MINERAL DEVELOPMENT DIVISION
DEPARTMENT OF MINES AND ENERGY
GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

LEGEND

QUATERNARY

25	Glacial outwash, sand and gravel in marine terraces

MESOZOIC (?)

24	Dark grey, brown weathering lamprophyre dykes

DEVONIAN

23	Pink to orange quartz-feldspar porphyry in dykes and plugs; green dacitic dykes
22	Fine- to medium-grained, grey diabase dykes and basaltic sills
21	BELLEORAM GRANITE: medium-grained grey to pink granite
20	GREAT BAY de l' EAU FORMATION: red to buff pebble to boulder conglomerate; minor green conglomerate, red shale, black shale, 20a, dark-grey, hornfelsed conglomerate

DEVONIAN OR EARLIER (?)

19	POOLS COVE FORMATION: 19a, red arkose, with thin pebble conglomerate beds; 19b, red pebble to boulder conglomerate; 19c, light buff arkose and pebble conglomerate; 19d, dark weathering, deep red to grey, pebble to boulder conglomerate
18	CINQ ISLES FORMATION: red micaceous sandstone, red and grey quartz-pebble conglomerate, red shale, red and grey micritic limestone
17	Fine-grained, pink, silicic dykes

ORDOVICIAN OR EARLIER (?)

SIMMONS BROOK BATHOLITH (13-16)

16	Coarse-grained, porphyritic, pink alaskitic granite
15	Medium- to coarse-grained, porphyritic, pink to red, hornblende-biotite granite
14	Medium-grained, equigranular, white to pink granodiorite
13	Fine- to medium-grained, dark grey diorite; includes some metavolcanics

UPPER CAMBRIAN

12	SALMONIER COVE FORMATION: black, rusty weathering shale, with thin beds of fine-grained, grey sandstone

MIDDLE CAMBRIAN

11	YOUNGS COVE FORMATION: dark grey to black shale, with thin beds and lenses of grey limestone; includes minor red and green shale and siltstone near the base

CAMBRIAN AND EARLIER (?)

10	BLUE PINION FORMATION: 10a, fine- to medium-grained, crossbedded, grey, brown-weathering, flaggy sandstone; 10b, medium- to coarse-grained, crossbedded, white sandstone and quartzite, with minor red and green shale and siltstone
9	CHAPEL ISLAND FORMATION: mainly grey micaceous siltstone, and fine-grained, thin bedded, grey, siliceous sandstone; includes minor red siltstone, pink quartzitic arkose, grey micaceous sandstone, shale-pebble conglomerate, rare grey limestone lenses

RENCONTRE FORMATION (5-8)

8	Red, micaceous siltstone with interbedded buff-weathering, pink, quartzitic arkose
7	7a, medium- to coarse-grained, crossbedded, pink, buff weathering, quartzitic arkose and pebble conglomerate; 7b, red pebble conglomerate; 7c, medium- to coarse-grained, crossbedded, pink, buff weathering, quartzitic arkose and conglomerate; minor red siltstone
6	Red and grey, thinly bedded siltstone and fine-grained sandstone, with interbedded coarse-grained, buff, crossbedded, quartzitic arkose; minor bright red shale and green argillite
5	Thin-bedded grey and black argillite; includes fine-grained, grey sandstone, black shale, rare grey limestone lenses

PRECAMBRIAN

LONG HARBOUR GROUP (3,4) (may be in part or entirely equivalent to Connaigre Bay Group)

4	Mainly mafic volcanic rocks: 4a, purple to grey, amygdaloidal, locally pillowed basalt, with interbedded agglomerate, and red and grey tuffaceous sandstone and conglomerate; 4b, purple and green, epidotized basalt, minor agglomerate and tuff; 4c, dark grey, mafic flows, silicic agglomerates and tuffs; includes minor silicic flows on Shag and Gull Rocks
3	Red and green silicic agglomerate, pink to purple, porphyritic rhyolite; minor grey shale and mafic flows

CONNAIGRE BAY GROUP (1,2)

2	Grey massive basalt, with interbedded purple and green agglomerate; minor silicic flows and tuffs
1	Thin-bedded, grey and black argillite; minor interbedded mafic flows, rare grey limestone lenses

SYMBOLS

Geological boundary (defined, approximate) ....

Bedding, tops known (inclined, vertical, overturned) ....

Beddings, tops unknown (inclined, vertical) ....

Fault (defined, approximate, assumed) ....

Fault (inclined, vertical) ....

Anticlinal axis (arrow indicates plunge) ....

Synclinal axis (arrow indicates plunge) ....

