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GEOLOGICAL SURVEY OF CANADA / COMMISSION GÉOLOGIQUE DU CANADA

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MARGINAL NOTES

Recent geological mapping in the Cheticamp map-area by the Geological Survey of Canada has emphasized pre-Carboniferous rocks and their structural and metamorphic history (Lynch and Tremblay, 1992; Currie, 1987). Carboniferous strata in the area were mapped by Cameron in 1948 and have not since been specifically emphasized. The present study is part of a regional assessment of Carboniferous stratigraphy in western Cape Breton Island. Hadrynian and Lower Paleozoic rocks which form the basement to the Carboniferous succession have been addressed mainly to determine their relationship to the Late Devonian-Carboniferous cover sequence, although some modifications to previous mapping of these older rocks is suggested by our work.

Two major rock units dominate the pre-Carboniferous geology of the Cheticamp map-area. The Cheticamp Pluton extends the entire length of the map-area as a narrow (1-3km) outcrop belt fault-bound on its eastern side but overlain unconformably by the Fisset Brook Formation on its western flanks. The pluton ranges in composition from granodiorite to granite, although it is predominantly granodioritic. Deformation within the pluton is variable in intensity. Mylonitic granitoid rocks have been noted by Currie (1987) and by Lynch and Tremblay (1992).

The Jumping Brook Complex comprises volcanic, pelitic and psammitic schists of Ordovician or Silurian age (Currie, 1987). These rocks are well exposed in coastal cliffs south of Cap Rouge and in embankments adjacent to the coastal highway south of Corney Brook. In the bed of Robert Brook at the southern boundary of the Cape Breton Highlands National Park, pink felsic rocks in faulted contact with the Fisset Brook Formation are here tentatively assigned to the Jumping Brook Complex.

DEVONIAN AND CARBONIFEROUS STRATIGRAPHY

In the Cheticamp map-area, the base of the Devonian-Carboniferous post-Acadian succession is marked by the base of the Fisset Brook Formation. The Fisset Brook Formation is composed largely of vesicular and amygdaloidal basalt, but locally contains rhyolite in significant quantity. Sedimentary rocks are interstratified with the volcanic rocks but comprise a relatively small portion of the formation. The Fisset Brook Formation is unconformable on the Cheticamp Pluton near Pembroke Lake in the southern part of the map-area, and lies unconformably on the Jumping Brook Complex in the vicinity of Presqu'ile Lake northeast of Cheticamp.

The Fisset Brook is overlain without apparent stratigraphic break by conglomerates and sandstones of the Creignish Formation (basal Horton Group). The Creignish Formation comprises several cycles of alluvial fan sediments overlain by fluviatile sandstones with spectacular low-angle trough cross-beds and abundant plant debris. Calcretes are common in the Creignish Formation. At several localities, the most notable of which is located at Cap Rouge, black sandy shales occur within the Creignish Formation. Associated with these shales are rare thin coal seams and oil shales. Fish scales and occasionally fish fossils have been noted in these black shales at Cap Rouge where they reach twenty metres in thickness.

Strathlorne Formation grey shales and fine-grained sandstones succeed the Creignish Formation and appear to be everywhere separated from the underlying Creignish Formation by bedding-parallel faults. The present configuration of these faults ranges from moderately dipping to overturned, as at Le Boutreau. Soft-sediment deformation is pervasive within the Strathlorne Formation. Red siltstones with associated fluviatile quartz-rich and arkosic sandstones overlying the Strathlorne Formation are assigned provisionally to the Ainslie Formation. The contact between the Strathlorne and Ainslie Formations has not been seen.

The base of the Middle to Late Viséan Windsor Group is marked by the Macumber Formation, characterized by laminated peloidal limestone, essentially devoid of any macrofauna but known regionally to be the first marine limestone to appear in the Carboniferous succession of eastern Canada. Above the Macumber Formation, the Windsor Group is very sparingly represented in surface exposure, but beds representative of both the middle and upper parts of the group have been mapped. The E1 limestone can be traced for several kilometres in outcrops in the southwestern part of the map-area. Its top is used to define the top of the Windsor Group. On Fisset Brook, the Herbert River limestone member is faulted against the Creignish Formation. At this locality, the Herbert River limestone member faces southeasterly towards the Creignish Formation, and overlies a series of gypsum, siltstone and limestone beds assigned here to the middle part of the Windsor Group. The base of the Herbert River limestone is the defined base of the upper Windsor Group.

