

Cape Breton Island Mineral Inventory Studies: A Sandstone Quarry Development Opportunity at Graham River (NTS 11F/14), Inverness County

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Compilation and revision of database records for mineral occurrences found on Cape Breton Island continued during 2001. In total, 38 new mineral occurrence records, 3 metallic and 35 industrial, were added to the Mineral Occurrence Database. These include record numbers:

F10-028 to F10-030, F11-026 to F11-041, F13-012, F14-074 to F14-090, F15-050.

In addition, 20 mineral occurrence records, primarily gypsum occurrences which had previously been entered as partial records, were given substantive updates.

Mineral inventory studies for the year focused on NTS map areas 11F/14 and 11F/11, which constitute the principal study area for the Targeted Geoscience Initiative (TGI), a joint federal-provincial geoscience mapping project. Completion of a mineral inventory compilation for these two map areas is one of the project components that the province agreed to provide as part of this initiative. At the beginning of the TGI project most of the metallic mineral occurrence records in the Mineral Occurrence Database were already up to date, but the industrial mineral compilation was only partially complete. As a result, industrial mineral occurrences are the focus of the inventory studies and database entries completed in 2001.

Most of the new mineral occurrence records listed above were compiled from Goudge (1934) and Shea and Murray (1970), but a few, particularly the metallic mineral occurrence records, were compiled from Nova Scotia Department of Natural Resources Assessment Reports.

Twenty mineral occurrence sites were field checked during the fall of 2001, and the field data collected are presently being compiled and added to the Mineral Occurrence Database. In addition to the site visits, two short diamond-drill holes were drilled to test an aeromagnetic anomaly located in the Ashfield area of Inverness County. The drilling indicated the source of this anomaly to be a magnetite-bearing basalt flow.

One of the mineral occurrences visited this year, database record No. F14-091, Graham River Sandstone Prospect (Fig. 1), may have significant potential for development of a sandstone quarry for the following reasons:

- (1) Recent global public interest in the construction of healthy homes and ongoing restorations of stone heritage buildings in the north-east American states is producing an upswing in the markets for natural stone.
- (2) An examination was made by the author this year of the Judique church manse foundation because Parks (1912) stated that it was built from sandstone extracted from the Graham River site (see Figs. 1 and 2) in the late 1880s. The sandstone blocks used in this foundation exhibit no signs of wear after more than a century of exposure.
- (3) The prospect has good access to an excellent transportation infrastructure. It is located approximately 3 km east of Route 19 and 30 km from deep water shipping facilities at Port Hawkesbury.
- (4) The sandstone is exposed in an area of steep topographic relief where a quarry face could be easily established.

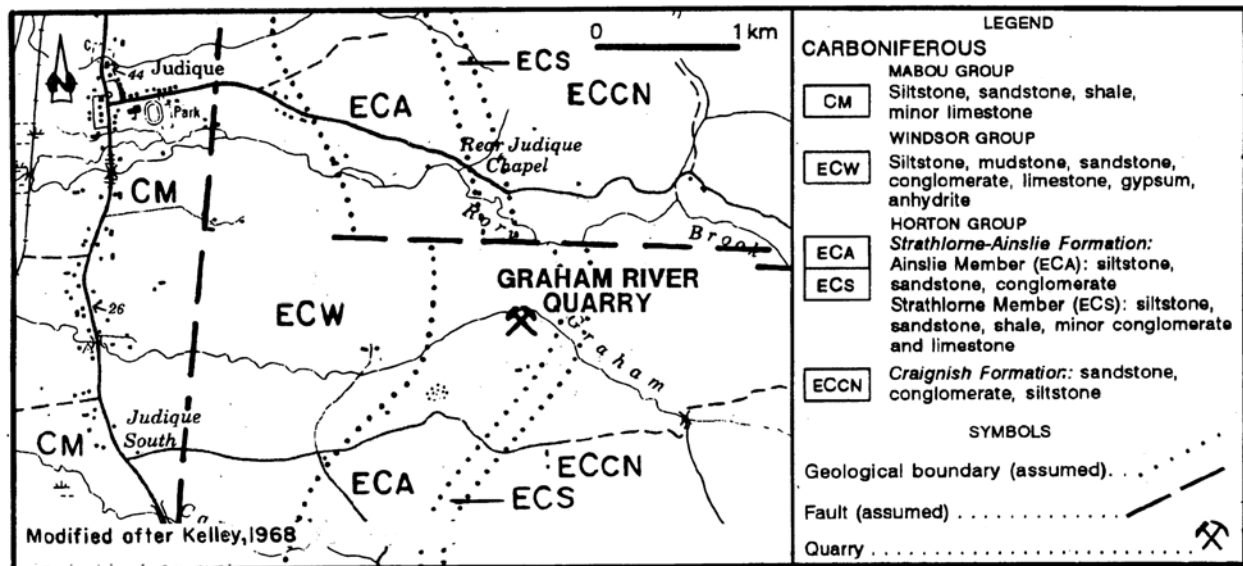


Figure 1. Geological map showing the location map of the Graham River sandstone prospect, Inverness County (11F/14). Figure from Dickie (1996).