Fossil locality ....

Mineral Occurrence

Copper	Cu
Fluorite	fl
Lead	Pb
Limestone	ls
Zinc	Zn
Iron	Fe

Geology by B.A. Greene, 1974

This preliminary map may be subject to revision and correction.

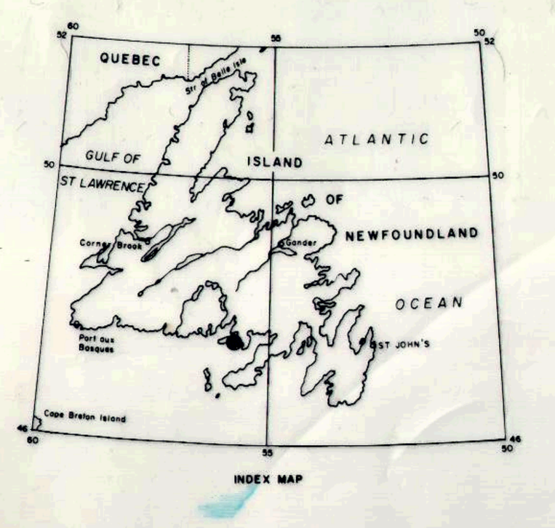
Geological cartography by the Mineral Development Division, Department of Mines and Energy, Province of Newfoundland and Labrador.

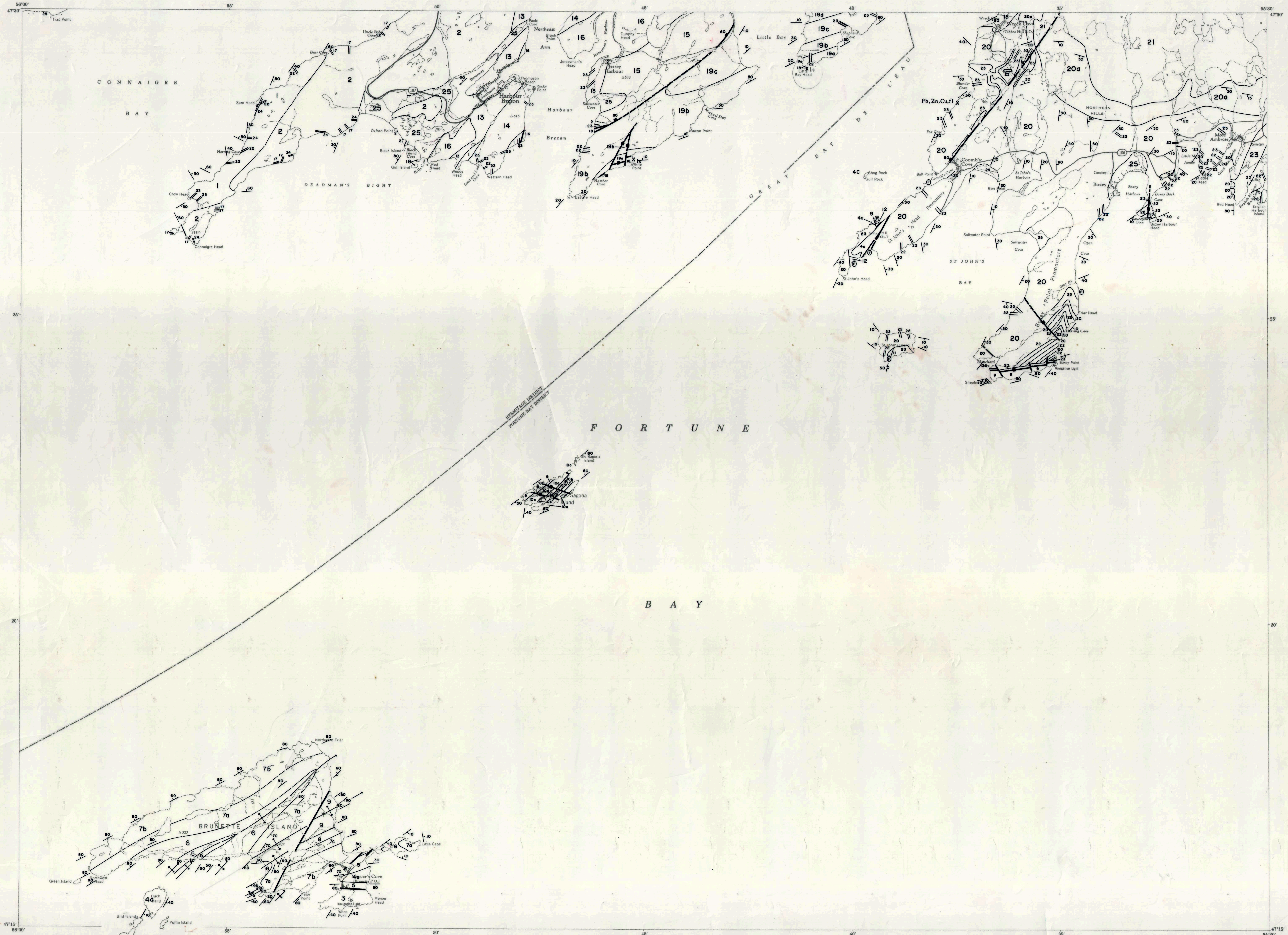
Copies of this map may be obtained from the Mineral Development Division, Department of Mines and Energy, St. John's, Newfoundland.

