GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES

LEGEND

WINDSOR GROUP

Carboniferous

WR — Limestone, gypsum, conglomerate

unconformity

Devonian

GR — Granodiorite, monzo-granite

Hornfels

MEGUMA GROUP

Cambro-Ordovician

Halifax Formation

FZ — FELTZEN MEMBER: grey slate and laminated to thinly-bedded, fine-grained sandstones.

CN — CUNARD MEMBER: black slate and thinly - to thickly-bedded pyritiferous sandstones.

Green Bay Formation

MI — MOSHERS ISLAND MEMBER: laminated, grey-green and green, fine-grained sandstones.

WD — WEST DUBLIN MEMBER: thinly - to thickly-bedded, buff-weathered sandstones with green and grey-green, fine-grained sandstones.

TK — TANCOOK MEMBER: thinly-bedded, thickly-bedded and massive, buff-weathered sandstones with green and grey-green, fine-grained sandstones.

R.B.Ss. — RISSERS BEACH MEMBER: thinly-bedded, green and grey-green, fine-grained sandstones.

Goldenville Formation

NH — NEW HARBOUR MEMBER: mainly thickly-bedded to massive, buff-weathered sandstones; subordinate green laminated sandstones and green slates.

SYMBOLS

Station outcrop

Geological boundary (defined, approximate, assumed)

Bedding (inclined, vertical, overturned)

Main cleavage (inclined, vertical)

Late cleavage (inclined, vertical)

Bedding-main cleavage intersection lineation

Crenulation lineation

Mesoscopic fold axis related with main cleavage ("Z" "S", vergence undefined)

Late mesoscopic fold axis ("Z", "S", vergence undefined)

Axial trace of macroscopic anticline with plunge direction (defined, approximate, assumed)

Axial trace of macroscopic syncline with plunge direction (defined, approximate, assumed)

Axial trace of macroscopic overturned anticline with plunge direction

Axial trace of macroscopic overturned syncline with plunge direction

Fault (with displacement direction, displacement unknown)

Mineral occurrence — Au: gold, Fe: Iron, Mn: Manganese

Note: Map units and symbols not present on this map sheet occur on another map sheet or on the open file map of the Lahave area.

DESCRIPTIVE NOTES

Map sheet B comprises part of the Mahone Bay area in south-central Lunenburg County, Nova Scotia. Bounded by 64°30', 44°31', 64°14' and 44°22'30", it adjoins map sheets C and D to the east, map sheet A to the north and GSC Open File Map 1156 to the south. Most of the ground in map sheet B is underlain by rocks belonging to the Cambro-Ordovician Meguma Group, although rocks of the undivided Lower Carboniferous Windsor Group underlie much of the coastal region and islands.

The contact between the Windsor Group and the Meguma Group is not exposed in map sheet B but, as elsewhere in the Mahone Bay area, it is probably an angular unconformity. An assumed boundary is drawn where there are abrupt changes in physiography or where the surficial deposits show a substantial number of Windsor Group clasts. Municipal and provincial records of construction and well drilling indicate the presence of Windsor Group lithologies in several places on the mainland. Previously reported limestone and gypsum exposures on some of the islands were not relocated. The distribution of Lower Carboniferous rocks is that of Faribault (1929), Sage (1954) and Giles (1981).

Cambro-Ordovician metasedimentary rocks in map sheet B belong to two formations in the Meguma Group. The older Green Bay Formation is partly represented by the West Dublin and Moshers Island members, while together the Cunard and Feltzen members comprise the younger Halifax Formation.

The West Dublin Member of the Green Bay Formation is lithologically characterized by buff-weathered, quartz-rich sandstones interstratified with fine grained, rhythmically interbedded, green and grey-green sandstones and siltstones. The buff sandstones are like those seen in the Goldenville Formation except they are generally thinner (25 cm - 1 m) and contain abundant internal sedimentary structures. The 5-15 cm thick green rhythmites at the base of the unit are similar to those seen in the Rissers Beach Member (not present in the Mahone Bay area). Laminated rhythmites near the stratigraphical top of the West Dublin succession resemble strata in the Moshers Island Member. In map sheet B the West Dublin Member is poorly exposed west of Dares Lake in the core of the Rhodes Corner Anticline. Within the Blockhouse Anticline it is mapped solely on the basis of assessment reports from the old mine workings.