Above the Windsor Group, grey shales with associated stromatolitic limestones comprise the Hastings Formation, the basal lithostratigraphic unit of the Mabou Group. The formation is well exposed near the mouth of Fisset Brook and on the shore at Anse des Dosithée. The lower contact at each of these localities is a fault. Overlying the Hastings Formation which ranges from latest Viséan to early Namurian in age, the Pomquet Formation consists of red-brown siltstones and sandstones with minor grey shales. The Pomquet Formation is overlain concordantly by basal beds of the Port Hood Formation. Clasts of Windsor Group limestone in conglomeratic lenses within thick channel sandstones in the lower portions of the Port Hood Formation suggest that the Pomquet-Port Hood contact is a paraconformity, and that a hiatus exists within the Namurian-Westphalian succession.

The Port Hood Formation is characterized by thickly bedded grey-brown channel sandstones, typically multi-storied in character and fine to medium grained, reaching thirty metres in thickness. In the lower part of the Port Hood Formation, here assigned to the Margaree Member named for exposures on the adjacent map-area to the southwest, the sand bodies are intercalated with red siltstones and shales. In its upper parts, asigned here to the Colindale Member, grey to black, variably carbonaceous and bituminous shales are interbedded with thick channel sandstones. The Colindale Member is exposed only in coastal sections near the southwestern limits of the map-area. The Port Hood Formation is the youngest Carboniferous rock unit exposed in the map-area, and is Westphalian A in age in its upper parts. The lower parts of the Port Hood Formation ranges in age from latest Namurian to early Westphalian.

MAJOR STRUCTURES

North-northeasterly trending fault systems dominate the structural framework of the map-area. These structures are thought to be steeply dipping as indicated by their relatively linear traces, and cut strata of the Mabou Group. The time of latest movement on these faults is at least as young as the early Namurian Pomquet Formation. North of the Cheticamp River, a second series of faults trends northerly to northwesterly. These are moderately to steeply-dipping structures, and appear for the most part to be high-angle reverse faults. The best-exposed can be seen at the picnic park at Grand Falaise, a short distance north of the entrance to the Cape Breton Highlands National Park, where granitoid rocks of the Cheticamp Pluton have been faulted over basalts and minor sandstones of the Fisset Brook Formation. These high-angle reverse faults seem best explained as transfer faults in a zone of overlap between two major northeasterly trending fault systems, the most westerly of which is inferred to be present in the offshore areas north of Presquile. Alternatively, these reverse faults may represent deformation in a restraining bend of a single major northeasterly trending fault system. The youngest strata known to be cut by these reverse faults are shales of the Strathlorne Formation (Middle to Late Tournaisian). On the shore a short distance east of the mouth of the Cheticamp River, beds of the Creignish Formation are in fault contact with shales of the Strathlorne Formation. This well-exposed major fault separates parallel strata, and although present relationships suggest that the Creignish Formation has been thrust westerly over Strathlorne shales, it is equally possible that the fault is a bedding-parallel detachment surface, subsequently folded into an overturned position.

MINERALIZATION

Copper mineralization is relatively widespread in mafic rocks of the Fisset Brook Formation, particularly where broken by the major fault systems. Copper mineralization is also relatively common in carbonate vein systems flooding fault zones, and in similar but smaller vein systems cutting Creignish Formation conglomerates. Fluorite is commonly associated with bornite and chalcopyrite in these smaller mineralized vein systems. The Turner Brook occurrence in the southeastern corner of the map-area is hosted by volcanic rocks of the Fisset Brook Formation, and shows both lead and copper (Demont, 1992).

Lead, zinc, copper and precious metal mineralization is well known in rocks of the Jumping Brook Complex in the Faribault Brook area which has a long history of mineral exploration (DeMont, 1992). Similar metal associations are seen in the upper reaches of Fisset Brook in Jumping Brook rocks.

