CANADA

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LEGEND

PALAEOZOIC

CARBONIFEROUS

CUMBERLAND SERIES

PENNSYLVANIAN

- 6d — *Sandstone, shale*
- 6c — *Conglomerate, sandstone, shale, coal*
- 6b — *Conglomerate, some sandstone*
- 6a — *Shale, sandstone, calcareous bituminous shale, coal*

BOSS POINT FORMATION: *sandstone, lenticular beds of calcareous conglomerate, shale*

- 5

PENNSYLVANIAN (?)

CLAREMONT FORMATION: *red arkose and conglomerate*

- 4

MISSISSIPPIAN

WINDSOR SERIES: *limestone, shale, gypsum*

- 3

SILURIAN AND, OR DEVONIAN

- 2 — *Intrusives ranging from granite to diorite*

SILURIAN

- 1 — *Sedimentary and volcanic rocks*

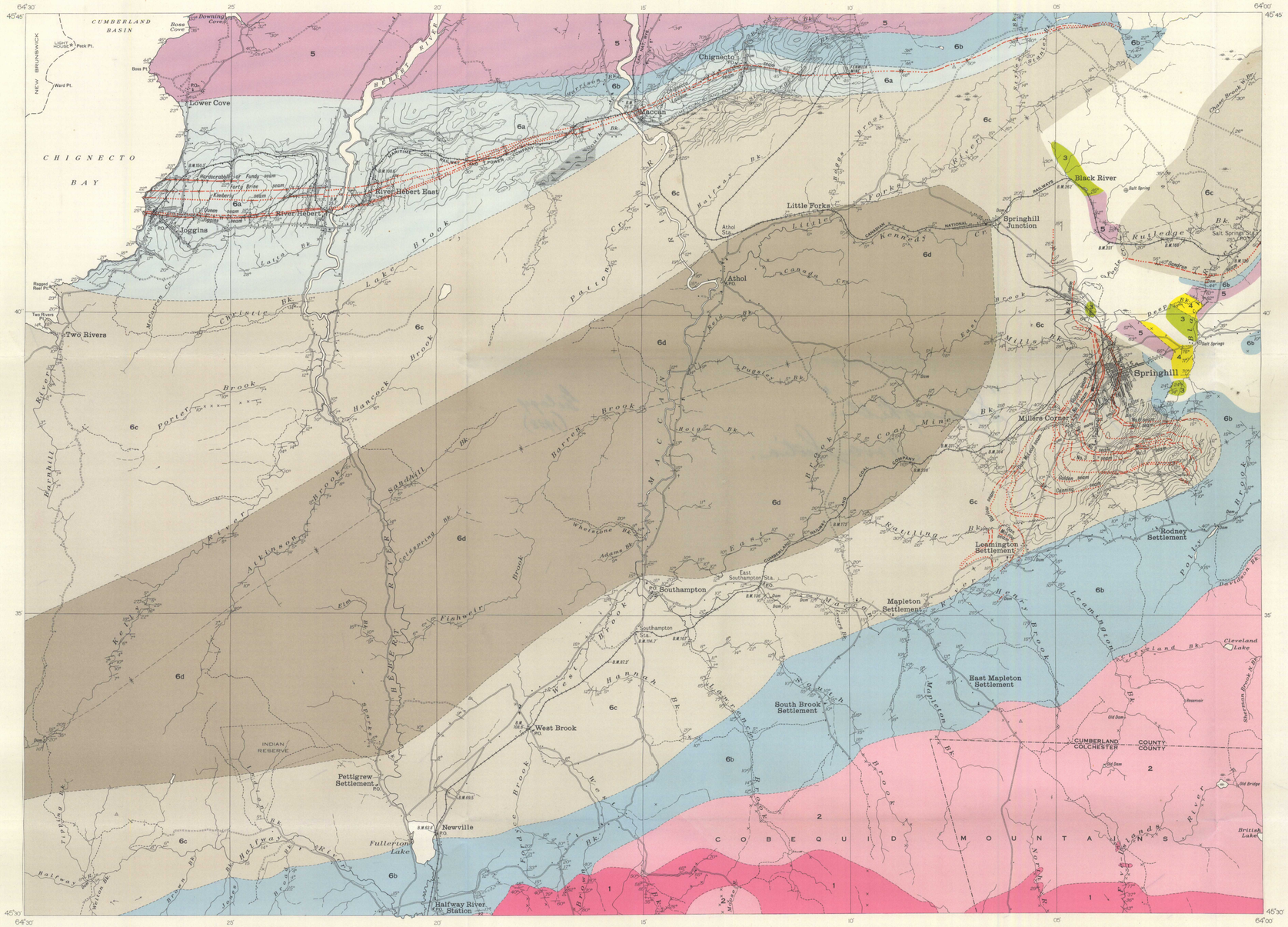
Geological boundary (approximate)
Bedding (inclined, vertical, horizontal, overturned)
Rock outcrop (attitude not determined)
Coal seam (defined, approximate, assumed)
Anticlinal axis (approximate)
Synclinal axis (approximate)
Fault (defined, approximate, assumed)
Coal slope
Quarry

