LEGEND
FOR THE
GEOLOGICAL MAP
OF THE
COBEQUID HIGHLANDS
COLCHESTER, CUMBERLAND & PICTOU COUNTIES
NOVA SCOTIA

BY

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1982

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY

Honourable Ron Barkhouse, Minister

John J. Laffin, P. Eng., Deputy Minister

A JOINT PROJECT

PROVINCE OF NOVA SCOTIA
DEPARTMENT OF
MINES AND ENERGY

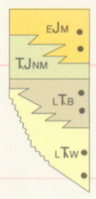
Canada REGIONAL ECONOMIC EXPANSION
EXPANSION ÉCONOMIQUE RÉGIONALE

TIME SCALE (Numbers in Ma)

STRATIFIED ROCKS

CATACLASTIC ROCKS

PLUTONIC ROCKS



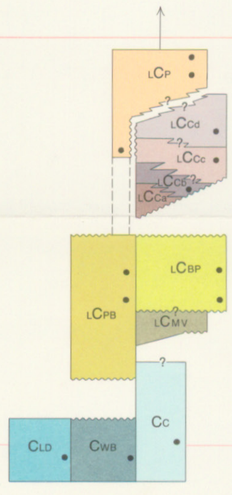
FUNDY GROUP

MCCOY BROOK FORMATION (EJm): orange-red to tan quartz wacke, siltstone, lithic wacke; some aeolian sandstones at base

NORTH MOUNTAIN BASALT (TJNM): dark red-brown to black, massive and amygdaloidal basalt flows and associated sills, dykes; locally agglomerate

BLOMIDON FORMATION (LTB): red-orange siltstone, shale, wacke

WOLFVILLE FORMATION (LTW): tan to red quartz arenite and wacke, lithic wacke, siltstone; polymictic conglomerate at and near base; aeolian sandstones at top



PICTOU GROUP
undivided (LCP): grey, green, tan, red feldspathic and lithic wacke, quartz wacke, siltstone, polymictic conglomerate; locally coal layers

CUMBERLAND GROUP
(LCCd) Upper fine facies : red wacke and siltstone
(LCCc) Upper coarse facies : red polymictic conglomerate, red and grey wacke
(LCCb) (coal bearing facies) Lower fine facies: grey wacke, red and grey siltstone, coal; locally polymictic conglomerate
(LCCa) Lower coarse facies : red polymictic conglomerate wacke

RIVERSDALE GROUP
PARRSBORO FORMATION (LCPB): red, tan, grey quartz and lithic wacke, siltstone, shale; red polymictic conglomerate; tan quartz arenite

BOSS POINT FORMATION (LCBP): red, grey quartz and lithic wacke; siltstone; polymictic conglomerate at base

MILLSVILLE CONGLOMERATE (LCMV): red, grey polymictic conglomerate, lithic wacke

CANSO GROUP
undivided (CC): grey-green, red quartz and lithic wacke, siltstone, shale

WEST BAY FORMATION (CWB): red, green, grey lithic and quartz wacke; red polymictic and intraformational conglomerate

LONDONDERRY FORMATION (CLD): green, green-grey lithic, feldspathic and quartz wacke, siltstone; purple shale and siltstone

WINDSOR GROUP
undivided (ECW): grey to tan limestone, calcareous siltstone; black to dark grey impure limestone; red siltstone and wacke

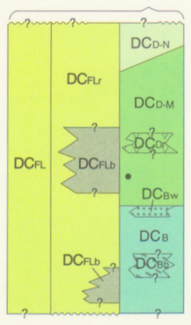
HORTON GROUP
undivided (ECH): grey, red quartz wacke, siltstone shale; limestone and basalt and red, grey siltstone along Cobequid Fault

NUTTBY FORMATION (DCN): grey, red quartz and lithic wacke, siltstone; polymictic conglomerate; green to tan felsic volcanic rock

GREVILLE RIVER FORMATION (DCG): grey, tan quartz wacke and arenite, siltstone; red, green siltstone

RAPID BROOK FORMATION (DCR): grey to tan quartz and lithic wacke; granite clast, polymictic conglomerate; grey, black and calcareous siltstone

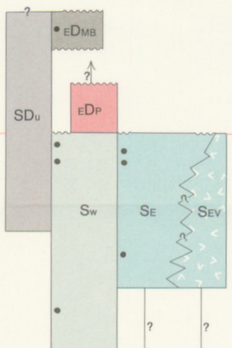
FALLS FORMATION (DCF): red-brown polymictic conglomerate, lithic wacke, minor siltstone



