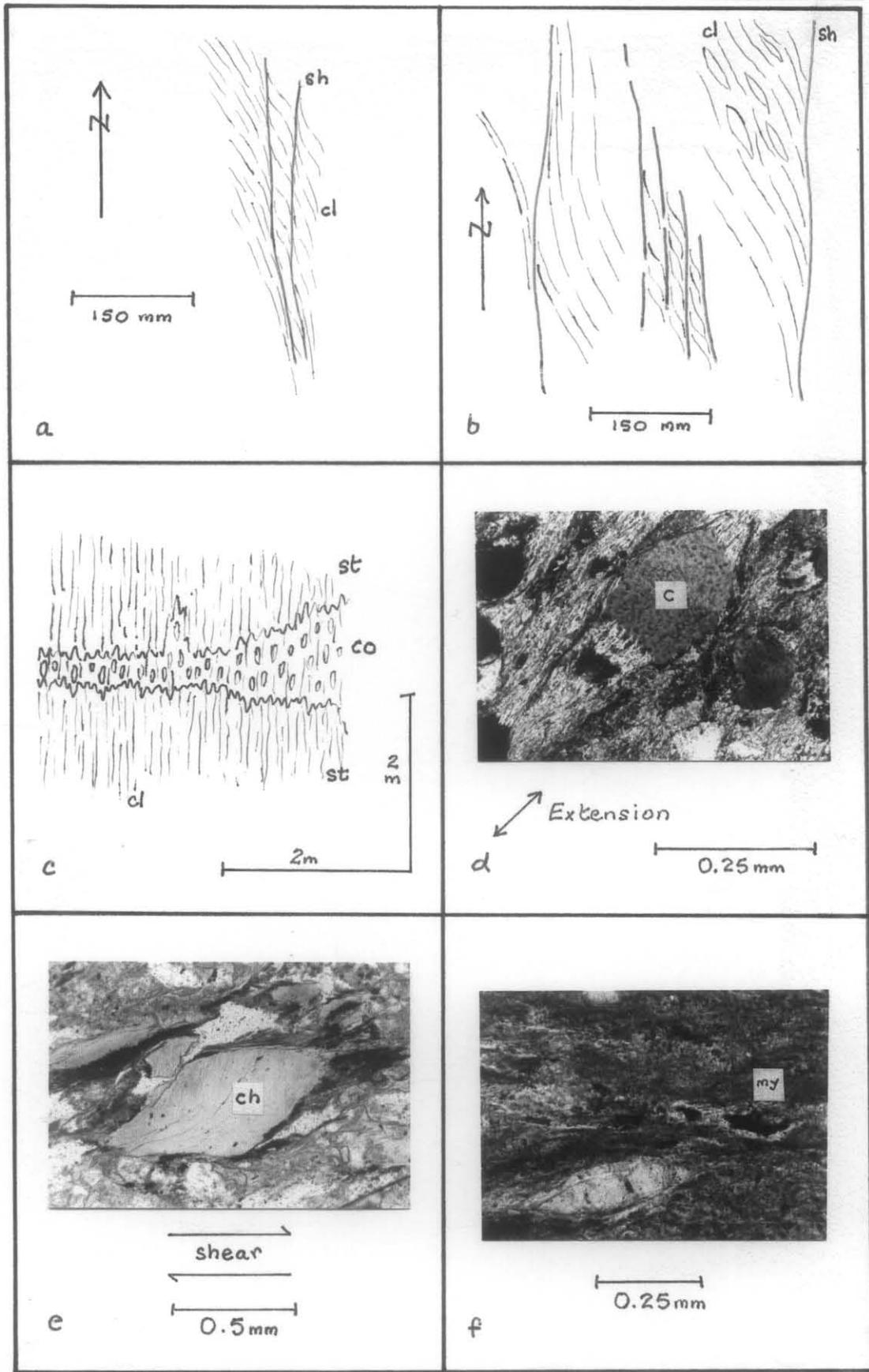


Figure 2.

5 cm

**Figure 2.**

- (a) Field sketch plan of shear zone in  $\text{C} \text{tg}$  (Locality 1, Figure 1). Thin lines (cl) are traces of cleavage, and heavy lines (sh) represent dextral shear surfaces.
- (b) Field sketch plan of shear zone in  $\text{C} \text{tg}$  (Locality 2, Figure 1). Thin lines (cl) are traces of cleavage, and heavy lines (sh) represent dextral shear surfaces.
- (c) Field sketch of vertical section of probable horizontal bed of schistose conglomerate (co) in schistose sandstone (st) of  $\text{C} \text{tl}$  (Locality 3, Figure 1). Thin lines (cl) are traces of cleavage.
- (d) Thin section between crossed polaroids of schistose arenite of  $\text{C} \text{tl}$  (Locality 4, Figure 1) showing clasts (c) with mica beards indicating extension direction within cleavage. (Department of Mines Number R002104).
- (e) Thin section of  $\text{C} \text{tg}$  from shear zone of Figure 2a, showing dextral rotation of chlorite fragment (ch). (Department of Mines Number R002105).
- (f) Thin section of  $\text{C} \text{tg}$  from shear zone of Figure 2b, showing remnant fragments within mylonite (my). (Department of Mines Number R002106).