Road and buildings
Road not well travelled
Trail or logging road
Railway, Mine tramway
Power transmission line
Church
School
Post office
Cemetery
Abandoned camp-site
Triangulation station
Bench-mark ←B.M. 214
County boundary
Intermittent stream
Dyke
Marsh
Salt marsh
Contours (interval 25 feet)
Depression contour

SOURCES OF INFORMATION

Surveyed in 1926 and 1927 by the Geological Survey and reproduced by the Bureau of Geology and Topography. Geology by F.A. Kerr, 1924; I.W. Jones, 1928, and W.A. Bell, 1935.

Approximate magnetic declination, 23° West



MAP 337A

SPRINGHILL SHEET

CUMBERLAND AND COLCHESTER COUNTIES

NOVA SCOTIA

Scale, 1/63,360 or 1 Inch to 1 Mile

Miles ½ 0 1 2 3

Kilometres 1 0 1 2 3 4 5

Elevations referred to Mean sea-level

GENERAL GEOLOGY

The eastern half of the area is covered with a mantle of glacial drift, generally less than 25 feet thick. In a large part of the western half of the area bedrock is covered only with a thin mantle of loose rocks and slightly transported rock debris. Rock outcrops throughout the area are confined practically to certain stream banks and channels.

The wooded, southern upland is underlain by pre-Carboniferous sedimentary and volcanic rocks (1) and intrusive bodies of various kinds (2). On West and Brown brooks, fossiliferous fine clastics, some of them calcareous, of Silurian age occur. In places these seem to be interbedded with banded tuffs, breccias and massive volcanics. These rocks for the most part are metamorphosed. The intrusives are mostly later than the sediments and all are older than the Carboniferous Claremont formation. They range from a light coloured, coarse-grained granitic type, made up largely of orthoclase and quartz, to a dark green dioritic rock consisting mainly of grey feldspar and ferromagnesian minerals. The basic phases contain considerable chlorite as an alteration product.

The area inferred to be underlain by Windsor rocks (3) is heavily drift-covered, and is characterized in places by swamps and sinkholes. Sparingly fossiliferous limestone, occurring at two localities, and calcareous fossiliferous shale on Black river directly east of Springhill, indicate a Windsor age. The presence of gypsum is attested by various sinks and the probable presence of salt beds by several brine springs.

The stratigraphic relations of the Claremont formation (4) suggest that it is a basal member of the Boss Point formation (5). On Deep brook the formation seemingly dips south whereas the Boss Point beds dip north and in places are overturned to the south. It is inferred that the Claremont beds of this locality are likewise overturned and lie in the northern limb of an overturned anticline. The arkosic conglomerate of the Claremont formation, though generally more friable, is practically indistinguishable from some parts of the basal Cumberland series. The formation, which comprises ill-assorted arkosic debris from Cobequid rocks, is at least 1000 feet thick.