FOUNTAIN LAKE GROUP
DIAMOND BROOK FORMATION (DCD): basalt flows, red lithic wacke, siltstone; (DCDr): minor lenses of rhyolitic flows;
Nabiscump Brook Member (DCD-N): red, green lithic and quartz wacke, siltstone; *McKay Brook Member* (DCD-M): mostly black to red-brown basalt flows, associated dykes and intrusions; red, grey siltstone, micaceous wacke, minor polymictic conglomerate

BYERS BROOK FORMATION (DCB): tan-orange to green rhyolitic ignimbrites and lava flows; dacitic flows; crystal tuffs, minor green to grey siltstone and volcanic wacke: (DCBb): lenses of basaltic tuffs; (DCBw): lens of grey quartz wacke

FOUNTAIN LAKE GROUP (undivided)
(DCFL): undifferentiated mafic and felsic volcanic rocks
(DCFLr): tan to orange rhyolitic lava flows and ignimbrites; red, grey siltstone, volcanic wacke, tuff and agglomerate
(DCFLb): dark green to red-brown basalt flows; grey,red siltstone and minor quartz wacke



MURPHY BROOK FORMATION (EDMB): grey to black, plant-bearing siltstone, shale; red and grey polymictic conglomerate and lithic wacke

(SDU): red, green, tan siltstone, quartz wacke; grey to black siltstone, polymictic (granite clast) conglomerates; grey to tan calcareous siltstone

PORTAPIQUE RIVER FORMATION (EDP): red, green siltstone, quartz and lithic wacke

WILSON BROOK FORMATION (SW): grey to black siltstone; shale, minor wacke and tuff at base; grey siltstone quartz wacke; (SWT): tan to orange rhyolitic and dacitic volcanic rocks at base in the West Brook - Brown Brook area; granite clast conglomerate and mafic volcanic rocks at Chain Lakes Brook possibly part of formation but stratigraphic position not known

EARLTOWN FORMATION (SE): grey to tan quartz and volcanic wacke; tan-orange to green flow-layered rhyolitic lava flows; (SEV): tan to orange rhyolite, crystal tuff; green to grey dacitic volcanic rocks; minor grey siltstone, wacke

(OSU-2) black siltstone, shale, lapilli tuff; red, green, grey lithic and volcanic wacke

(OSU-1) green-grey, green quartz and volcanic wacke, siltstone, tuff

JEFFERS FORMATION (HJ): (all rocks altered by varying amounts of metamorphism and deformation) green to grey volcanic, lithic tuff, siltstone and agglomerate; green chlorite phyllite; altered, mafic metavolcanic rocks (meta-basalt?); green to grey felsic cataclasites; (HJM): grey, white marble and calcareous meta-siltstone

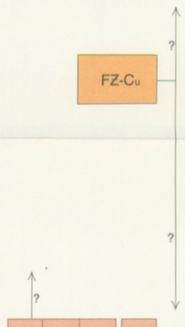
WARWICK MOUNTAIN FORMATION (HW): (all rocks altered by varying amounts of metamorphism and deformation) grey to green chlorite phyllite and altered mafic, meta-volcanic rocks (meta-basalt); green, tan volcanic wacke, tuff, siltstone; green to grey felsic cataclasites

BASS RIVER COMPLEX
FOLLY RIVER SCHIST (PF): dark green chlorite schist, mafic metavolcanic rocks; meta-agglomerate; white, grey quartzite

GAMBLE BROOK SCHIST (PGB): white, grey quartzite; biotite ± muscovite ± almandine schist

GREAT VILLAGE RIVER GNEISS (PGV): grey hornblende ± biotite ± quartz ± chlorite ± feldspar gneisses; dark green amphibolite; grey-tan granitoid gneisses

MT. THOM COMPLEX
undivided (PMT); grey biotite ± garnet ± microline ± plagioclase gneiss; hornblende - chlorite - plagioclase gneiss; granite gneiss

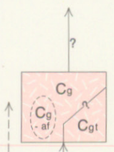


(FZ-CU): tan to orange wacke and conglomerate in Cobequid Fault Zone

CLARKE HEAD FAULT ZONE
(FZ-C1) red-brown lithic and quartz wacke, siltstone
(FZ-C2) red-brown, grey calcareous siltstone, wacke, limestone intraformational conglomerate
(FZ-C3) plant-bearing grey siltstone, wacke
(FZ-CH) mixture of mega-blocks of various lithotypes in gouge matrix

(FZlms) grey, tan, white limestone; some siltstone; massive to thinly bedded; most locations have fossils; found in Cobequid Fault Zone

