GEOLOGICAL SURVEY OF CANADA

DEPARTMENT OF MINES
AND TECHNICAL SURVEYS

MEMOIR 322

STRATIGRAPHY OF MIDDLE DEVONIAN AND OLDER PALAEOZOIC ROCKS OF THE GREAT SLAVE LAKE REGION, NORTHWEST TERRITORIES

A. W. Norris

Price, $3.25

1965

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PREFACE

Middle Devonian, Ordovician, and ?Older Palaeozoic rocks outcrop in a northwest-trending belt bordering the Precambrian Shield between 60 and 64 degrees north latitude. Great Slave Lake lies athwart the southern third of this belt and is part of the historical Mackenzie water route connecting the interior with the Arctic Ocean. Fossil collections by some of the early explorers travelling this route indicated the presence of Middle Devonian rocks in the Great Slave Lake area. Recognition of Ordovician rocks came with the work of G. S. Hume in 1920 on the North Arm of the lake. Outcrop sections and distribution of fossils presented in this report will provide a standard for comparison with the subsurface sequences to the southwest and elsewhere.

Economic interest in the area has always been keen because of the presence of oil-seeps in the vicinity of Sulphur Bay and Horncastle Point, and lead-zinc deposits immediately southwest of Pine Point, both occurring in Middle Devonian rocks.

J. M. HARRISON,
Director, Geological Survey of Canada

OTTAWA, September 5, 1962

Memoire 322—Stratigraphie des Mitteldevons und älteren Paläozoikums im Gebiet des Grossen Sklavensees im Nordwest-Territorium Kanadas. Von A. W. Norris

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Мемуар 322 — Стратиграфия среднедевонских и нижнепалеозойских пород в области озера Грэйт Слэйв (Большое Невольничье озеро), северозападных территорий Канады. Автор: А. В. Норрис

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Abstract

This report is based on work in 1957 by members of Operation Mackenzie in the Interior Plains around Great Slave Lake.

Ordovician and ?Older Palaeozoic rocks outcrop in a narrow belt along the North Arm of the lake along the border of the Precambrian Shield. In the north the succession consists of four units named in ascending sequence the Old Fort Island Formation, La Martre Falls Formation with Mazenod Member near base, and Chedabucto Lake Formation. Only the upper two rock units are fossiliferous and are dated as Middle and Upper Ordovician. In the south a rock unit named the Mirage Point Formation occupies the combined interval of the upper three and in places the four units developed in the north.

Middle Devonian rocks unconformably overlie the Ordovician and outcrop in a belt immediately to the west. A basal evaporitic unit, the Chinchaga Formation, is present throughout the area. In the south it is overlain by a thin carbonate unit named the Little Buffalo Formation, succeeded by a thick evaporitic unit named the Nyarling Formation. Northward the Chinchaga is overlain by various facies of the Pine Point Formation, and by the Lonely Bay Formation succeeded by the Horn River Formation. The Presqu'ile dolomite, and its undolomitized equivalent named the Sulphur Point Formation, overlie the Pine Point Formation. The Slave Point Formation overlies the Nyarling, Presqu'ile, and Sulphur Point Formations. The youngest Middle Devonian unit named the Horn Plateau Formation outcrops at one locality in the northwest part of the region.

Résumé

Le présent rapport se fonde sur des travaux exécutés en 1957 par les membres de l'opération Mackenzie, dans les plaines intérieures, autour du Grand lac des Esclaves.

Des roches ordoviciennes et paléozoïques plus anciennes (?) affleurent dans une zone étroite le long du bras nord du lac, à la limite du Bouclier précambrien. Dans le Nord, la série se compose de quatre unités désignées comme il suit, par ordre ascendant: la formation Old Fort Island, la formation La Martre Falls avec le niveau Mazenod près de la base, et enfin la formation Chedabucto Lake. Seules les deux unités supérieures contiennent des fossiles et remontent à l'Ordovicien moyen et supérieur. Dans le sud, une unité rocheuse, désignée formation Mirage Point, occupe l'intervalle combiné des trois unités supérieures, et même, par endroits, des quatre unités du nord.

Des roches du Dévonien moyen recouvrent en discordance les roches ordoviciennes et affleurent dans une zone juste à l'ouest. A la base, une unité constituée d'évaporites, la formation Chinchaga, se trouve dans toute la région. Au Sud, cette unité est recouverte par une mince unité carbonatée, la formation Little Buffalo, qui est suivie d'une épaisse unité de roches formées d'évaporites à laquelle on a donné le nom de formation Nyarling. Vers le nord, la formation Chinchaga est sous-jacente à divers facies de la formation Pine Point et à la formation Lonely Bay, qui est suivie de la formation Horn River. La dolomie Presqu'île et son équivalent non dolomitisé, auquel on a donné le nom de formation Sulphur Point, recouvrent la formation Pine Point. La formation Slave Point recouvre les formations Nyarling, Presqu'île et Sulphur Point. L'unité la plus jeune du Dévonien moyen, appelée formation Horn Plateau, affleure en un endroit dans la partie nord-ouest de la région.

INTRODUCTION

Location and Accessibility

The northwest-trending belt of Middle Devonian and ?Older Palaeozoic rocks described in this report lies within 60° to 64° latitude and 112° to 120° longitude in the District of Mackenzie (*see* Fig. 1). In this area it forms the northeastern margin of the Interior Plains and is bounded on the northeast by the Precambrian Shield.

The main settlements are Hay River, Fort Providence, Rae, Yellowknife and Fort Resolution; Fort Smith lies just off the southeast corner of the region.

All these settlements except Rae have airfields. Another airstrip has been built 3 miles from Pine Point townsite. In addition to charter flights, there is daily air service between Yellowknife and Edmonton, 710 miles away, and weekly service between Yellowknife and Hay River.

