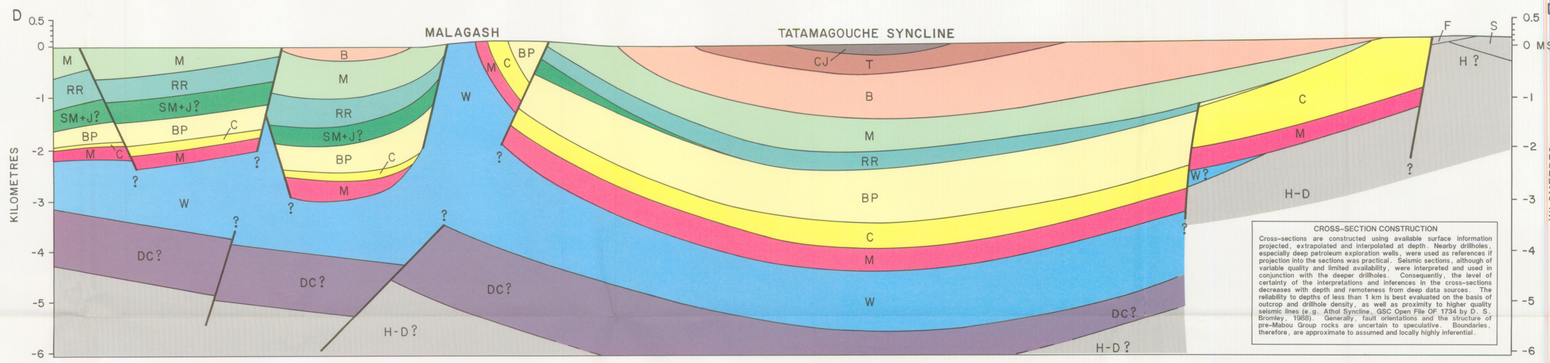
MINERAL OCCURRENCES

4–1	Annandale – An – 4	Cu
4–2	Bailey Brook	Cu
4–3	Balfron	Cu
4–4	Balmoral Brook	Cu
4–5	Biz Brook	Cu, U
4–6	Black River	Cu, U (Pb, Zn)
4–7	Blockhouse Point	Cu, Ag, Zn
4–8	Brule Point	Cu
4–9	Cape Cliff	Cu (Zn, Ag)
4–10	Central New Annan	Cu, Pb
4–11	Donaldson's Mill Brook	Cu, Ag (Pb, Au)
4–12	Drysdale Falls Quarry	R
4–13	Gravois Point	Cu, Ag
4–14	Johnsons Point	Cu
4–15	Keeble	Cu
4–16	Lazy Bay	G
4–17	Louisville	U
4–18	Malagash	Na, K
4–19	Malagash – 1	Na
4–20	Malagash – 2	Na
4–21	Malagash Point	Cu, Ag (Zn, C)
4–22	Malagash Shore	Cu, Ag
4–23	Matheson Prospect	Cu
4–24	Miller Brook	Cu, Ag (Zn, Re)
4–25	Mine Brook	Ba
4–26	Mine Hole Brook	Cu, Ag
4–27	Mullins Point	Cu, C
4–28	North Shore	Cu, Ag (Ba, Zn)
4–29	Oliver Mine	Cu, Ag
4–30	Oliver North	Cu
4–31	Plainfield Brook	P (albertite)
4–32	Reef Point	Cu, Mn
4–33	River John	Cu
4–34	River John Town	Cu
4–35	Ross Brook	Ba, Cu
4–36	Scotsburn IC–1	P (oil show)
4–37	Six Mile Road	R
4–38	Skinner's Cove	Pb, Zn
4–39	South Annandale	U, F
4–40	South Shore	Cu
4–41	Stakes Road	R
4–42	Tatamagouche	Cu
4–43	The Falls	Cu
4–44	Tramley	R
4–45	Treen Bluff	Cu, Ba
4–46	Wallace – 1	Na, K
4–47	Wallace – 2	Na, K
4–48	Wallace Sandstone Quarry	B
4–49	Wallace Station Quarry	R
4–50	Welsford	Cu
4–51	Welsford South	Ba
4–52	Woodlock Brook	Cu, U
4–53	Yellow Brook	Cu