REFERENCES CITED

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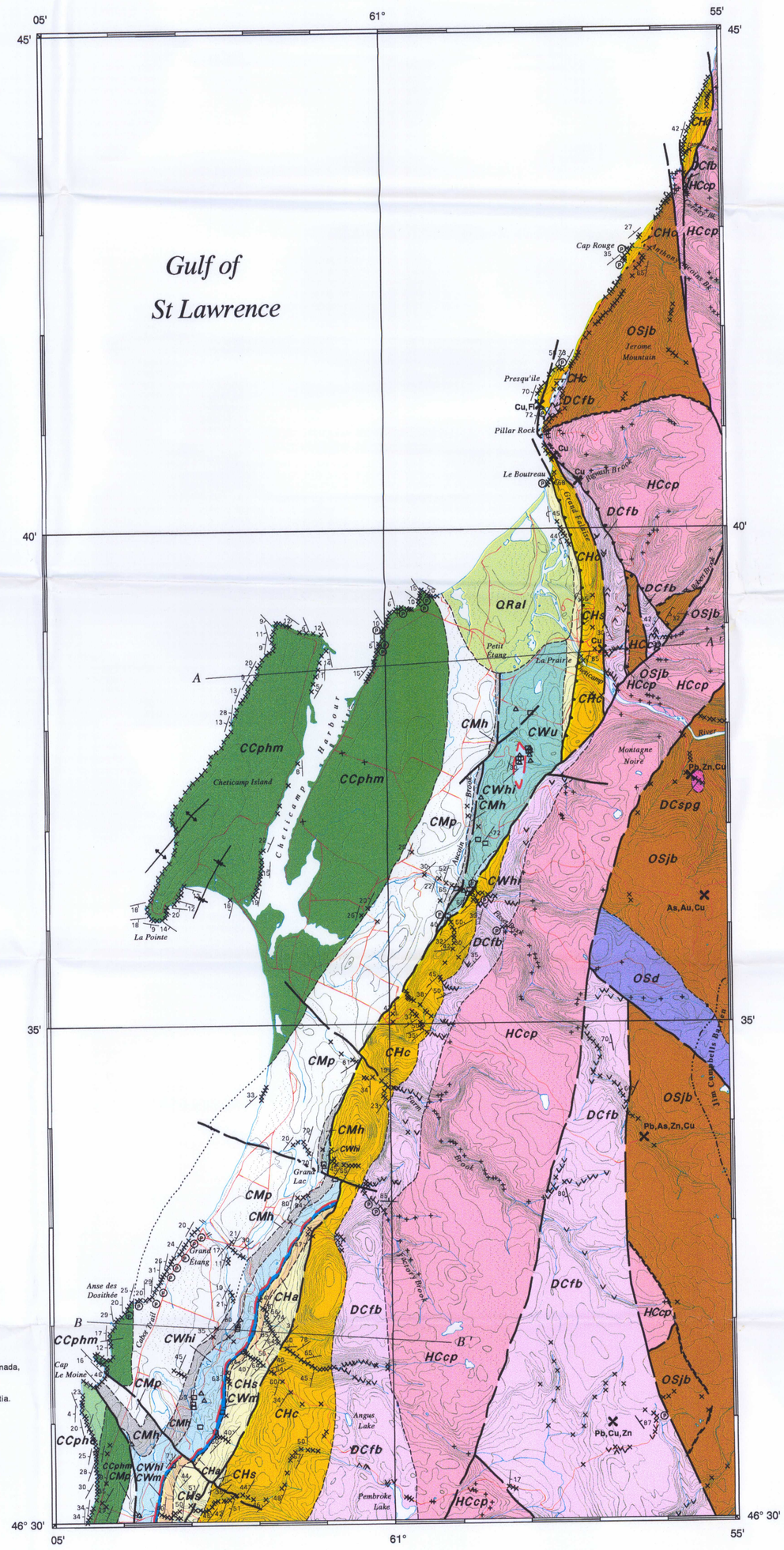
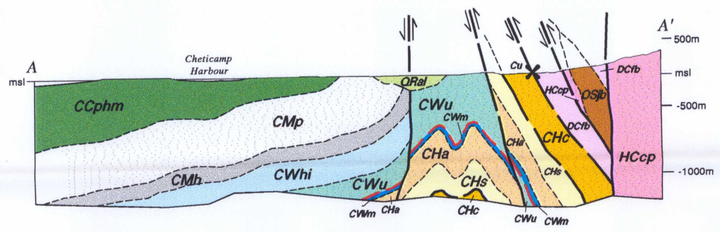
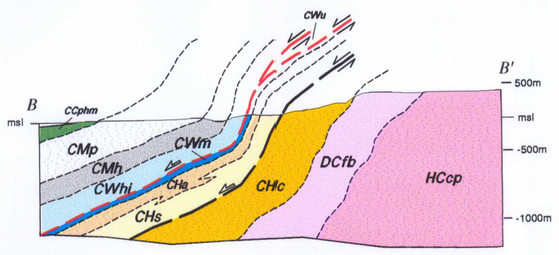
Currie, K.L., 1987: Relations between metamorphism and magmatism near Cheticamp, Cape Breton Island, Nova Scotia. Geological Survey of Canada, Paper 85-23, 66p.