The Mackenzie Highway extends 356 miles from Grimshaw, Alberta, on the Northern Alberta Railway, to Hay River. A gravel road suitable for year round traffic branches off the highway 27 miles south of Hay River and leads to a point 5 miles above Fort Providence. Fort Providence is connected with Rae and Yellowknife by a road completed in 1960. During the winter months heavy supplies are shipped in to Yellowknife over the winter tractor road from the railhead at Peace River Crossing. Winter tractor roads also connect Hay River settlement with Dawson Landing near Pine Point and Hay River with Fort Smith.

Before the advent of aircraft, Slave River, Great Slave Lake and Mackenzie River provided the main access into the area. During the summer season boat communication is still frequent between Rae, Yellowknife, Hay River and Fort Smith. Fort Smith is connected by a 16-mile road with Fitzgerald, which is on the west side of Slave River above a series of four rapids. No rapids of any consequence interrupt navigation from Fitzgerald to McMurray on the Athabasca River, the railhead of the Northern Alberta Railway which connects with Edmonton to the south.

The navigation season on Great Slave Lake lasts about 4 months. Freeze-up and break-up vary greatly in different parts of the lake and from year to year. Spring conditions generally commence in April, but it is not until the first week of June that areas of open water appear near the shores. The main body of the lake is usually clear of ice by late June. Ice begins to form along the northern shore about October 15 and navigation usually ceases about October 10. The lake is then completely ice-covered for about 5½ months.

Detailed information on break-up and freeze-up dates of rivers and lakes in the Great Slave Lake region is provided by the Meteorological Branch, Department

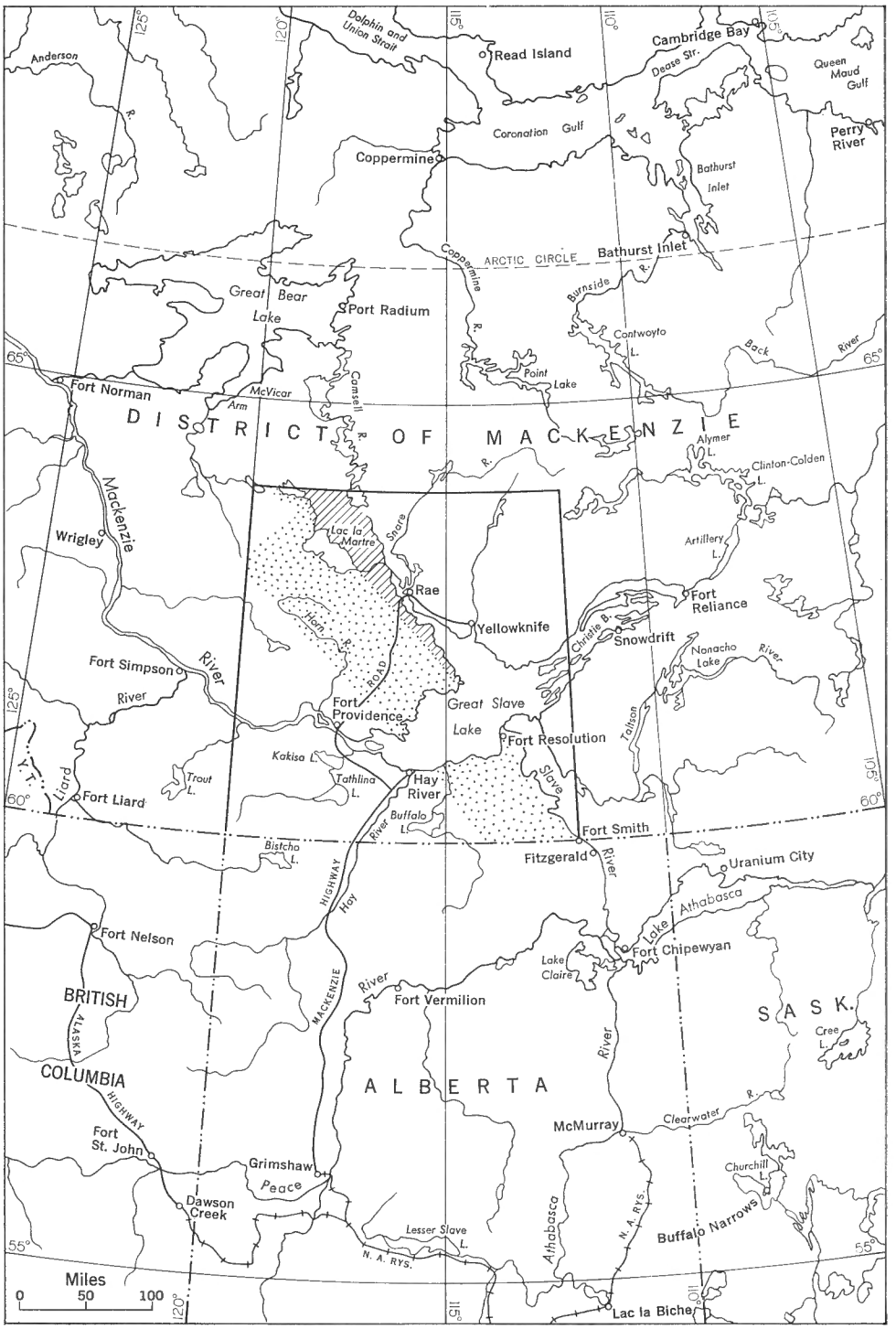

FIGURE 1. Index map showing outcrop belts of Ordovician and ?Older Palaeozoic rocks (ruled pattern) and Middle Devonian rocks (dotted pattern) in the Great Slave Lake region.

of Transport, Canada (1959). Further information can be obtained from the Great Slave Lake and Mackenzie River Pilot, issued by the Canadian Hydrographic Service (Cooper, 1958).