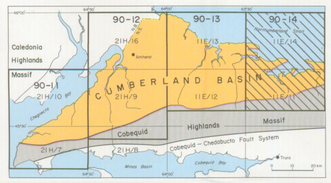


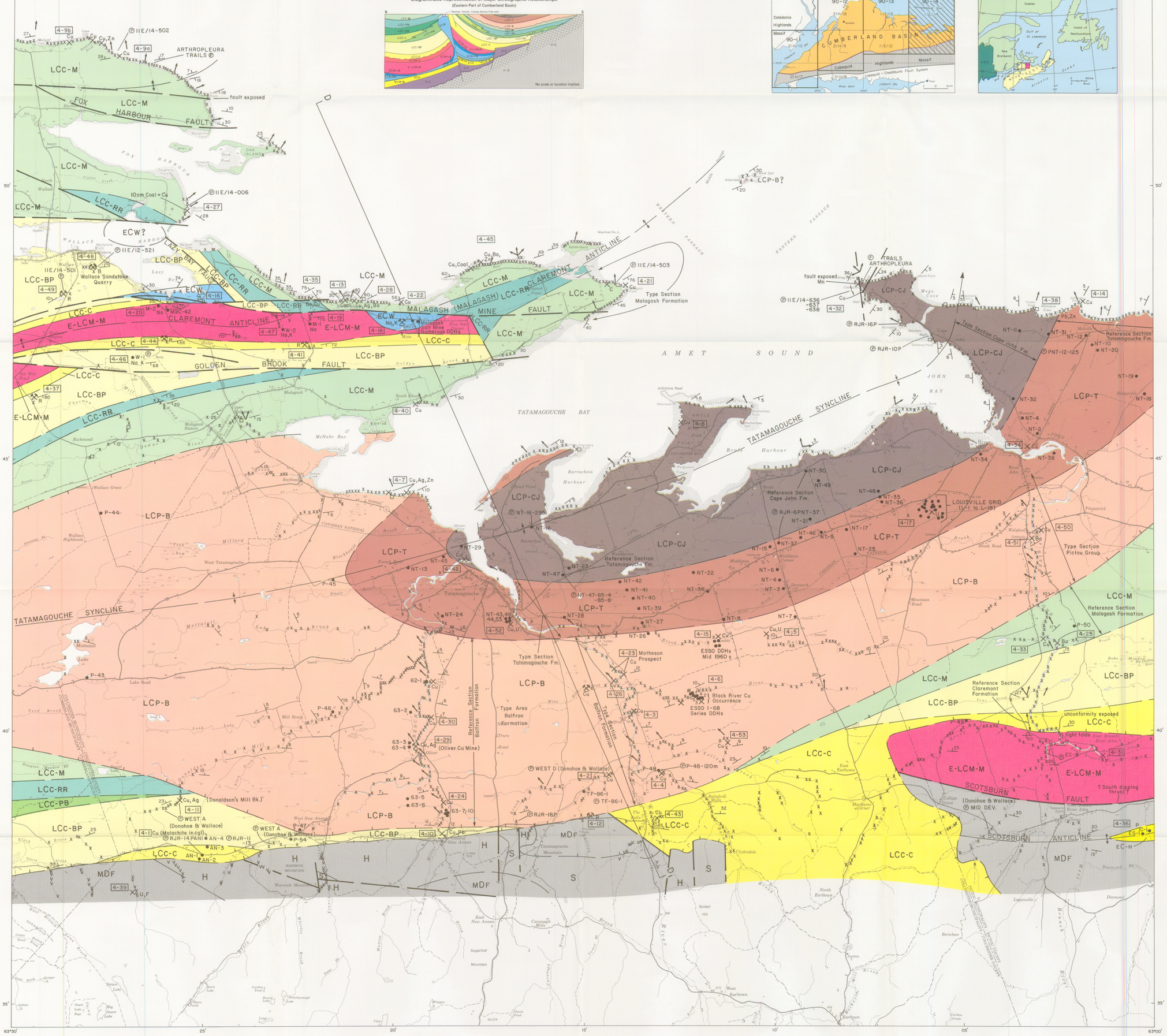
CROSS–SECTION CONSTRUCTION

Cross–sections are constructed using available surface information projected, extrapolated and interpolated at depth. Nearby drillholes, especially deep petroleum exploration wells, were used as references if projection into the sections was practical. Seismic sections, although of variable quality and limited availability, were interpreted and used in conjunction with the deeper drillholes. Consequently, the level of certainty of the interpretations and inferences in the cross–sections decreases with depth and remoteness from deep data sources. The reliability to depths of less than 1 km is best evaluated on the basis of outcrop and drillhole density, as well as proximity to higher quality seismic lines (e.g. Athol Syncline, GSC Open File OF 1734 by D. S. Bromley, 1988). Generally, fault orientations and the structure of pre–Mabou Group rocks are uncertain to speculative. Boundaries, therefore, are approximate to assumed and locally highly interstinal.

Northumberland Strait

Diagrammatic Representation of Major Stratigraphic Relationships
(Eastern Part of Cumberland Basin)





TIME SCALE

SYSTEM	SUBSYSTEM	SERIES	STAGE	BRITISH RES	STAGE BELGIUM
PERMIAN					
CARBONIFEROUS	SILESIAN	STEPHANIAN	AUTUNIAN		
		WESTPHALIAN	C–D		
			B		
			A		
		NAMURIAN	BRIGANTIAN		
			ARNSBIAN		
		VISEAN	PENDLEIAN		
			CHADIAN		
