CLASTIC SEDIMENTARY ROCKS OF THE MICHIPICOTEN VOLCANIC-SEDIMENTARY BELT, WAWA, ONTARIO. Richard W. Ojakangas, Department of Geology, University of Minnesota, Duluth, MN 55812

The Wawa area, part of the Michipicoten greenstone belt, contains rock assemblages representative of volcanic-sedimentary accumulations elsewhere on the shield. Three mafic to felsic metavolcanic sequences and cogenetic granitic rocks range in age from 2749 ± 2Ma to 2696 ± 2Ma[1]. Metasedimentary rocks occur between the metavolcanic sequences. The total thickness of the supracrustal rocks may be 10,000 m. Most rocks have been metamorphosed under greenschist conditions. The belt has been studied earlier[2-5] and is currently being remapped by Sage[6].

The sedimentologic work has been briefly summarized[7]; two main facies associations of clastic sedimentary rocks are present - a Resedimented (Turbidite) Facies Association and a Non-marine (Alluvial Fan-Fluvial) Facies Association.

The Resedimented Facies Association consists of conglomerates, graywackes and mudstones. The sedimentary sequence is thick in the west and passes into thin carbonaceous and pyritic shales to the east; iron-formation forms a marker horizon in the sequence, passing from iron-oxides in the west where the conglomerates are thick, to carbonate in the vicinity of the felsic volcanic centers, to sulfide facies to the east in the shale[4]. The graywackes have the classic characteristics of turbidites, including excellent grading and internal Bouma intervals; the interbedded mudstones, with minor silty laminae, indicate deposition under low energy conditions (Fig. 1). The conglomerates associated with the graywackes in the west have an abundant poorly-sorted matrix of sandy graywacke or chlorite-shale, and are crudely stratified[4]. The assemblage is indicative of deposition on submarine fans, although slumping from the edges of explosive volcanic edifices does not necessitate the presence of fans.

The Non-Marine Facies Association consists largely of cross-bedded lithic to feldspathic sandstones with local conglomeratic units. Sedimentary features include small- to medium-scale cross-bedding of both trough and planar types (Fig. 2), parallel bedding, parting lineation, ripple marks, soft sediment deformation (water escape structures?), mudcracks, and mudchip horizons. The assemblage is characteristic of braided fluvial and alluvial fan sequences (and perhaps deltaic), rather than meandering river channel-floodplain sequences which would contain more muddy and silty units.

Mapping by Sage[6] has revealed that locally the sequence consists, from the bottom up, of volcanics, turbidites, cross-bedded sandstones, and conglomerates. Sage (personal communication, 1981) has suggested this constitutes a shoaling-upward sequence as the depocenter was locally filled.

Preliminary petrographic studies indicate that both facies associations consist largely of felsic volcanic debris (Table 1). Recrystallization has commonly partially obscured original textures, but in the least metamorphosed samples detrital grains are readily discernable (Figs. 3 & 4). Clearly, felsic volcanic sources were dominant; in addition to the volcanic rock fragments, most of the fine-grained, recrystallized quartz-feldspar matrix and at least part of the quartz and plagioclase may also have been derived from volcanic sources. Plutonic detritus is minor and may reflect derivation from coeval plutons as suggested earlier[4]. The Q:F:L (quartz to feldspar to lithics or rock fragments) ratios for the point - counted samples of Table 1 are 23:23:54, 13:15:72, and 31:12:57. If the fine quartz-feldspar matrix is assumed to have originally been sand-sized rock fragments, the L component increases to 58, 78 and 64. Much of the sediment may have been derived from the reworking of unconsolidated or poorly consolidated pyroclastic detritus, as suggested by Ayres[8] for graywackes of the Gamitagama belt 50 km to the south and by Ojakangas[7] for much of the sedimentary detritus in Archean volcanic-sedimentary belts of the Canadian Shield.