Present Work and Acknowledgments

This report deals mainly with the stratigraphy of Middle Devonian, Ordovician, and ?Older Palaeozoic rocks outcropping in the Great Slave Lake region. It is a compilation of work done by various officers of the Geological Survey of Canada on Operation Mackenzie during the field season of 1957. A detailed account of the logistics of this operation has been prepared by Douglas (1958, 1959a). Participating officers were: W. B. Brady, B. G. Craig, R. J. W. Douglas (chief of operation), P. Harker, D. J. McLaren, A. W. Norris, D. K. Norris, B. R. Pelletier, and D. F. Stott. They were assisted in the field by D. A. Andrews, F. J. A. Arthur, R. K. Broeder, K. P. R. Cole, W. N. Hamilton, I. M. Harris, R. N. McCowan, D. B. McKennitt, and J. B. Read. Crew of the helicopters, supplied by Associated Helicopters Ltd., were N. R. Staniland, R. Huff, J. Brochu, and R. Barnes; and crew of the Beaver aircraft, supplied by Pacific Western Airlines Ltd., were W. McKinney and J. Furber. Other members of the party included W. T. Spratt, radio operator; E. Greyson, and the late A. E. Martin, cooks. To all these men, the writer and other officers of the party are greatly indebted and extend their appreciation and thanks.

Ordovician fossils were identified and dated by G. W. Sinclair of the Geological Survey of Canada. Devonian fossils were examined by D. J. McLaren and the writer. Helen R. Belyea provided well log descriptions of many of the wells referred to in the report. Subsurface data provided by Consolidated Mining and Smelting Company Ltd., and The American Metal Company of Canada Ltd., covering the Pine Point area, and data from the Windy Point Mining Company on the Sulphur-Windy Bays area, are gratefully acknowledged. Most of the subsurface formation 'tops' used in this report can be found in Irwin (1955), Office of Oil Conservation Engineer (1959, 1960), and Thoms and Coad (1959, 1960). California Standard Company and Imperial Oil Company kindly provided maps showing locations of many of the outcrops in the Great Slave Lake region based on their own field work, as well as other helpful information.

Field observations by various officers are credited by letters appended to station locality numbers which are shown on Figure 2 and cross-referenced with described composite sections included in the Appendix of the report. The field letters of the officers who contributed data are as follows:

W. B. Brady	BI	A. W. Norris	NB
B. G. Craig	CD	D. K. Norris	NC
R. J. W. Douglas	DD	B. R. Pelletier	PI
D. J. McLaren	MD	D. F. Stott	FI

Sample numbers are indicated by the addition of a letter or number to the station number (e.g., 96NBa or 96NB1).

Most of the exposures are widely scattered and relatively thin. In an attempt to piece together these scattered segments of the stratigraphic sequence data on outcrops have been projected onto sixteen arbitrary equally spaced lines, numbered from 1 to 16 from north to south. The lines are more or less perpendicular to the general strike of Ordovician and Middle Devonian strata. North of Great Slave Lake outcrops were projected as columnar sections (vertical scale: 1 inch to 20 feet) southward to the nearest line of section; south of the lake they were projected northward. Covered intervals between widely separated exposures were calculated generally on the basis of a presumed southwest regional dip of 10 to 20 feet per mile. Rough vertical control for the measured sections was by aneroid; contour and elevation data were taken from available maps. Most available well data within the Great Slave Lake region were plotted on a scale of 1 inch to 50 feet for comparison and correlation with plotted outcrop sequences. Both the detailed outcrop columnar and subsurface sections are omitted from the present report because of the large amount of drafting they would entail for publication; they will, however, be available in Geological Survey open files.

The present report is primarily concerned with outcrop data and correlation with the subsurface is restricted to wells within or relatively near the outcrop belt. Southwest of an arbitrary northwest-trending line passing through the west end of Great Slave Lake, the Ordovician and particularly the Middle Devonian successions are atypical from those to the northeast and have been omitted in the present study.

For each of the more fossiliferous rock units, tables are presented listing the fossils, their relative abundance, sample, station, and line of section numbers. Samples in the tables are arranged in ascending sequence from left to right for each line of section. More precise placement of some of the fossils is indicated in selected composite sections in the Appendix of the report. The ranges of the Middle Devonian fossils are presented in Figure 6. Trivial names of many of the Middle Devonian fossils are indicated by letters of the alphabet until such time as they are more thoroughly studied. Representatives of each form have been set aside in Survey index collections as comparative material and the specific designation of each form is consistent throughout Survey reports.

Previous Geological Work

Most of the earlier explorers of the Great Slave Lake area referred to its geography and geology. Samuel Hearne crossed the eastern arm of the lake in 1772, Alexander Mackenzie traversed the west arm in 1789; and Franklin, Richardson, Back, and others spent some time in the vicinity of the lake. Probably the first geological map covering the Great Slave Lake area is that by Isbister (1855) showing Precambrian (Crystalline), Silurian, and Devonian rocks. From the geological notes of all the early arctic explorers passing through the Great Slave Lake region, G. M. Dawson (1887) compiled a geological map covering the northern portion of Canada east of the Rocky Mountains. McConnell (1891) and Cameron (1922a) have also made detailed summaries of the geological observations of many of the early investigators.

McConnell in the summer of 1886 traversed the south shore of Great Slave Lake from Fort Resolution to Mackenzie River, and the northwest shore as far north as the tar springs in the vicinity of Windy Point. During the following winter he made an overland trip from Fort Providence to Rae Point and noted Palaeozoic rocks exposed in that vicinity. His account (1891) of the geology of the area is the most complete up to that date.

Camsell (1903) in 1902 investigated the region southwest of Fort Smith in the angle between Slave and Peace Rivers. He described the geology along the lower part of Salt River, the outcrops in the escarpment west of Fort Smith, and the outcrops along Little Buffalo River where it cuts through the escarpment. In 1916 he investigated the gypsum deposits exposed on the lower part of Peace River, on Slave River, and on Salt River. In this report he briefly described (1917, p. 138) the Palaeozoic exposures at Bell Rock, 7 miles below Fort Smith, and at a locality immediately below Pointe Ennuyeuse, both on Slave River.