		TOURNAISIAN	COURCEYAN		
			HASTARIAN		
DEVONIAN			ARDENNIAN		
			WOMENSIAN		
HADRYNIAN–DEVONIAN					

LEGEND

Note: This is a common legend for Nova Scotia Department of Mines and Energy Maps 88–11, 90–12, 90–13 and 90–14. All references unless otherwise stated refer to the entire Cumberland Basin.

CARBONIFEROUS

PICTOU GROUP (LCP = undivided):

CAPE JOHN FORMATION (LCP–CJ):
red–brown mudrock, pebbly arkosic sandstone, sandstone, minor calcareous mud–chip conglomerate; minor grey beds; rare, thin, laterally persistent limestone beds.
Fine / Coarse = 5 Thickness = 350–400+ m
paraconformity or conformable

TATAMAGOUCHE FORMATION (LCP–T):
red–brown mudrock, sandstone, calcareous mud–chip conglomerate; minor grey beds; rare pebbly sandstone; several thin, laterally persistent limestone beds; thick (up to 30 m) sandstones form sheet–like bodies that are laterally persistent for 10s of km.
Fine / Coarse = 3 Thickness = 300–350 m
paraconformity or conformable

BALFRON FORMATION (LCP–B):
red–brown sandstone, mudrock, minor pebbly sandstone, calcareous mud–chip conglomerate; minor grey beds; rare, thin, discontinuous limestone beds; thick (up to 40 m) sandstones form sheet–like bodies with a lateral extent of up to several km.
Fine / Coarse = 1 Thickness = 800–900 m
paraconformity – angular unconformity

CUMBERLAND GROUP (LCC = undivided or unassigned):
sandstone, grey, bodies up to 30 m thick with interstratified red mudrock and rare, thin coal.