The Boss Point formation (5) along the shore of Cumberland basin is about 3850 feet thick. There and eastwards to Styles brook, the contact with the Cumberland series is a disconformable one. On Black river, 2¼ miles northeast of Springhill, the contact with the same series is a marked angular unconformity and the total thickness of the Boss Point there is probably not more than 1300 feet. In general the sandstones of the Boss Point are rarely arkosic and they contain much more quartz sand than those of the Cumberland series. Lenticular beds of concretionary-limestone conglomerate are more characteristic of this formation than of others within the district. The flora of the Boss Point formation indicates an upper Lower Pottsville age.

The Cumberland series (6a-6d), 7000 to 11000 feet thick, is so variable in lithological character along individual horizons that subdivisions may be made only on an arbitrary basis. The divisions mapped are based on the presence or absence of appreciable quantities of conglomerate and their boundaries in places cut across chronological horizons. Division 6a, sometimes called the Joggins formation, is dominantly grey and green sandstone and shale, and includes workable coal seams. Division 6b is dominantly conglomerate and arkose and is of the same age as part of Division 6a. Division 6c is very variable in composition; it consists of conglomerate, sandstone and shale and carries workable coal seams in the Springhill district. In the eastern half of the map-area, a lower part of Division 6c is of the same age as the upper part of Division 6a (Joggins formation). That part of Division 6c that outcrops along the shore of Chignecto bay conformably overlies the Joggins formation and has been called the Shulie formation. Division 6d is practically free of conglomerate. It consists of chocolate-red shales and sandstones that are prevailingly chocolate-red in the eastern half of the map-area though largely grey in the western half.

Subdivisions of the Cumberland series on faunal and floral grounds has up to the present proved fruitless. The flora as a whole indicates an upper Pottsville (lower Yorkian) age. The series is entirely freshwater in origin and represents river alluvium deposited in a progressively sinking trough of deposition, presumably of elliptical form. The conglomerates were derived mainly from Cobequid rocks and were contributed by short streams that drained the Cobequid upland of the time and possibly also by streams draining an upland made up of Boss Point and earlier Carboniferous rocks that existed east of the map-area. An overlap of the series took place towards these uplands so that the conglomerates (6b) that flank the present Cobequid upland and those in the vicinity of Springhill represent horizons well up in the series whilst older strata of the series that are present in the Joggins area are absent. Coals are restricted to that part of the series in which there is a maximum of grey, fine clastics. These parts were deposited seemingly in secondary, local, elliptical, east-west trending shallow basins or downwarps within the main basin. One of them was located in the Joggins area, another in the Springhill area. In the former, fluvio-lacustrine limestone and dark shell-bearing strata occur in addition to coal at many horizons. In the Springhill area the coal-producing swamps were apparently better drained and the grey sediments are dominantly fine, siliceous silts and other clastics. The two sub-basins were not strictly contemporaneous, for the coals of the Springhill district lie somewhat higher in the series than those of the Joggins district. On the borders of the sub-basins the coals peter out into barren sediments in which sandstones and coarser clastics prevail and where the shales are prevailingly red.