Camsell (1915, p. 56) also visited and reported on the lead-zinc deposit south of Pine Point in the course of his trip from Lake Athabasca to Great Slave Lake via Taltson River in 1914.

Cameron (1917) spent the summer of 1916 making a reconnaissance survey of the West Arm of Great Slave Lake. He made geological observations along the south shoreline between Fort Resolution and the mouth of Hay River, and side trips to the lead-zinc deposit south of Pine Point, and up Hay River to Alexandra Falls. From Hay River mouth he continued the traverse westward to the mouth of Mackenzie River, thence northward along the northwest shore of Great Slave Lake. A micrometer survey was made of the northwest shore from Windy Point to Hardisty Island. In 1917 he continued the exploratory and geological work started in 1916. He traversed Buffalo Lake and River and surveyed the north shore of Great Slave Lake from Mackenzie River eastward to Slave Point to connect with the survey made of the northwest shore in 1916. In his report (Cameron, 1918) he subdivided the Middle Devonian strata of the Great Slave Lake area into three formations named the Pine Point limestones, Presqu'ile dolomites, and Slave Point limestones. Older Palaeozoic rocks of the area were referred to the Upper Silurian and subdivided into the Fitzgerald dolomitic limestones, and Redrock arenaceous limestone. E. M. Kindle and E. J. Whittaker in 1917 made a collection of fossils from the area (Cameron, 1922a, p. 2). These fossils with others collected by Cameron in 1916 formed the basis of a compilation geological map of the area published along with Cameron's more detailed report (1922a), which is by far the most informative summary of the Palaeozoic geology of the Great Slave Lake region. In 1920, Cameron traversed the lower part of Little Buffalo River from Salt River portage to Great Slave Lake. He described the escarpment which borders the river for about 35 miles and along which exposures of Devonian carbonate rocks overlie gypsum. He noted a limestone outcrop at the mouth of "Log-jam Creek" about 40 miles above the mouth of Little Buffalo River containing fossils similar to those found in limestones around Fort Resolution.

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Hume (1921) in 1920 investigated the Palaeozoic rocks of the west shore of the North Arm of Great Slave Lake as far north as the west side of Marian Lake and assigned them to the Silurian. He also investigated the single outlier of Palaeozoic rocks at Rae Point on the east side of the North Arm which had been visited earlier by McConnell. After more detailed study of the fossils collected in 1920, Hume (1926) recognized the presence of both Ordovician and Silurian strata, and described and illustrated some of the Ordovician fossils. Foerste (1926) described and illustrated the cephalopod fauna collected by Hume in 1920 from the west shore of the North Arm of Great Slave Lake.

Whittaker (1922) in 1921 examined the country along Mackenzie River between Great Slave Lake and Simpson. He traversed Horn River for a distance of 125 miles and described outcrops of Middle Devonian strata above Fawn Lake which he named the Horn River shale, overlain by a limestone which he referred to the Pine Point Formation.

Kidd (1936) in 1934 made a reconnaissance geological survey of the canoe route between Rae at the north end of Great Slave Lake to the south end of Great Bear Lake. He indicated the contact between Precambrian and Palaeozoic rocks along the route traversed. Within the area covered by the present report he briefly described Palaeozoic rocks outcropping in the vicinity of Marian, Mazenod, Sarah, and Faber Lakes. On the basis of Hume's work (1921) to the south, Kidd dated these rocks as Silurian.

Officers of the Geological Survey of Canada published a preliminary map (41-2) in 1941 covering the area adjacent to the canoe route from Great Slave Lake to Great Bear Lake showing all geology from published and unpublished Survey sources. The map shows roughly the eastern boundary of Palaeozoic rocks between the North Arm of Great Slave Lake to the north end of Hottah Lake at about 65° latitude.

Lord (1939, 1942) in 1938 and 1939 mapped the Snare River map-area lying between latitudes 63° and 64° and longitudes 115° and 117°. According to Lord, the southwest corner of this map-area is underlain by nearly flat-lying dolomite, sandstone, conglomerate and arkose which he dated as Ordovician on the basis of fossils identified by Alice E. Wilson. He indicated the eastern border of Ordovician strata as a highly irregular line extending from the west side of Marian Lake to the southeast side of Mazenod Lake. He listed Ordovician fossils collected from sandy dolomite, and Upper Ordovician fossils collected from an overlying grey dolomite both from a locality south of Rivière la Martre about 11 miles from its mouth.

McGlynn (1957) in 1955 mapped the Tumi Lake area between latitudes 63°15′ and 63°30′, and longitudes 116°30′ and 117°00′ on a scale of one inch to one mile. Palaeozoic rocks underlie the western quarter of this map-area and where examined by McGlynn consist of sandy and finely crystalline buff dolomite. Locally he noted a few feet of conglomerate lying between the Precambrian rocks and the dolomites.

The lead-zinc deposits in the Presqu'ile Formation located about 10 miles south of Pine Point on the south side of Great Slave Lake have been examined and described by numerous workers including: R. Bell (1902, pp. 103-110), J. M.

Bell (1929a, pp. 122-139; 1930, pp. 219-224; 1931, pp. 611-624), Campbell (1950, 1957), Consolidated Mining and Smelting Company, Ltd. (1954), Telfer (1955), and others. The reports by Campbell are particularly important because they contain subsurface stratigraphic data pointing out facies changes within the Middle Devonian not previously recognized from surface data.

Brown (1950) indicated the Middle Devonian strata in the vicinity of Fort Resolution and the mouth of Little Buffalo River on a preliminary map of the Fort Resolution area based on work by Camsell in 1914 and by Cameron in 1916. For the geological map of the District of Mackenzie (Map 1055A) on a scale of one inch to 20 miles, Brown compiled all geological data up to 1957 pertaining to the Great Slave Lake area from published and unpublished maps and reports of the Geological Survey of Canada.