The Moshers Island Member of the Green Bay Formation comprises rhythmically laminated and rarer crosslaminated, green and grey-green, fine grained sandstones and siltstones. The rhythmic layering is on millimetre and centimetre scales. Pink and brown coloured laminae contain Mn-garnets and Mn-carbonates. Mineralogically zoned concretions occur in particular laminae in the upper parts of the unit where they define an excellent marker horizon. The Moshers Island Member is the most widely distributed unit in the Green Bay Formation, outcropping extensively in the hinge zone of the Gold River Anticline and displaying closed outcrop patterns in the Rhodes Corner and Blockhouse periclines. The contact with the overlying Cunard Member is particularly sharp and well defined in several localities in map sheet B. The contact with the underlying West Dublin Member is gradational but mapped at the first appearance of thickly bedded, buff sandstones.

The Cunard Member of the Halifax Formation contains black slates interbedded with pyritiferous, cross-stratified, ripple marked sandstones. These fine grained, grey sandstones are 20-50 cm thick and they commonly display giant concretions made up of chlorite, carbonate and sulphide. The slate : sandstone ratio is highly variable. The Cunard Member is the most widespread unit in map sheet B and is commonly quarried for road metal. At present erosion level, it is the only member disposed about all the regional fold structures. Throughout most of the map sheet the Cunard Member is estimated to be at least 2 km thick. However, near Schnares Crossing, it thins to approximately 700 m in thickness. In section CD the Cunard Member is seen to be thinnest in the Rhodes Corner Anticline and thickest, only 5 km to the southeast, in the Indian Path Anticline.

The Feltzen Member of the Halifax Formation is composed of light grey, dark grey and blue-grey slates rhythmically interbedded with laminated to thinly bedded, fine grained, buff-weathered, grey sandstones. At the base of the member sandstone beds are 5-10 cm thick, whereas higher in the stratigraphical succession 1-2 cm thick beds prevail. Thin bedded strata are bioturbated in places and contain the trace fossil Arenicolites. Patchy replacement of quartz sandstones by secondary carbonate is particularly common. In map sheet B the Feltzen Member is restricted to the western shoreline of Mahone Bay, where it occurs in four, widely dispersed synclines. The contact with the underlying Cunard Member is gradational over approximately 150 metres but is drawn at the top of the stratigraphically highest black slate. The transition is well exposed in the Heckmans Back Harbour–Back Passage area and the Sunnybrook-Smelt Cove area.

The disposition of the lithostratigraphical units in the Meguma Group is controlled by large scale, NE-SW trending folds. Average wavelength is 3-5 km; average amplitude is 0.5-1 km. The direction and amount of plunge varies systematically for minor and major folds. Some of the important plunge reversals are depicted by members of the Green Bay Formation. The fold plunge is commonly gentle, although the Rhodes Corner Anticline is locally vertical. There is considerable variation in fold shapes, especially on passing from dominantly sandy to dominantly shaley units. The Rhodes Corner Anticline is a good example. In section EF, it is open and upright and contains several parasitic folds. In section CD, it is tight and overturned.

The main phase foliation in the Meguma Group is a widespread, subvertical, slaty cleavage. It is axial planar to most of the major folds. Where major folds are locally overturned, the slaty cleavage dips gently. Rarely, in certain sandstones, the main phase foliation is a notably fanned, spaced cleavage. A late phase foliation is found in the Meguma Group in most parts of map sheet B. Where it is weakly developed, it is observed to be a fracture cleavage associated with kink bands. Where it is strongly developed, the fracture cleavage is axial planar to tight, kink folds. Structures related to the late phase of Meguma deformation are most common and best formed in areas where the fold axial traces swing from NE-SW to ENE-WSW orientations. Such a flexure is found in map sheet B between Clearland and Centre. This structure is probably related to an extension of the NNW-SSE trending fault zone occupying Lower South Cove in the LaHave River area (O'Brien et al, 1985).

Although the Windsor Group locally outcrops across the folded contact between the Feltzen and Cunard members, in many places the inferred unconformity defines possible folds that crudely mimic the shape of some regional folds in the Meguma Group. These cover folds are presumably sited on basement structures.

Regional dynamothermal metamorphism is witnessed by the preferred alignment of chlorites and white micas along the slaty cleavage. Macroscopic silicate porphyroblasts are not developed. Pyrite, arsenopyrite and pyrrhotite crystals and polymineralic nodules and concretions are common in all units. They are augened and distorted by the slaty cleavage. Most nodules and concretions are rich in carbonate relative to the host metasediments but those in the manganiferous Moshers Island Member also contain abundant microscopic garnets.