Additional work is planned in the Wawa area to better determine the paleogeography, including the temporal and spatial relationships of the turbidites and other sandstones to each other and to the volcanic rock units. Pyroclastic rocks are abundant, and probably were deposited in both subaerial and subaqueous environments[9,10]. Transitions should exist between the pyroclastic and the sedimentary rock units. Because of structural complications, including overturned folds and differential movement of fault blocks, detailed sedimentological studies have of necessity awaited field mapping in progress by Sage.

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TABLE 1

MODAL ANALYSES

	Turbidite facies ("Graywacke") WA-81-8B	Trubidite facies ("Graywacke") WA-81-10B	Fluvial facies ("Sandstone") WA-81-11
Rock Fragments:			
Volcanic, felsic	33	39	31
Volcanic, intermediate-mafic	4	8	1
Plutonic, feldspar-quartz	4	3	5
Quartz			
Common	4	4	13
Polycrystalline, recrystallized	14	5	7
Feldspar	18	10	8
Matrix-cement			
Micas	8	13	18
Quartz-feldspar (fine)	10	17	13
Epidote	2	1	1
Carbonate	4	-	3

Figure 1. Interbedded graywackes and mudstones near the dam on the Magpie River, Chabanel Township, north of Wawa.

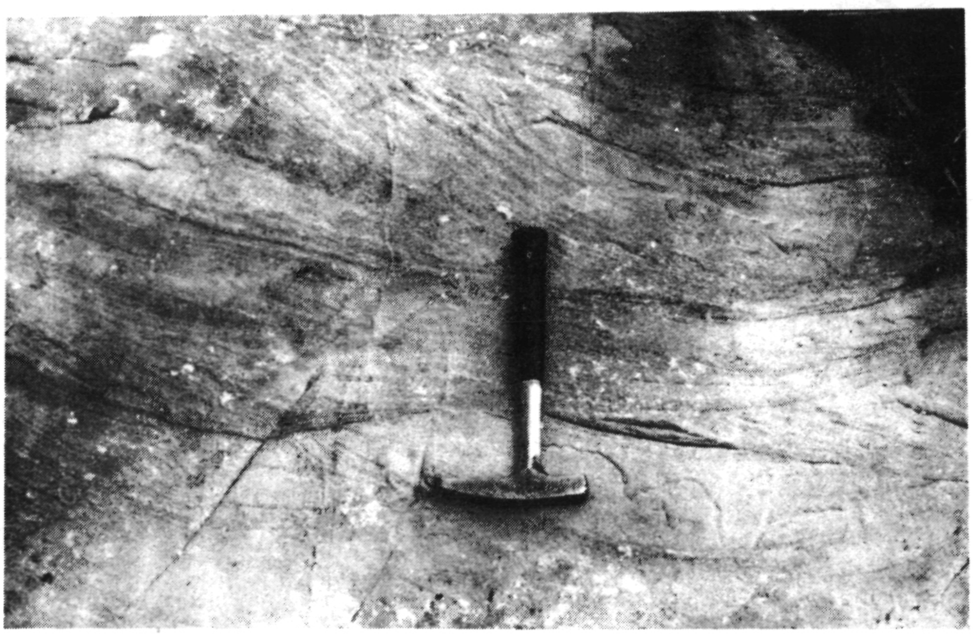

Figure 2. Cross-bedded sandstones near Bauldry Lake in Esquega Township northeast of Wawa.