Meek (1867) described and illustrated a number of Middle Devonian fossils collected by Mr. Kennicott from dark bituminous limestone outcropping on the south shore of Great Slave Lake. Kindle (1916, p. 248) identified fossils collected by Camsell (1915, p. 56) from the same general locality, and dated them as Middle Devonian. Kindle (1921, p. 21) reported the discovery in 1917 of *Stringocephalus burtini* in magnesian limestone of the "Presqu'ile Formation" outcropping on the south shore of Great Slave Lake providing a more precise means of long range correlation with part of the Middle Devonian successions of Manitoba and the lower Mackenzie Basin. Parks (1936, pp. 57-67, pl. X, figs. 1-2) erected a new genus and species of stromatoporoid, *Trupestroma warreni,* on material collected by Cameron in 1920 from the "Presqu'ile dolomite" of the Great Slave Lake area. Until Galloway's recent work (1960) *Devonian Stromatoporoids from the lower Mackenzie Valley of Canada,* the above species was the only stromatoporoid described from this vast area. Warren and Stelck (1956) illustrated a typical assemblage of fossils from the Pine Point Formation and also a few from the Presqu'ile Formation of the Great Slave Lake region. Koch (1959) described and illustrated charophyta and brachiopods from the Slave Point Formation outcropping on the northwest shore of Great Slave Lake.

In 1950, deWit, then an officer of the Geological Survey of Canada, made fossil collections from strata in the vicinity of Pine Point and examined some of the drill core from the Cominco Concession located a short distance south of the lake.

Preliminary maps and reports of Operation Mackenzie covering the area treated in this report have been prepared by Douglas (1959b) and Douglas and Norris (1960). A preliminary account of the surficial geology of the southern part of the area has been prepared by Craig (*in* Douglas, 1959b).

Physical Features

The Great Slave Lake region embraces part of the Precambrian Shield in the northeast and part of the Interior Plains in the southwest. Great Slave Lake, the fifth largest lake on the North American continent, lies in the southeastern third of the area straddling the two physiographic divisions. The contact between the two physiographic provinces is a northwest-trending sinuous line marked roughly by the Slave River valley in the south, and the North Arm of Great Slave

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Lake, Marian River, Hislop, Sarah, and Faber Lakes in the north. The East Arm of the lake, lying wholly within the area of Precambrian rocks, is in sharp contrast with the West Arm which is underlain by Palaeozoic and later rocks. Except for one small outlier of Palaeozoic rocks at Rae Point, all of the east shore of the North Arm is underlain by Precambrian rocks. In contrast, a number of Precambrian inliers of various sizes are present along the west shore of the North Arm.

Slave River is the largest stream entering Great Slave Lake, forming a large delta half-way along the south shore. Other principal streams entering the West Arm from the south include Little Buffalo, Buffalo, and Hay Rivers.

Mackenzie River, dwarfing all others in size, issues from the west end of the West Arm of the lake and flows westward. The principal streams entering the Mackenzie River from the south are Kakisa River, which drains Kakisa and Tathlina Lakes, Bouvier, Redknife, and Trout Rivers. Horn River drains the northeast and east slopes of Horn Plateau and is the principal stream entering the Mackenzie River from the north.

A chain of lakes and rivers comprising Lac Grandin, Rivière Grandin, Lac la Martre, Rivière la Martre, and tributary streams, drains the north and east slopes of Cartridge Mountain. Rivière la Martre joins Marian River about 16 miles north of the north end of Marian Lake. This chain of lakes and rivers is part of a canoe route frequented by Indians travelling between the North Arm of Great Slave Lake and McVicar Arm of Great Bear Lake. Another chain of lakes and rivers east of the former, separates the Interior Plains on the west and the Canadian Shield on the east. This chain comprises Sarah Lake, Camsell River and Faber Lake which drain northward; and Mazenod, Squirrel, Hislop, Rabbit and Tumi Lakes, Marian River, Shoti Lake and tributary streams which drain southward. This chain is part of a canoe route connecting the North Arm of Great Slave Lake with McTavish Arm on Great Bear Lake.

The Caribou Plateau, Cameron Hills, Horn Plateau and Cartridge Mountain all lie within the Interior Plains region of the Great Slave Lake area. Only the northern edge of Caribou Plateau, drained by the headwaters of Buffalo River, extends into the Great Slave Lake area, where it has a maximum elevation of 1,050 feet. The northern part of Cameron Hills lies between Tathlina Lake and Hay River, rising to an elevation of 2,679 feet. Horn Plateau, best described by Whittaker (1922), is in the midwestern part of the area, with its long axis oriented nearly east-west. It rises to a maximum elevation of 2,820 feet. Its northern slope is drained by tributaries of Horn River, and its western slope by tributaries of Rabbitskin and Laferté Rivers. Cartridge Mountain, in the northwest corner of the Great Slave Lake region, has a strong southeast grain imparted by glacial action. All these features are remnants of former land surfaces preserved as plateaux or high areas and underlain by Cretaceous rocks.

A prominent feature in the southwestern part of the Great Slave Lake region is a northward-facing limestone escarpment trending west-northwest and rising to well over 400 feet above the level of the Mackenzie River. The escarpment intersects Hay River, upper Kakisa River, lower Redknife and Trout Rivers.

Several less conspicuous topographical features have formed in the outcrop belt of Middle Devonian rocks. The most prominent of these in the south is an escarpment more or less parallel to and immediately west of Little Buffalo River. Falls and a gorge have been produced where the river crosses the escarpment west of Fort Smith. The northern part of the escarpment in this area has been well described by Cameron (1922a), and its southern extension in northern Alberta has been described by Camsell (1903) and Norris (1963). The escarpment is held up by a relatively thin unit of resistant carbonate rocks both underlain and overlain by less resistant evaporites. The erosion of the evaporites underlying the resistant carbonates and lying east of the escarpment has produced low flat plains bordering Slave River. Gently rolling uplands characterized by sink-holes and playa lakes have been developed on the upper evaporitic sequence west of the escarpment.