Base map at same scale published by the Surveys and Mapping Branch, Department of Energy, Mines & Resources, Ottawa, in 1970.

Approximate magnetic declination, 1969, 28° 17' west, decreasing 2.6' annually.

Elevations in feet above mean sea level.





HARBOUR BRETON

NEWFOUNDLAND

Scale 1:50,000 Échelle

DESCRIPTIVE NOTES

Geological investigations in the Harbour Breton area, prior to the present work, were carried out by Anderson[1], Berrange[2], Calcutt[3], Harrison[4], Taylor[5], and Widmer[6].

Physiographically, the area forms part of the Atlantic Upland of Newfoundland[7]. Three erosion levels are present. The High Valley level[7], at about 300 meters, is represented by peaks within the Belleoram Granite east of Wreck Cove. The Lawrence level is probably represented by 150 to 250 meter hills, cut in the Connaigre Bay volcanics, the Simmons Brook Batholith and the Belleoram Granite and its contact aureole[7]. A lower, unnamed erosion surface, generally below 100 meters, is present in the area underlain by the Pools Cove and Great Bay de l'Eau conglomerates. All erosion levels have been deeply dissected by glaciation. Cirques are present in the hills east of Wreck Cove. Glacial valleys extend inland from Mose Ambrose and Boxey Harbour, and are especially well developed near Harbour Breton (Northeast Arm, Southwest Arm, Barasway). Wave cut terraces are well developed at several elevations along the coast.

Basic volcanic rocks outcropping east of Connaigre Bay, referred to as the Connaigre Bay Group, are undated, but may be equivalent to the late Precambrian Long Harbour Group. The Connaigre Bay Group consists of a lower unit (1) of thinly bedded, grey and black, siliceous argillite, with rare grey limestone lenses and occasional mafic flows; and an upper unit (2) of mafic flows, tuffs, and agglomerates, with minor pink silicic flows and tuffs. The group is intruded by the Simmons Brook Batholith (of probable Ordovician age) on the east; north of the map area it is in fault contact with pre-Middle Ordovician gneisses to the west.

The oldest dated rocks in the map area are Precambrian volcanic rocks, referred to the Long Harbour Group. The group is best exposed on Brunette Island, where it consists of a lower unit (3) of silicic flows and agglomerates, with minor mafic flows, and an upper unit (4) of amygdaloidal, locally pillowed basalt, agglomerate and red, tuffaceous sandstones and conglomerate. Smaller occurrences of the group occur at St. Johns Head and on the Shag and Gull Rocks in Great Bay de l'Eau. Total exposed thickness of the group in Harbour Breton map area is estimated at 300 meters.

The volcanics of the Long Harbour Group are overlain by a thick succession of sedimentary rocks, the upper units of which contain Middle and Upper Cambrian fossils. The Rencontre Formation, at the base of the sedimentary succession, consists of thinly bedded, grey and black argillite (5), red and grey argillite (6), coarse-grained, crossbedded, pink, quartzitic arkose (7a), red pebble conglomerate (7b), and coarse-grained, crossbedded, pink, quartzitic arkose with interbedded, red, micaceous argillite (7c). Total thickness of the formation on Brunette Island is estimated at 1800 meters. The Chapel Island Formation (9) conformably overlies the Rencontre Formation. It consists of grey, green-weathering, micaceous, ripple-marked argillite and shale, with thinly bedded, fine-grained, grey, siliceous sandstone prominent at some horizons; red argillite and crossbedded pink quartzitic arkose occurs near the base of the formation, and red and green argillite occur locally in the upper part; rare grey limestone lenses are present in the unit on Brunette Island. About 300 meters of the formation are exposed on Brunette; upper beds of the formation are present on Sagona Island, Boxey Point and on the shore of St. Johns Promontory north of the Tolt.