MALAGASH FORMATION (LCC–M):
sandstone, grey and minor red; mudrock, red and grey; rare, thin coal seams and laterally persistent limestone beds.
Fine / Coarse = 0.5 Thickness = 100–400 m

RAGGED REEF FORMATION (LCC–RR):
grey pebbly sandstone, conglomerate, fine grained sandstone, subordinate mudrock, grey and red; rare, thin coal seams and bituminous limestone beds; mudrock may locally predominate.
Fine / Coarse = 0.7 Thickness = 0 (east) to 700–1000 m (west)

SPRINGHILL MINES FORMATION (LCC–SM):
sandstone, grey, sandstone bodies up to 22 m thick; mudrock, grey and sideritic, rarely red; significant coal seams (up to 4 m); thin cone–in–cone limestone locally; (SMv) MacCarrons River Member with poorly developed coal seams; red mudrock increases up section, numerous thin (less than 2 m) sandstones; rhythmic interstratification common.
Fine / Coarse = 0.7 to 4.3 Thickness = 0 (east) to 600–1000 m (west)

JOGGINS FORMATION (LCC–J):
mudrock, grey and minor red (predominant in lower half); subordinate sandstone, grey; numerous, thin (up to 1 m) coal seams closely associated with bivalve–bearing, bituminous limestone and shale.
Fine / Coarse = 2 Thickness = 0 (east) to 1100–1450 m (west)

POLLY BROOK FORMATION (LCC–PB):
red and grey polymictic ortho– and paraconglomerate, boulder – pebble; pebbly sandstone; rare mudrock; variable rounding and sorting; (PBc) Leamington Member with granule conglomerate and silty mudrock, grey with subordinate red, thinly interstratified, poorly sorted (transitional with the overlying *Springhill Mines Formation*).
Fine / Coarse – very low Thickness = 0 (east and north) to 0–1500? m (west)
conformable – angular unconformity?

BOSS POINT FORMATION (LCC–BP):
sandstone, grey to green–grey, medium– to coarse–grained, locally abundant plant debris; limestone (calcrete); calcareous mud–chip conglomerate; subordinate grey to minor red mudrock.
Fine / Coarse – 0.4 Thickness = 200–600 m (east) 700–1200 m (west)
local disconformity

CLAREMONT FORMATION (LCC–C):
red polymictic conglomerate, pebble to granule, arkosic, pebbly sandstone, weakly cemented, minor grey–green mottle.
Fine / Coarse – very low Thickness = 50–1500 m+
local disconformity ?

MABOU GROUP (E–LCM = undivided):

SHEPODY FORMATION (E–LCM–S):
red mudrock and red to grey sandstone with abundant plant debris.
Fine / Coarse – 0.7 Thickness = 0–250 m

MIDDLEBOROUGH FORMATION (E–LCM–M):
red mudrock, minor sandstone, rare fine conglomerate, interstratified: age and facies equivalent, in part, with the upper part of the Windsor Group.
Fine / Coarse = 2–3 Thickness = 200–500 m
local disconformity ?

WINDSOR GROUP (ECW = undivided):
interstratified redbeds, evaporites and carbonates.

LIME–KILN BROOK FORMATION (ECW–LB):
red mudrock, minor sandstone and fine conglomerate; interstratified fossiliferous marine limestone and dolostone; anhydrite, gypsum and locally salt (Borehole PFH C96v).
Fine / Coarse = high Thickness = 300–800 m
structural contact (fault–intrusive)

PUGWASH MINE FORMATION (ECW–PM):
interstratified halite, anhydrite, gypsum, grey and red mudrock; dominantly residual collapse breccia (cap rock) in near surface environment where these complexly–deformed diapiric rocks outcrop and are/were subject to dissolution by groundwater or formation water.
Thickness = 300–500 m+ ?

Basal Anhydrite (informal) (ECW–ba):
anhydrite with thin interstratified carbonate and mudstone; unit is inferred to be present (seismic data) but has not been confirmed in the map area.
Thickness = 100–200 m ?

MACUMBER FORMATION (ECW–M):
limestone to dolostone, laminated, sparsely fossiliferous, variably organic–rich in basinal settings; unit is inferred to be present but has not been confirmed in the map area.
Thickness = 3–10 m ?
disconformity ?

HORTON GROUP (ECH = undivided):
sandstone, mudrock and conglomerate, red and grey; inferred to be present in the subsurface.
Thickness = 1000 m ?
? unconformity – conformable ?