A similar but less conspicuous eastward-facing escarpment formed in Middle Devonian strata is present on the north side of Great Slave Lake. It can be traced northwestward from east of Lonely Bay more or less parallel to the North Arm of the lake to the south end of Lac la Martre. Here again, beds underlying the resistant carbonate beds and east of the escarpment are evaporitic; the overlying beds are presumed to be shales.

The most important feature formed in Ordovician strata is another eastward facing escarpment, east of the former, which can be traced from the vicinity of Redrock Point, on the west shore of the North Arm of the lake, north-northwestward to the west side of Faber Lake at the northern boundary of the area mapped. This feature has been described by Hume (1921) and referred to as a cuesta. The relief and height of this escarpment gradually increases northward. It is held up by a resistant dolomite unit, underlain by soft shaly and evaporitic strata, and overlain by evaporitic beds. La Martre Falls and gorge on Rivière la Martre have formed where the river intersects and flows over this escarpment.

STRATIGRAPHY

The succession of Ordovician and Middle Devonian rock units in the Great Slave Lake region is presented in the table of formations below. For further explanations of the exceedingly complex and in places abrupt facies changes, see also Figures 3 and 9. Figure 3 shows the nomenclature and in a general way the relationship of the various units, and Figure 9 (a geological map) shows their distribution.

Table of Formations

Era	Period or epoch	Formation or Member	Thickness (feet)	Lithology and distribution
Palaeozoic	Upper Devonian	Hay River	11 max. exposed	Richly fossiliferous argillaceous limestone with shaly partings; brown medium- to coarse-grained dolomite; and olive grey fine-grained limestone.
	Unconformity			
	Middle Devonian	Horn Plateau	*c.* 40 exposed	Richly fossiliferous, light to medium brown, coarse-grained clastic limestone; and finer-grained massive reefal limestone.
		?Unconformity		
		Slave Point	0—*?310	Brown fine-grained stromatoporoidal limestone; finely fragmental limestone with argillaceous and carbonaceous material; and grey or brown dense argillaceous limestone. Amco Shale marker present at base in Buffalo River area.
		Watt Mountain	0—*26	Green waxy in part pyritic shale, buff pyritic shale, dark brownish grey calcareous shale, greenish grey limestone; light greyish brown limestone, vuggy argillaceous limestone, and brecciated limestone. Present in subsurface of Deep Bay-Big Island area.

*Thickness in subsurface

Table of Formations—(Cont.)

Era	Period or epoch	Formation or Member		Thickness (feet)	Lithology and distribution
Palaeozoic	Middle Devonian	Sulphur Point		*c.* 170	Light brown, white weathering stromatoporoidal limestone; pale to dark brown argillaceous limestone; minor beds of light brown petroliferous and in part sandy limestone; minor medium to dark brown fine-grained dolomite.
		Presqu'ile		0— *260	Massive, coarse-grained, vuggy, in part petroliferous, recrystallized dolomite, probably reefoidal; tongues of bedded brown fine-grained dolomite in Sulphur Bay area.
		Nyarling		?420	Gypsum, minor limestone, probably some dolomite; poorly exposed in southern part of Great Slave Lake region.
		Pine Point Formation	Upper Limestone Member	215 ±	Pale brown to light grey limestone, dolomitic and nodular limestones, thinly interbedded with calcareous shale and mudstone showing ripple and fucoidal markings; and richly fossiliferous olive grey bioclastic limestone and shale in upper part.
			Horn River Tongue	?100 ±	Dark *Tentaculites*-bearing shale and argillaceous limestone. Not exposed but presumed to underlie northwest shore from west half of Lonely Bay to Moraine Point on the basis of talus at Northwest Point and well data to southwest.
			Lonely Bay Member	120 ±	Thickly bedded to massive medium brown limestone in upper part; and rubbly bedded pale brown limestone and argillaceous limestone in lower part.
			Fine-grained Dolomite Member	0— *460	Brown, fine-grained, granular, in part vuggy and petroliferous dolomite; sandy textured earthy dolomite; fine-grained dolomite; minor coarse-grained crinoidal dolomite.

*Thickness in subsurface

Table of Formations—(Cont.)

Era	Period or epoch	Formation or Member		Thickness (feet)	Lithology and distribution
Palaeozoic	Middle Devonian	Pine Point Formation	Brown Limestone Member	?150 max.	Medium to dark brown thinly bedded fine-grained fossiliferous limestone; dark brown platy in part petroliferous limestone; thinly bedded slightly argillaceous limestone; and minor medium brown, medium- to coarse-grained vuggy dolomite. Exposed on escarpments up to 1.7 miles southwest of Dawson Landing wharf.
			Buffalo River Member	0— *185	Bluish-grey to dark green fissile limy shale containing concretionary iron sulphide. Present in subsurface on south side of Great Slave Lake on north side of recrystallized belt.
			Bituminous Shale and Limestone Member	0— ?200	Medium to dark brown thinly bedded limestone, in part petroliferous and dolomitic; and dark brown fine-grained thinly bedded and nodular limestone interbedded with a dark brown to black bituminous shale; some beds richly fossiliferous. Partly exposed in general vicinity of Pine Point, Dawson Landing wharf, and on Green Islands.
			Limestone Member	0— 110±	Medium brown fine-grained to aphanitic limestone; interbedded limestone and brownish grey shale. Partly exposed in Fort Resolution area.
		Horn River		*c. 270	Dark grey non-calcareous shale, and fossiliferous medium grey limestone and nodular limestone exposed on Horn River; limestone and argillaceous limestone exposed on Clive River.
		Lonely Bay		125— ?280	Medium brown limestone, nodular and brecciated limestones, argillaceous limestone, and massive fetid limestone in upper part. Dark brown massive aphanitic limestone, slightly dolomitic limestone with bitumen partings, and pale brown slightly argillaceous limestone in lower part.

*Thickness in subsurface

Table of Formations—(Cont.)