The Blue Pinion Formation conformably overlies the Chapel Island Formation on Sagona Island and Boxey Point; upper beds of the formation also outcrop on St. Johns Island. The Blue Pinion Formation consists of fine-grained, crossbedded, grey, brown-weathering, flaggy sandstone (10a) overlain by medium- to coarse-grained, crossbedded, white quartzite and quartz-pebble conglomerate (10b). Some red, micaceous shales and argillites are interbedded with the quartzites of the upper unit. The formation is 250 meters thick on Sagona.

The Young's Cove Formation (11) disconformably overlies the Blue Pinion Formation on Sagona and St. Johns Islands. The Young's Cove Formation is represented by about 30 meters of black shales, with grey limestone nodules, on Sagona; some 60 meters of similar black shales with grey limestone nodules, underlain by a few feet of red and green shale and sandstone, make up the formation on St. Johns Island. The formation at both localities contains Middle Cambrian trilobites.

The Upper Cambrian Salmonier Cove Formation (12), of black pyritiferous shale and grey micaceous sandstone, occurs in three small outcrops near St. Johns Head; all the outcrops are bounded by faults or igneous intrusions. The northern outcrop on the eastern side of the Head contains an *Agnostus pisiformis* fauna[6]; the outcrop on the western side of the Head contains *Olenus*[6]. Less than 30 meters of strata are present at each of these localities. The southern outcrop on the eastern side of St. Johns Head consists of grey micaceous argillite, containing inarticulate brachiopods. The argillites are intruded by quartz-feldspar porphyry, and are overlain with angular unconformity by the Devonian Great Bay de l'Eau conglomerate. They are assigned to the Salmonier Cove Formation on the basis of lithological similarity to argillites at the type locality of the unit, north of the map area.

The Simmons Brook Batholith consists of fine- to medium-grained diorite (13), medium-grained, white to light pink, hornblende-biotite granodiorite (14), pink to red, porphyritic, hornblende-biotite granite (15) and pink, porphyritic leucogranite (16). Diorite and pink leucogranite phases of the batholith intrude the Connaigre Bay Group. The batholith is unconformably overlain by the Devonian (?) Cinq Isles and Pools Cove Formations north of the map area.[8].

The Cinq Isles Formation (18) overlies the Salmonier Cove Formation with angular unconformity just north of the map area.[3,6]; it unconformably overlies the Simmons Brook Batholith in Belleoram map area[8]. The formation consists of red micaceous sandstone, quartz-pebble conglomerate, and red and grey micritic limestone. The Cinq Isles Formation is unfossiliferous and its age is uncertain; sedimentological evidence[3] suggests it is Devonian. The formation is approximately 360 meters thick north of Wreck Cove, where a complete section is exposed.

The Cinq Isles Formation is disconformably overlain by predominantly conglomeratic units on both sides of Great Bay de l'Eau. The conglomerates on the west side of the bay, formerly assigned to the Great Bay de l'Eau Formation[6], are here reassigned to the Pools Cove Formation, since they display a stratigraphic succession similar to that unit in its type locality, as pointed out by Williams[8]. The typical Pools Cove succession (coarse red conglomerate, followed by arkosic sandstone and conglomerate, with buff, boulder conglomerate at the top) is underlain on the west side of Great Bay de l'Eau by a thin red arkose unit, which is assumed to mark the base of the formation in Harbour Breton map area. The Pools Cove Formation contains abundant fragments of Ackley Granite, and is cut by what appears to be a late intrusive phase of the same batholith, north of the map area[6]. The Ackley Batholith is generally considered to be Devonian, and a Devonian age is therefore suggested for the Pools Cove Formation. Total thickness of the formation within the map area is estimated at 800 meters.

The Great Bay de l'Eau Formation (20), which disconformably overlies the Cinq Isles Formation on the east side of Great Bay de l'Eau, consists of red to buff, pebble to boulder conglomerate, with minor green conglomerate, red shale and black shale. Late Devonian plant fossils (*Protolepidodendron* sp. and *Eospermatopteris* sp.) occur in black shales of the Great Bay de l'Eau Formation at the eastern entrance to Coombs Cove[6]; plant fossils are also present in red shales near the mouth of Otter Brook on Boxey Point. The thickness of the formation exposed within Harbour Breton map area is estimated at 900 meters.

The Great Bay de l'Eau Formation is intruded and metamorphosed by the Belleoram stock (21), a medium-grained, equigranular, gray to pink granite. The Belleoram granite has been dated isotopically at 400[9] and 342[10] million years; since the granite intrudes the late Devonian Great Bay de l'Eau Formation, a late Devonian or early Carboniferous age is most probable.