STRUCTURAL GEOLOGY

The Silurian sediments are closely folded, locally sheared and locally altered by igneous intrusions. The general strike of the sediments is east. The major structure of the Pennsylvanian strata throughout the greater part of the area is a syncline, the axis of which trends about north 60 degrees to 75 degrees east. This syncline is a closed structure, plunging gently northeastward in the western half of the area and somewhat more steeply southwestward from the vicinity of Springhill Junction. The centre of the structure lies approximately along Pugsley brook, 2 miles southeast of Athol. There are local minor folds in both limbs of the major syncline. Dips in the northern limb reach a maximum of 75 degrees near Maccan. In most of the southern limb the dips are less than 20 degrees. The eastern border of this syncline has a complex structure that is partly due to faulting and partly to folding. The structural pattern may owe some of its complexity to the fact that soft plastic beds of the Windsor series were affected. The major fold structures of this border area are two synclines and an intervening anticline, all of which are termini of major structures present in the Oxford area to the east. The northerly syncline, lying in the Salt Springs district, plunges gently about north 75 degrees east and is continued east of the map-area to Oxford. The southerly syncline is fault-broken to some extent. It plunges about south 60 degrees west from Poly brook. East of the map-area a low arch in this syncline reverses the plunge. The main anticline which plunges about south 50 degrees west from Springhill is the western terminus of an anticline that lies south of Oxford. It is separated from the main body of the anticline, however, by a faulted and folded portion. Lack of sufficient outcrops precludes the unravelling of details of this intervening area. However, the distribution of Windsor, Claremont and Boss Point strata and local southerly overturning of the latter indicates a local anticlinal structure with trend about north 60 degrees west, the northern limb of which is in places vertical, in other places overturned to the south.

ECONOMIC GEOLOGY

The Windsor strata include gypsum and possibly salt deposits. On account of a thick mantle of drift over the rocks and the strong folding to which they have been subjected conditions for prospecting are not favourable. Both the Boss Point formations and Cumberland series contain massive beds of sandstone, some of which are suitable for building stones and grindstones. Coal is the most valuable economic resource of the area. Workable coals are confined to the Cumberland series and in that series practically to two districts, one extending from Joggins to Styles brook, the other situated at Springhill and vicinity. The area between these two districts is unfavourable for prospecting, partly on account of depth of any potential coal but mainly because the coals peter out into barren rock. In the Joggins-River Hebert section of the northern district the workable coal seams lie from 3200 feet to 4300 feet above the base of the series. Farther east the lower strata of the series are overstepped by overlap and the coal east of Maccan river lies about 2100 feet above the base of the series. Correlation of the seams occurring at Joggins and River Hebert may be carried some two miles east of River Hebert. Farther east correlation is more doubtful. The Lawson seam is thought to represent the Joggins and the Chignecto seam may represent a union of the Forty Brine, Queen and Kimberly for there is apparently a decrease in stratigraphic intervals between these coal seams east of River Hebert. There are five workable seams in the Joggins group, viz., in ascending order, Fundy (2 feet 6 inches maximum), Forty Brine (3 feet maximum), Kimberly (3 feet maximum), Queen (3 feet maximum), Joggins (5 feet maximum). The Chignecto seam of uncertain correlation is the only workable seam of this group which persists east of Maccan river. It is locally 13 feet thick, inclusive of shale partings. In the Springhill district there are 25 coal seams each of which contains nearly two feet or more of coal. They occur in a zone, 1700 feet thick, that lies at least 1700 feet above the base of the series and that is somewhat younger than the zone of the Joggins group, the base of the Cumberland series at Springhill being considerably younger than the base of the same series at the Joggins. The main workable coals in ascending order are Number 6 seam (6 feet maximum), Number 7 seam (5 feet maximum), Number 2 seam (10 feet maximum), Number 1 seam (4 to 10 feet maximum), Number 3 seam (11 feet maximum). These coals deteriorate and finally pass into barren sediments both north and south of Springhill, the uppermost persisting farther southward in conformity with the progressive encroachment of the Cumberland series upon the Cobequid upland.

Beyond the limits of the coal-fields of Joggins and Springhill only one coal seam exceeding 2 feet is known. This seam, the Sandrun, occurs in the Salt Springs district. Locally it is 7 feet thick with shale partings, though it averages between 2 and 3 feet. About 50 feet above the coal is a horizon of ostracod shale and rare *Lesia* whilst 400 to 450 feet below the coal is a horizon of *Naiadites*. It is thought that this coal belongs to the Joggins group of coals, perhaps not far from the horizon of the Joggins seam, and that it is older than Number 6 seam of the Springhill field. The coal is variable and apparently deteriorates west of Black river whilst about a mile east of the map-area it is overlain unconformably by rocks younger than the Cumberland series. There is no evidence to favour prospecting for other workable seams in this district.

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