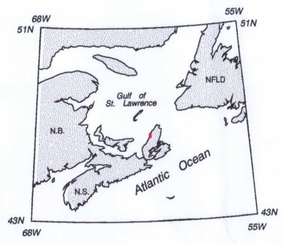
DeMont, G.J., 1992: Selected metallic mineral occurrences of Cape Breton Island, Nova Scotia. Nova Scotia Department of Mines and Energy, Open File Report 92-010, 299 p.

Lynch, J.V.G. and Tremblay, C., 1993: Geology of the Cheticamp River map (11K10), central Cape Breton Highlands, Nova Scotia; Geological Survey of Canada, Open File 2448, preliminary map, 1:50 000 scale









Copies of this map are available from Geological Survey of Canada - Atlantic. For information, send an inquiry by e-mail to agc@agc.bio.ns.ca, by fax to +1(902)426-4266, or by letter to:

Director
Geological Survey of Canada - Atlantic
P.O. Box 1006
Dartmouth, Nova Scotia, B2Y 4A2
Canada

Please refer to the map-title and to Open File 3455.

COOPERATION

COOPERATION AGREEMENT ON MINERAL DEVELOPMENT

ENTENTE DE COOPÉRATION SUR L'EXPLOITATION MINÉRALE

Contribution to Canada-Nova Scotia Cooperation Agreement on Mineral Development (1992-1995) a subsidary agreement under the Economic and Regional Development Agreement.

Contribution à l'Entente de coopération Canada - Nouvelle-Écosse sur l'exploitation minérale (1992 - 1995) entente auxiliaire négociée en vertu de l'Entente Canada/Nouvelle-Écosse développement économique et régional.

Canada

Province of Nova Scotia

LEGEND

QRal — Quaternary to Recent coastal and alluvial sands and gravels in floodplain of Cheticamp River

CARBONIFEROUS

CUMBERLAND GROUP

CCphc / CCphm

PORT HOOD FORMATION : COLINDALE MEMBER *(CCphc)*: sandstone in channel bodies to 30 metres in thickness, pale grey-brown in colour, associated with grey and dark grey shales

MARGAREE MEMBER *(CCphm)*: sandstone in thick channel bodies, mostly multi-storied; sandstones fine-grained, medium grey-brown, buff and grey weathering, intercalated with red-brown siltstone and shale

..... *regional disconformity* .....

MABOU GROUP

CMp

POMQUET FORMATION *(CMp)*: siltstone, red-brown and minor grey, with intercalated fine-grained sandstones, typically ripple-marked, pale reddish grey, lessor pale grey-green

CMh

HASTINGS FORMATION *(CMh)*: shale, grey and dark grey, with intercalated stromatolitic limestone and minor grey sandstone in thin beds; gypsum associated in lowest part

WINDSOR GROUP

CWhi

HOOD ISLAND FORMATION *(CWhi)*: siltstone, red-brown, with intercalated limestone, dolostone and associated gypsum

CWu

UNDIVIDED MIDDLE WINDSOR GROUP *(CWu)*: gypsum, siltstone, minor limestone

..... *Ainslie Detachment* .....

CWm

MACUMBER FORMATION *(CWm)*: limestone, grey, laminated, peloidal and sparsely oolitic, unfossiliferous

..... *regional disconformity* .....