DEVONIAN–CARBONIFEROUS (D C = undivided):

Late Devonian? to Late Carboniferous (Namurian) conglomerate, pebbly sandstone, minor sandstone and mudrock; lower age limits uncertain; may include rocks previously mapped as Greville River and Rapid Brook formations, Fountain Lake Group, Falls Formation and Millsville conglomerate; outcrops primarily in the eastern and western ends of the Cobequid Highlands, inferred to be present in the subsurface.
Thickness = 0? – 1000 m ?
angular unconformity – nonconformity

COBEQUID HIGHLANDS ROCKS:
stratified: (MDF) undivided middle Devonian Fountain Lake Group, felsic to mafic volcanics, coarse to fine clastics. (See also DC)
(S) undivided Silurian metawacke and metamudstone.
(H) undivided metavolcanic rocks.
unstratified: Devonian to Carboniferous (D C), Hadrynian (H), granitoid rocks; granite (g), diorite (d).

SYMBOLS

Rock outcrop; siliciclastic, limestone–dolostone, gypsum, granitoid, volcanic
Bedding attitude; inclined (tops known), unknown, overturned, vertical, horizontal
Geological boundary, inferred–approximate
Unconformity, inferred–approximate
Coal seam; inferred, approximate–defined
Fault, inferred–approximate
Fold axis; inferred–approximate, anticline, syncline, overturned syncline
Paleocurrent indicator, trough axis–intersection; typically a mean of more than 5 measurements
Drillhole or borehole
Water well
Palynology sample
Fossil locality
Type–reference section locality
Mineral or energy resource locality; reference numbers (keyed to list on map), occurrence or prospect, mine or quarry (active), abandoned, locality reported but not verified, coal mine adit (see reference list)

Cu–copper, Pb–lead, Zn–zinc, Ag–silver, U–uranium, Fe–iron, Mn–manganese, C–coal, G–gypsum, K–potash, Ba–barite, Sr–celestite, L–limestone/dolostone, Na–rock salt, Au–gold, S–sulphur, R–rock or aggregate, B–building stone, P–petroleum (oil), NG–natural gas.

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Geology of the Springhill Coalfield compiled from Calder, NSDME OFM 90–006. Cobequid Highlands geology compiled and/or modified after Donohoe and Wallace (1982, NSDME MAPS 82–5, 7, 8 and 9) and unpublished GSC field maps by D. G. Kelly (1974). Coal mine locations in the vicinity of Stellarton to Styles Brook area after Copeland (1959, GSC Memoir 298, Figure 5). Mapping in the Tatamagouche Syncline area (NTS 11E/11 and 12) based upon Ryan (1985, GSC OFR 1257).

Cumberland Basin Project 1985–1988 field assistants: M. Black, J. Chisholm, V. Clifford, B. Cox, K. Deveau, T. Milburn and A. Stark.

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These final maps contain interpretations that supercede Preliminary Geological Field Maps of the Cumberland Basin (1:10 000 scale map sheets) previously released in 1988 as NSDME Open File Maps 88–39 to 88–42.

MAP NOTES

Planimetric base map derived from 1:50 000 scale, National Topographic System (NTS) maps, Surveys and Mapping Branch, Department of Energy, Mines and Resources, Canada. Universal Transverse Mercator Projection (UTM). Base maps compiled from aerial photography circa 1979 and culture update 1990. Thematic Cartography by Cartographic Services, Nova Scotia Department of Mines and Energy. Colour separation and printing by Land Registration and Information Service (LRIS), Amherst, Nova Scotia.

MAP 90–14
CUMBERLAND BASIN GEOLOGY MAP

TATAMAGOUCHE AND MALAGASH

CUMBERLAND, COLCHESTER AND PICTOU COUNTIES

R. J. RYAN AND R. C. BOEHNER

Scale 1:50 000

miles 1 0 1 2 3 miles
kilometres 1 0 1 2 3 4 5 kilometres

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY
Jack MacIsaac, Minister
John J. Laffin, D.ENG., FEIC, P.ENG., Deputy Minister
HALIFAX, NOVA SCOTIA
1990

Nova Scotia Department of Mines and Energy
Canada–Nova Scotia Mineral Development Agreement