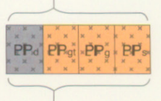
(FZc) cataclastic rocks; dark grey to black phyllite, dark grey to black, tan quartz-rich cataclasites; found in Cobequid Fault Zone



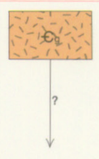
(Cg): red, pale orange, tan-grey hornblende ± biotite monzongranite to alkali feldspar granite
(Cg - af): areas of alkali feldspar granite
(Cgt): granitoid rocks (monzogranite to granodiorite)

(DCg): grey, tan, pale orange hornblende ± biotite monzogranite to alkali feldspar granite

(DCd): dark grey to pale tan hornblende ± pyroxene diorite



(PPd): grey diorite
(PPgt): grey to pale tan granitoid intrusion
(PPg): orange-tan alkali feldspar granite to syenogranite
(PPs): orange-tan syenite



(Cs): red, grey to pale orange syenogranite

(Hd): grey diorite to quartz-diorite

(Pgg): orange-tan granite gneiss

SYMBOLS USED IN LEGEND
unconformity....
age control from fossils....

SOURCES OF GEOLOGICAL INFORMATION

1. Kelly, D.G., 1962 to 1968; unpublished field notes and field maps; Geological Survey of Canada; Reports of Activities, Papers 63-1, 64-1, 65-1, 66-1, 67-1
2. Donohoe, H.V. Jr. and Wallace, P.I., 1978, Geology map of the Cobequid Highlands; Nova Scotia Department of Mines and Energy, Preliminary Map 78-1; 1981, Geological Map of the Cobequid Highlands, Nova Scotia; Nova Scotia Department of Mines and Energy, Open File Report, OFR 454.
3. Gillis, J.W., 1964, Geology of Northwestern Pictou County, Nova Scotia; unpublished Ph. D. dissertation, The Pennsylvania State University, University Park, Pennsylvania
4. Benson, D.G., 1967, Geological Map of the Hopewell area, Nova Scotia (1:63 360 Scale); Geological Survey of Canada, Map 1215A
5. Stevenson, I.M., 1958, Geological map of the Truro area, Colchester, Hants, and Pictou Counties, Nova Scotia (1:63 360 scale); Geological Survey of Canada, map 1058A.
6. Weeks, L. J., 1946, Geology of the Londonderry area, Colchester and Hants Counties, Nova Scotia (1:63 360 scale); Geological Survey of Canada, Map 874A.
7. Weeks, L.J., 1946 Geology of the Bass River area, Colchester and Hants Counties, Nova Scotia (1:63 360 scale); Geological Survey of Canada, Map 867A.
8. Liew, M.Y., 1976, Structure, geochemistry, and stratigraphy of Triassic rocks, north shore of Minas Basin, Nova Scotia, unpublished M.Sc. dissertation, Acadia University, Wolfville, Nova Scotia.
9. Olsen, P., Comment on eolian dune field of Late Triassic age, Fundy Basin, Nova Scotia, Geology, volume 9, number 12, p. 557-559.
10. Copeland, M.J., 1959, Geology Map of Cumberland County (west part), Nova Scotia (1:126 720 scale); Geological Survey of Canada, Map 1070A.
11. Norman, G.W.H. and Bell, W.A., 1938, Geology of the Oxford Sheet (west half), Cumberland and Colchester Counties, Nova Scotia (1:63 360 scale); Geological Survey of Canada, Map 410A.
12. Norman, G.W.H. and Bell, W.A., 1938, Geology of Oxford sheet (east half), Cumberland and Colchester Counties, Nova Scotia (1:63 360 scale), Geological Survey of Canada, Map 409A.
13. Rodgers, Seglund and Shaw Associates, 1959, Surface geology map of northern Nova Scotia (1:50 000 scale);unpublished map.

Geology by
H.V. Donohoe, Jr., 1974 to 1978 and P.I. Wallace, 1976 to 1978

Cartography by
Maritime Resource Management Service, Amherst, Nova Scotia

SYMBOLS

Bedding, tops known (inclined, horizontal, overturned) 20

Bedding, tops unknown (inclined, vertical) 50

Flow layering in volcanic rocks (inclined, vertical) 28

Geological boundaries (defined, approximate, assumed)

Unconformities (defined, approximate, assumed)

Faults (defined, approximate, assumed)
arrows indicate relative lateral movement;
solid circle indicates downthrown side;
single arrow represents dip direction with dip amount if known
capital letter represents age of movement where known

Exposures (in place; volcanic rocks; float)