Description of the Graham River Sandstone Prospect

History

Fletcher first made note of a red and grey sandstone quarry at Graham River on his geological map (1884) and described it briefly in his report (1881). He noted that sandstone was extracted from this site for local use.

Parks (1912) undertook a more detailed evaluation of the site for his Canada Department of Mines report on the building and ornamental stones of Canada. In his text he stated that no real quarry existed here, but he also noted that stone was produced from loose blocks found along the walls of a ravine. The stone was used for constructing the foundation for the presbytery building in Judique. Several tests were conducted on sandstone samples to determine the physical and chemical properties of the stone. He concluded that the physical properties of this stone are of a high order, and in particular, the coefficient of saturation was considered remarkable, the best in the Maritime Provinces. He also suggested that sandstone beds found at this site were capable of producing large blocks.

G. Dickie (1996) studied this site for his report on building stone in Nova Scotia. Part of his study included drilling a short diamond-drill hole to test the lateral extent of the sandstone deposit. This hole intersected 13.4 m of shale, but no sandstone. He concluded that (1) the sandstone was too jointed to produce large blocks, and (2) that the areal extent of the sandstone beds was limited by the shale bed intersected by the drill hole.

Regional Geology

The sandstone is part of a large, north-trending block of Carboniferous Horton Group strata extending north from St. Georges Bay to Southwest Mabou River. The south end of the block is truncated by a northeast-trending fault and the north end is truncated by a northwest-trending fault.

The sandstone was mapped by Kelley (1968) and Lynch and Brisson (1994) as part of the Ainslie Formation, a subunit of the Horton Group. This formation is characterized by fine-grained grey-green and pale reddish-grey sandstone separated by red-brown siltstone representing a range of fluvial environments (Lynch and Brisson, 1994). The sandstone is typically quartz rich.



Figure 2. This photograph illustrates the condition of sandstone blocks found in the foundation of the Judique Manse. Note how the chisel marks (round spots) made when the stone was cut over a century ago are still evident.

The Ainslie Formation is conformably underlain by grey siltstone, shale and limestone of the Strathlorne Formation, which are in turn underlain by coarse sandstone and conglomerate of the Craignish Formation, the basal most unit of the Horton Group. The Horton Group strata are bounded to the west by a thin band of marine limestone of the Macumber Formation, a subgroup of the Carboniferous Windsor Group which conformably overlies the Ainslie Formation.

Deposit Geology

Red and grey sandstones are exposed along the north and south banks of Graham River over a minimum distance of 500 m. The river flows roughly east-west, but the strike of the sandstone beds is roughly northeast-southwest, so the 500 m dimension is exaggerated and does not reflect the true bedding thickness of this stratigraphic section. The sandstone beds dip northwest at angles of 63°-

86°. Outcrops are most prominent on the south bank of the river where the sandstone is exposed along a steep, north-facing hillside to a height of more than 20 m above the water level (Fig. 3).

A thick section of grey shale, marking the contact between the Ainslie and Strathlorne formations, is exposed along the south bank of the river, at the east end of the sandstone section. Assuming that the strike of the Strathlorne shale exposed along the river bank is constant, the sandstone sequence should extend at least 300 m south of the river bank before this shale unit is encountered. The sandstone section should also extend for a considerable distance north of the river.

Sandstone bed thicknesses are variable, but the brook bed exposures contain some massive beds which should produce blocks of greater than 1.5 m in thickness. The principal joint pattern is



Figure 3. This is probably the site where blocks were removed to build house foundations in Judique. The bed thicknesses found at this site suggest that large blocks could be quarried here.

approximately perpendicular to the strike of bedding, so many of the outcrop faces are joint surfaces.

Thin interbeds of shale and siltstone are found at several locations within the sandstone section, one of which was cored by the Nova Scotia Department of Natural Resources drillhole. This drill core was examined as part of the 2001 mineral inventory site visit, at which time it became apparent that the hole was drilled parallel to the dip of a red shale/siltstone bed. As a result, the drillhole gives a false impression that a thick shale bed is located within the sandstone sequence, but if the hole had been drilled at right angles to the bedding strike direction, it could have provided a totally different, and most likely favourable, picture of the volume of sandstone available at this site.

Conclusions

The Graham River Sandstone Prospect is a potential development opportunity, but detailed geological mapping is required to ascertain the volume and quality of stone available. Parks (1912) also mentions that similar sandstone occurrences are found north of the Graham River site, on the hills behind the villages of Judique and Port Hood.

References

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