HORTON GROUP

CHa

AINSLIE FORMATION *(CHa)*: sandstone, grey-green and pale red-brown, with interbedded red-brown siltstone

CHs

STRATHLORNE FORMATION *(CHs)*: siltstone, fine-grained sandstone; shale, grey and dark grey; minor limestone

..... *zone of shear deformation* .....

CHc

CREIGNISH FORMATION *(CHc)*: conglomerate, pebbly sandstone, sandstone, red-brown and grey-green, with minor dark grey bituminous shale; cut locally by mafic dykes

DEVONIAN / CARBONIFEROUS

DCspg / DCfb

FISSET BROOK FORMATION *(DCfb)*: undivided vesicular and amygdaloidal basalt, porphyritic rhyolite, with associated red-brown sandstone and conglomerate, mainly red-brown in colour; distinguished from overlying Creignish Formation by the presence of volcanic rocks

SALMON POOL GRANITE *(DCspg)*: massive, red to pink, medium-grained biotite granite; mapped only as a small body south of the Cheticamp River, compiled from Currie (1987)

ORDOVICIAN / SILURIAN

OSjb / OSd

JUMPING BROOK METAMORPHIC SUITE *(OSjb)*: metasedimentary and metavolcanic rocks with variably foliated igneous rocks; in part mylonitic; includes felsic rocks of uncertain affinities in Robert Brook

unnamed diorite *(OSd)*: diorite and chloritic foliated diorite

HADRYNIAN TO CAMBRIAN

HCcp

CHETICAMP PLUTON *(HCcp)*: granodiorite to granite, medium-grained, equigranular, in part mylonitic near major faults; mafic content variable and controls colour

PERMIAN

CARBONIFEROUS

VISÉAN	LATE	STEPHANIAN
		WESTPHALIAN D
		WESTPHALIAN C
		WESTPHALIAN B
		WESTPHALIAN A
		NAMURIAN C
		NAMURIAN B
		NAMURIAN A
	MIDDLE	
	EARLY	
TOURNAISIAN		

SYMBOLS

Rock outcrop

× terrigenous sedimentary rocks
V basalt
^ rhyolite
+ plutonic rocks (granitoids, diorite)
□ limestone
△ gypsum

bedding, inclined, vertical, overturned, tops unknown
foliation, schistocity
foliation, mylonitic
geological boundary
fault, steep, movement sense uncertain
fault, high-angle reverse or thrust
Ainslie Detachment, and associated listric faults
fault, extensional, cutting pre-Carboniferous rocks
fold axis; anticline, syncline
× mineral showing; Cu copper, Fl fluorite, Pb lead, Zn zinc, Au, gold
Ⓟ fossil locality
Ⓟ palynology sample location

Canada

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3455
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
OTTAWA
1997

Contour interval 50'
North American Datum 1983
Transverse Mercator Projection

Digital base map from Canada Centre for Geomatics published at the same scale. Generalized and modified by the Geological Survey of Canada

Mean magnetic declination 1994, 22°43' West, decreasing 6.8' annually

Recommended Citation:

Giles, P.S., Allen, T.L. and Hein, F.J., 1997: Bedrock geology of the Cheticamp map-area, western Cape Breton Island, Nova Scotia; Geological Survey of Canada, Open File 3455, map with marginal notes

BEDROCK GEOLOGY OF

CHETICAMP MAP-AREA (11K11, 11K10)

CAPE BRETON ISLAND, NOVA SCOTIA

Kilometres
0 1 2 3 4 5 6 7 8

Geology by P.S. Giles, T.L. Allen and F.J. Hein, 1995, assisted by C. Robinson; pre-Carboniferous rocks of the Cape Breton Highlands compiled in part from Lynch and Tremblay (1992) and Currie (1987). The authors gratefully acknowledge the assistance of C. Currie, Geological Survey of Canada - Atlantic, in preparing this digital map. Thanks are expressed to D.J.W. Piper and S.M. Barr who freely shared their observations and data for rocks of the Fisset Brook Formation in the southern portion of the map-area.

NATMAP
CARTNAT

Canada's National Geoscience Mapping Program
Le Programme national de cartographie géoscientifique du Canada