Coastal area of continuous exposure

Lineament (from air photo)

Joints (inclined, vertical) 80

STRUCTURAL SYMBOLS

TIME (orogeny) / Unit / STRUCTURES	HADRYNIAN OR OLDER (unnamed orogenies) Mt. Thom and Bass River Complexes DT2 or DB2	BT3 or DB3	LATE HADRYNIAN (Cadomian) Jeffers and Warwick Mountian Formations DC1	DC2	MIDDLE DEVONIAN (Acadian) DA1	MIDDLE CARBONIFEROUS (Hercynian - Alleghenian) DH1	LATE CARBONIFEROUS OR YOUNGER
STRUCTURAL SURFACES	SECOND DEFORMATION ST2 or SB2 high grade metamorphic foliation	THIRD DEFORMATION ST3 or SB3 crenulation cleavage	FIRST DEFORMATION SC1 low grade metamorphic foliation	SECOND DEFORMATION SC2 crenulation cleavage	SA1 fracture to slaty cleavage	SH1 fracture or slaty cleavage	
inclined	20	45	35	60	85		
vertical							
horizontal							
MINERAL LINEATION	LB2 10						
ASYMMETRIC MINOR FOLDS		FT3 or FB3			FA1	FH1	
"S - sense"		S 20					
"Z - sense"		Z 35			Z 20	Z 30	
"M - sense"		M 20					
MAJOR FOLDS		FT3 or FB3		FC2	FA1	FH1	
antiform							
synform							
anticline							
syncline							
overturned syncline							

Fold axial traces for all of the above; (known, approximate);
arrow indicates direction of plunge

Local cataclastic foliation found in some Paleozoic plutonic rocks and in the Cobequid Fault Zone where it is designated FFZ1

Local crenulation cleavage in Cobequid Fault Zone (designated SFZ2)

Folds adjacent to or inthe Cobequid Fault Zone (designated FFZ3) which post- date Hercynian - Alleghenian cleavage; arrow indicates plunge direction (syncline, anticline)

Diabase dyke (age indicated by letter where known) db Pdb

Aplite dyke (inclined, vertical) 20

Granodiorite dyke gd

Breccia dyke bd

FOSSIL LOCALITIES (flora or fauna; spores recovered) F17057 S D1349
Numbers after a fossil locality are Geological Survey of Canada locality numbers; those without letter prefix are registered at Ottawa; those with a "D" are registered at the Atlantic Geoscience Centre, Eastern Petroleum Geology, Dartmouth, Nova Scotia; those with a "P" are plant locality numbers registered in Ottawa.
Numbers prefixed by "USNM" are locality numbers of the United States National Museum, Smithsonian Institution, Washington, D.C. Many fossil locality numbers are followed by their stated age.

RADIOMETRIC AGES: Sample sites for Rb/Sr isochron dates; 331 ± 27 Rw ; 287 ± 34 Kw
location of K/Ar dates shown by arrow; numbers refer to age date in Ma; K: K/Ar system date; R: Rb/Sr System date;
w: whole rock; m: mineral; mu: muscovite; b: biotite; h: hornblende

MINERAL OCCURRENCES: numbered and described in the text, Memoir 9 and Nova Scotia Department of Mines and Energy, Report 82-1.
(M: metallic; N: non-metallic)
X M-29 Pb, Cu
X N-18 asb

Cu - copper	U - uranium	ank - ankerite	shal - shale
Pb - lead	Th - thorium	marb - marble	clay - clay
Zn - zinc	F - fluorine	asb - asbestos	gra - graphite
As - arsenic	La - lanthanum	gyp - gypsum	gem - gemstones
Au - gold	V - vanadium	lms - limestone	(jasper, amethyst)
Ce - cesium	Ag - silver	Ba - barite	rock - rip rap,
Fe - iron	Mn - mangenese	Si - silica	road metal
		diat - diatomite	coal - coal

Quarry or mine (active, abandoned)

Gravel pit

Oil well, dry hole

CROSS SECTION SYMBOLS

Conglomerate

Foliation form surface

Fault

Bedding form surface

Axial surface of folds

Unconformity

Younging direction

Topographic base derived from 1:50 000 scale, National Topographic System maps, Surveys and Mapping Branch, Department of Energy Mines and Resources, Ottawa.
Transverse Mercator Projection
Contour interval 50 feet, North American Datum 1927. Road network and culture partly updated by Maritime Resource Management Service, Amherst, Nova Scotia from 1975 1:10 000 aerial photography.

To accompany Memoir 9 by H.V. Donohoe, Jr. and P.I. Wallace.