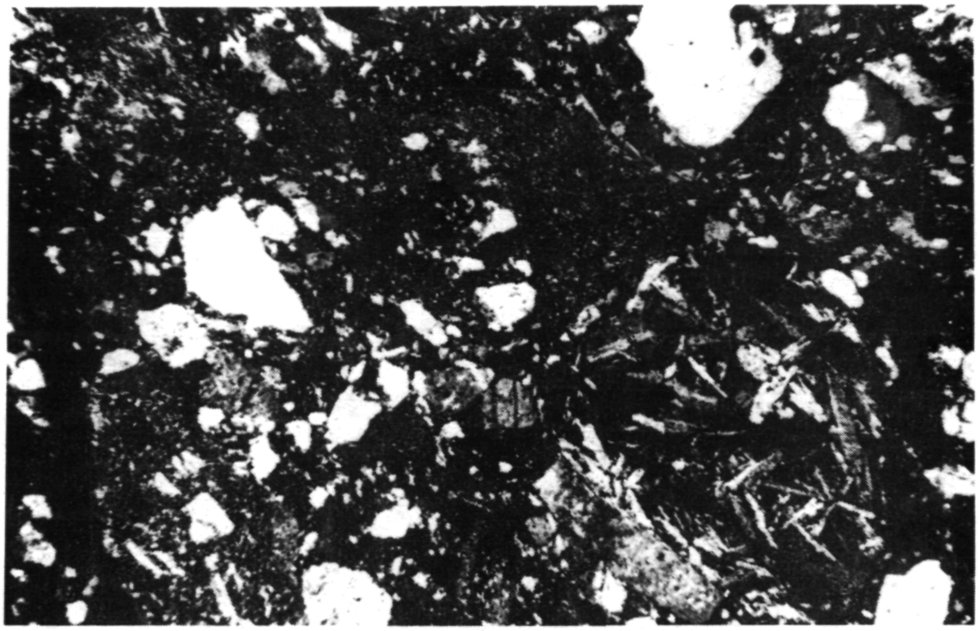

Figure 3. Photomicrograph of representative graywacke. Note mafic volcanic fragment at lower right, felsic volcanic fragments at lower left and upper center, plagioclase, and common quartz grains. Field of view is about 2.5 mm high. Crossed nicols.

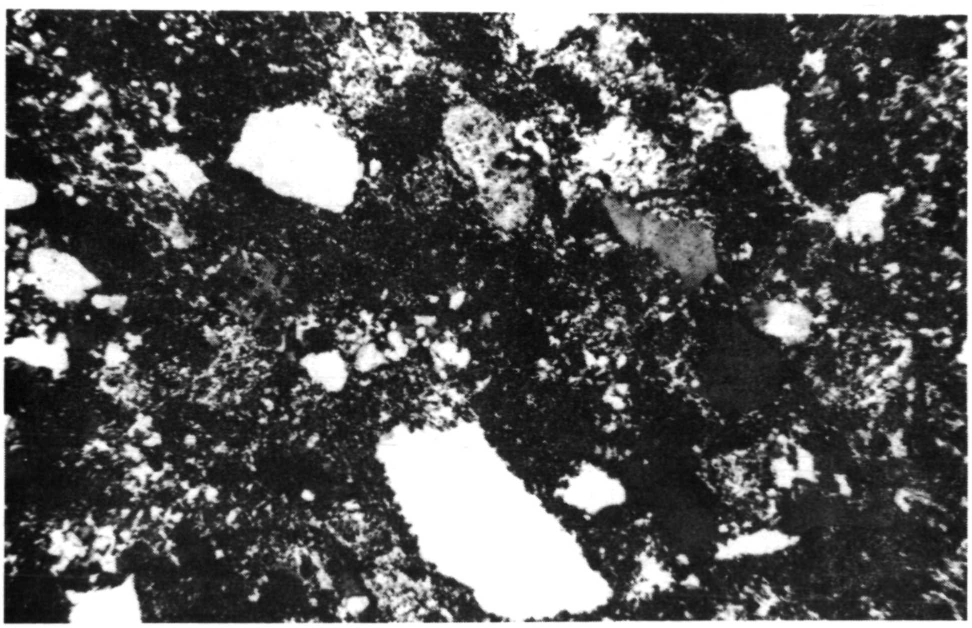

Figure 4. Photomicrograph of representative cross-bedded sandstone. Most grains are felsic volcanic fragments of various textures and common quartz. Field of view is about 1.5 mm high. Crossed nicols.