Era	Period or epoch	Formation or Member	Thickness (feet)	Lithology and distribution
Palaeozoic	Middle Devonian	Little Buffalo	115 ±	Medium brown rubbly bedded argillaceous limestone with shale partings, gypsiferous dolomite, medium-grained dolomite, and crinoidal limestone; underlain by brown banded dolomite, and minor argillaceous limestone.
		Chinchaga	?300–?430	Gypsum, limestone, dolomite, limestone and dolomite breccia, salt, and minor green shale.
		Hay Camp Member	35 ±	Limestone, brecciated limestone, nodular limestone, shaly limestone, and brown shale; outcrops on Slave River.
	Unconformity			
	Upper to Middle Ordovician or Older	Mirage Point	*58–*595	Red beds of dolomite, dolomitic silty mudstone breccia, gypsiferous and sandy dolomite, shale, siltstone, gypsum, anhydrite, and salt; present in southern part of Great Slave Lake region.
	Upper Ordovician	Chedabucto Lake	0–?280	Thickly bedded to massive dolomite, red to brown in south and grey in north, containing some chert and silicified fossils; sandy and conglomeratic dolomite over Precambrian knobs.
	Middle Ordovician	La Martre Falls	90–225+ (south)	Green and dusky red shale; greenish grey quartzose sandstone; and dark brownish grey silty and sandy dolomite in the south.
			300–400 (north; exclusive of Mazenod)	Yellowish grey sandstone; red shale with salt crystal moulds; red sandy dolomite; and yellowish brown, shaly, silty and sandy dolomite in north.

*Thickness in subsurface

Table of Formations—(Conc.)

Era	Period or epoch	Formation or Member	Thickness (feet)	Lithology and distribution
Palaeozoic	Middle Ordovician or Older	Mazenod Member	0—70+	Argillaceous and silty dolomite; oolitic in part limy dolomite; basal sandy and conglomeratic dolomite and sandstone over Precambrian knobs. Developed in northern part of Great Slave Lake region, in lower part of La Martre Falls Formation.
		Old Fort Island	0—110 ± (south) 0—135 ± (north)	White friable quartzose sandstone, and minor greenish grey siltstone and green shale in south; whitish yellow medium-grained non-calcareous sandstone in north.

Ordovician and ?Older

Outcrops of Ordovician and/or older rocks are present in a narrow belt fringing the west shore of the North Arm of Great Slave Lake between Marian and Faber Lakes. The belt gradually widens northwestward to a maximum width of 35 miles near the northern boundary of the region. Four distinct lithologic units, named in ascending sequence the Old Fort Island Formation, La Martre Falls Formation and Mazenod Member, and Chedabucto Lake Formation, are recognized in the northern part of the belt. A fifth unit, more or less equivalent to the latter three and named the Mirage Point Formation, is developed in the southern part of the belt. None of these units outcrop within the Great Slave Lake region south of Great Slave Lake, although two of the formations, the Old Fort Island and Mirage Point, are present there in the subsurface. The Old Fort Island Formation is analogous to the La Loche Formation outcropping on Slave River immediately southeast of the map-area. Both are basal sandstones of the Palaeozoic succession immediately overlying Precambrian rocks, but differ in lithological character and may be of different ages. Representative total thicknesses of the Ordovician and/or older successions are: 307 feet in the Cominco Test G-4 well on the south side of Great Slave Lake, and 708 feet in the Northwest Windy Point No. 1 well on the northwest side of the lake.

The Ordovician and/or older formations are described below and their presumed relationships indicated by Figures 3 and 4.

Old Fort Island Formation

The oldest Palaeozoic rock unit outcropping in the area is a sandstone which unconformably overlies the Precambrian. It is overlain by red beds of the Mirage Point Formation south of Redrock Point, and to the north by beds of the La Martre

Falls Formation. The name Old Fort Island Formation is proposed for the sandstone after the island on which it is best exposed. Old Fort Island is located near Wrigley Point about mid-way up the west shore of the North Arm of Great Slave Lake. Beds of the Old Fort Island Formation outcrop also on the south side of Wrigley Point and on the eastern island of the Louise Islands just below lake level. A white weathering sand covering the beaches and relatively large areas inland where it has been carried by the wind from Whitebeach Point is presumably derived mainly from the disintegration of the sandstone. The northward extension of this formation along the edge of the Precambrian Shield is suggested by the presence of talus blocks of sandstone on the south shore of Shoti Lake, half-way along the south shore of Tumi Lake, and along an escarpment a few miles southwest of the southwest end of Mazenod Lake.

In the preliminary report and map covering the Great Slave Lake and Trout River map-areas, Douglas (1959b) included these beds in the lower part of map-unit 8. They were included in map-units 5 and 7 by Douglas and Norris (1960) in the preliminary report and map covering the Horn River map-area to the north.

In the type area the exposures of the Old Fort Island Formation consist mainly of thin- to thick-bedded, fine- to coarse-grained, varicoloured but mainly white, friable, quartzose sandstone; some thin beds of greenish grey and dusky red siltstone; and occasional laminae and partings of green shale.

The lowest beds exposed outcrop just south of the east end of the island and are coarsely cross-bedded. Overlying beds west of this point are thinly to medium-bedded varying from even to irregular. Most of the sandstone is porous, loosely

Old Fort Island Formation Surface Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	82PI	2	talus blocks	1 mile bearing 248T from southwest end of Mazenod Lake
	84PI	2	talus	Between 85PI and 82PI southwest of the southwest end of Mazenod Lake
	103NC	3	talus blocks	Middle of south shore of Tumi Lake
	381NB	5	talus blocks	4.6 miles bearing 298T from Fort Rae. May be Precambrian sandstone
	44DD	5	large talus blocks	South shore of Shoti Lake
	316NB	8	pavement	Eastern island of Louise Islands. Exposed 0.8 foot and more below lake level
1	328NB 327NB	8 8	13.5 28	Type section: Old Fort Island
2	326NB	8	6	South side of Wrigley Point

Old Fort Island Formation Subsurface Data

Name of well	Thickness (feet)	Locality and comments
Briggs Rabbit Lake No. 2	3	60°54′03″N, 118°46′47″W. Granite wash
Briggs Foetus Lake No. 1	1	60°55′N, 118°31′W. Granite wash
Northwest Territories Desmarais Lake No. 1	20	60°48′N, 116°48′W
Cominco Test G-4	15.1	60°54′N, 114°46′W
Northwest Windy Point No. 1	110	61°19′N, 115°52′W

consolidated, and distintegrates on weathering to a white sand in places stained a light orange. Iron staining is common in some beds, especially along bedding planes and laminae.