In map sheet B occurrences of Au and less commonly Mn have been reported in the Meguma Group in the Green Bay and Halifax formations. One Au-Mn showing near Clearland is located in the Moshers Island Member. In the Mushamush Lake and Dares Lake areas lode gold is found in folded, stratabound veins near the Spondo and Rhodes Corner anticlines respectively. Most other lode gold showings are associated with small faults or kink bands.

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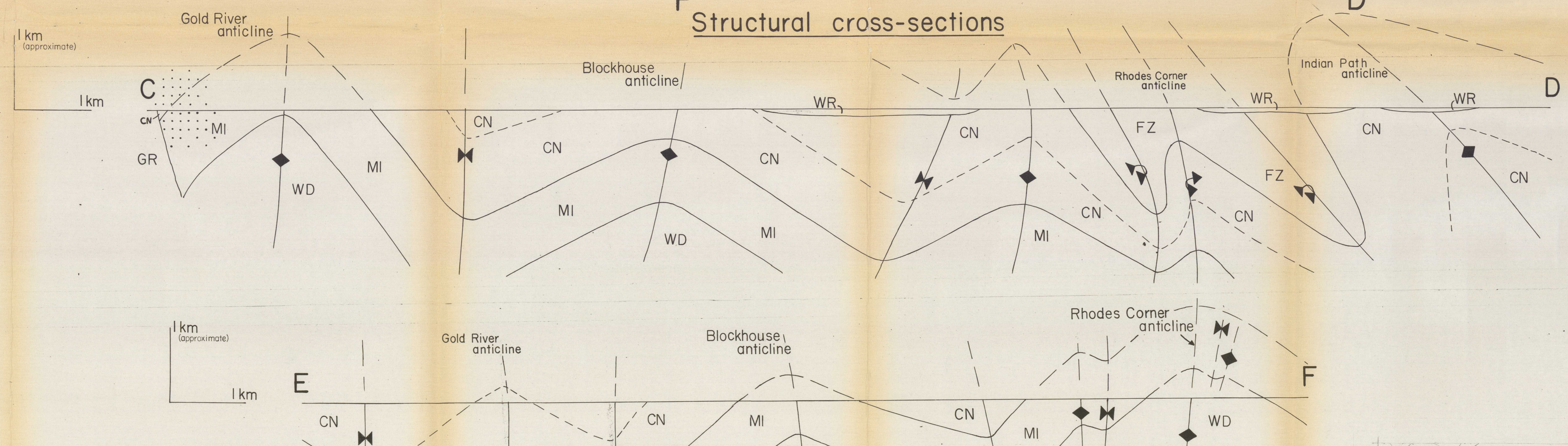
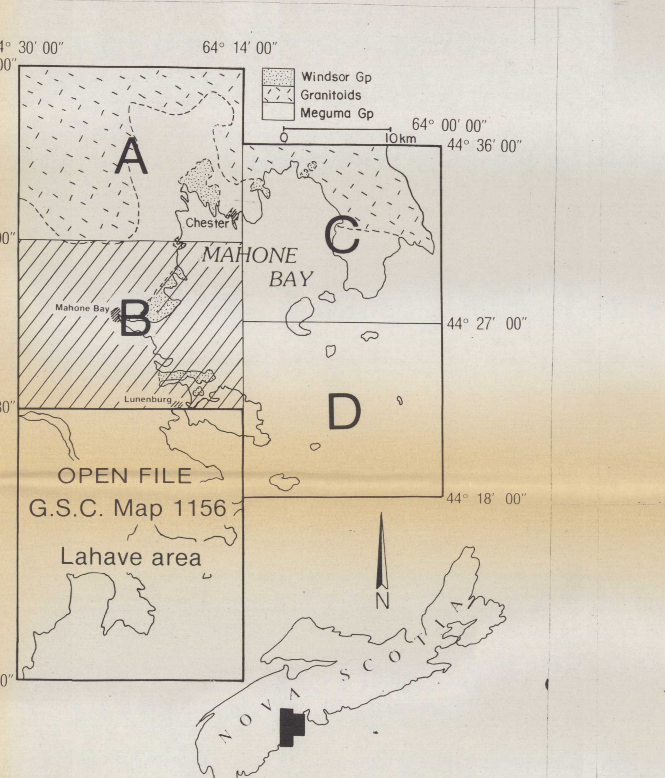
SCALE 1:25 000

1 0 1 2 km

Structural cross-sections





GEOLOGICAL MAP OF THE MAHONE BAY AREA, NOVA SCOTIA.

Sheet B

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1985

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Sheet 2 of 4

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