A variety of minor intrusives occur within the map area. Fine-grained, pink, silicic dykes (17) are confined to the outcrop area of the Connaigre Bay Group, and may represent feeders to silicic volcanics higher in the Connaigre Bay sequence. Mafic dykes and sills (22) occur throughout the area, but are especially prominent in the Great Bay de l'Eau Formation. Four basaltic sills, ranging in thickness from 50 to 200 feet, occur on Boxey Point, and part of the same sequence outcrops at Boxey Harbour Head. Dykes and plugs of pink to orange quartz-feldspar porphyry (23) are common in the Devonian conglomerates. The dykes are from 5 to 50 feet wide; many have green dacitic marginal zones. Several brownish-weathering lamprophyre dykes (24), 3 to 10 feet wide, occur on the Connaigre Head Peninsula; similar rocks elsewhere in Newfoundland have yielded Mesozoic isotopic ages[9,10].

Northeast striking reverse faults, which dip steeply to the northwest, are the most prominent structural feature of Harbour Breton map area. The most important of these are the White Horse fault, which forms the southeastern boundary of the Simmons Brook Batholith, and the Coombs Cove fault, which has brought volcanics of the Long Harbour Group into contact with Great Bay de l'Eau conglomerates at St. Johns Head. Several smaller northeast-trending, northwest-dipping reverse faults, associated with the Coombs Cove fault, are responsible for the outcrops of Chapel Island and Salmonier Cove Formations on St. Johns Head. The Coombs Cove fault itself is marked by a zone of quartz-feldspar porphyry instrusions.

Another fault set, striking approximately at right angles to the reverse faults described above, is made up of steeply dipping or vertical normal faults of small displacement; the faults on Boxey Point and Sagona Island belong to this set. A third set trends approximately east-west and consists of steeply dipping to vertical faults along which the south side has moved upward relative to the north side; this group includes the fault cutting across the tip of Boxey Point, and the one at Mercer Head on Brunette Island.

The area northwest of the White Horse fault forms part of a major, northeast-plunging, open, upright syncline, with an axis running through the Connaigre Head – Deadmans Bight area; the southeastern limb of this syncline has been intruded by units of the Simmons Brook Batholith. The rocks on Brunette Island are folded into northeast plunging open folds, which are locally overturned toward the southeast. The Cinq Isles, Pools Cove and Great Bay de l'Eau Formations are little deformed, exhibiting only very gentle folding.

Thin calcite veins cutting the Great Bay de l'Eau conglomerate near Blunder Cove carry small amounts of galena, fluorite, sphalerite and chalcopyrite. Galena has also been reported in calcite veins near Open Cove, south of Boxey[6], but close examination during the present work failed to locate any mineralization. Limestone possibly suitable for agricultural use occurs in the Cinq Isles Formation at Wreck Cove, Little Bay Head, and White Point.

REFERENCES

1 Anderson, F.D. (1965): Belleoram, Newfoundland; Geol. Surv. Can., map 8-1965.

2 Berrange, J.P. (1955): Salmonier Cove Pond area; unpub. rept., Nfld and Lab. Corp., St. John's.

3 Calcutt, M. (1973): The stratigraphy and sedimentology of the Cinq Isles Formation, Fortune Bay, Newfoundland; unpub. M.Sc. thesis, Memorial University, St. John's.

4 Harrison, W.D. (1953): Fortune Bay map-area; unpub. rept., Nfld. and Lab. Corp., St. John's.

5 Taylor, T.H. (1940): Geology and lithology of the Smiths Hole conglomerate, Fortune Bay, Newfoundland; unpub. B.Sc. thesis, Princeton Univ.

6 Widmer, K. (1950): The geology of the Hermitage Bay area, Newfoundland; unpub. PhD. thesis, Princeton Univ.

7 Twenhofel, W.H. and Paul MacClintock (1940): Surface of Newfoundland; Bull. Geol. Soc. Am., vol. 51, pp. 1665-1728.

8 Williams, H. (1971): Geology of Belleoram map-area, Newfoundland; Geol. Surv. Can., Paper 70-65.

9 Wanless, R.K., R.D. Stevens, G.R. Lachance and R.Y.H. Rimsaite (1965): Age determinations and geological studies; Geol. Surv. Can., Paper 65-17 (Part 1).

10 Wanless, R.K., R.D. Stevens, G.R. Lachance and C.M. Edmonds (1967): Age determinations and geological studies; Geol. Surv. Can., Paper 66-17.