The section of the Old Fort Island Formation exposed on the south side of Wrigley Point (Section 2 in Appendix) is about 6 feet thick. It consists of white to pale brown, fine-grained, evenly thin-bedded quartzose sandstone, weathering white and pale orange. Olive green argillaceous sandstone beds are present in the middle third of the section.

On the southeast side of the eastern island of the Louise Islands group, sandstone outcrops as a pavement just below lake level. The sandstone is medium-grained, vaguely laminated white and light grey, evenly thin-bedded between 2 to 4 inches thick and weathers a light brownish grey and rusty brown.

Numerous loose blocks of light grey to white, coarse-grained sandstone and fine-grained grit were noted on the south shore of Shoti Lake. The blocks are loosely cemented, and show laminae and cross-bedding. Precambrian rocks outcrop nearby.

Pebbles of grey sandstone and igneous rocks were noted just under water along the south shore of Tumi Lake.

At the base of a prominent escarpment near the southwest end of Mazenod Lake one block of whitish yellow, medium-grained sandstone was noted. It was associated with Precambrian debris and was probably derived from a nearby source.

The nearest borehole penetrating this unit is the Northwest Windy Point No. 1 well some 75 miles south-southwest of Old Fort Island. In this well the Old Fort Island Formation consists of brownish red and red sandstone (110 feet thick) between depths of 1,640 and 1,750 feet (Cameron, 1922a, p. 16; Irwin, 1955, p. 25).

In the Cominco Test G-4 well, located near Sulphur Point on the south shore of Great Slave Lake, beds overlying the Precambrian between 1,326.8 and 1,341.9 feet deep are assigned to the Old Fort Island Formation. These beds, 15.1 feet thick, consist of light brown quartzose and feldspathic sandstone containing greenish

grey argillaceous laminae, overlain by light buff, green, and red quartzose siltstone. Within the siltstone are occasional thin layers of angular gritstone and interbeds of varicoloured argillaceous siltstone. The upper contact is transitional but is placed where the quartzose siltstone grades to a brick red silty mudstone.

In the Cominco Test G-1 well, located 13 miles east-southeast of the Cominco Test G-4 well, the top of the Precambrian is about 330 feet higher and the basal sandstone beds are missing. Other wells in which the Old Fort Island sandstone is absent or very thin are Northwest Territories No. 2, Desmarais Lake No. 1, and Briggs Foetus Lake No. 1.

The Old Fort Island Formation appears to be mainly preserved in Precambrian depressions and thins to the vanishing point where it abuts against Precambrian high areas.

Age and correlation

The age of the Old Fort Island Formation is not known as it appears to be unfossiliferous. However, it is limited above by the Mirage Point Formation and by the La Martre Falls Formation which contains Middle Ordovician fossils in its upper part, and below, by the Precambrian. The Old Fort Island Formation is therefore dated as Middle Ordovician or older.

This sandstone is analogous to but not necessarily the same age as the La Loche sandstone unconformably overlying the Precambrian on the upper part of the Clearwater River in northwestern Saskatchewan, and on Slave River in northeastern Alberta (Norris, 1963). In these latter areas the La Loche Formation is overlain by beds tentatively dated as Middle Devonian.

La Martre Falls Formation

The name La Martre Falls Formation is proposed for a highly variable sequence of red beds comprising shale, mudstone, sandy and argillaceous dolomite, gypsum, and salt, which overlies the La Loche sandstone and is overlain by the Chedabucto Lake dolomite. Locally, as in the area west of Faber Lake, the red beds unconformably overlie Precambrian basement rocks. North of Rivière la Martre a conspicuous dolomitic member, named the Mazenod and described elsewhere, is developed within the lower part of the formation. Rocks of this formation are discontinuously exposed in a narrow sinuous belt at and near the eastern margin of Palaeozoic rocks extending from Redrock Point in the south to the northern limit of the area mapped. No rocks of this formation are exposed south of Great Slave Lake.

The most completely exposed sequence of the La Martre Falls Formation, selected as the type section, outcrops along a 1.5 mile stretch of the Rivière la Martre canyon immediately below La Martre Falls (Section 13 in Appendix). There, the formation consists mainly of green and dusky red, fissile, soft, ferruginous shale, in places containing thin interbeds of fine-grained, ripple-marked, dolomitic sandstone; and a few harder fairly thick units of pale greenish grey and

light grey, resistant, cliff-forming sandy and silty dolomite. The upper contact is sharp but gradational with the overlying scarp-forming dolomite of the Chedabucto Lake Formation forming La Martre Falls. The lower contact with the underlying Old Fort Island sandstone is not exposed. The incomplete thickness of the La Martre Falls Formation exposed in the canyon is about 117 feet.

Three representative composite sections compiled from scattered outcrops north of La Martre Falls are presented in the Appendix (*see* Sections 10, 11, and 12). In the area immediately north of La Martre Falls and west of Hislop and Squirrel Lakes (Section 12 in Appendix) the exposed parts of the La Martre Falls Formation consist of thinly bedded, argillaceous, variably sandy, light grey, fine-grained dolomite in the lower part; succeeded by pale red and mottled red and green, flaky shale; and thinly bedded, medium to light grey, in part laminated fine-grained sandstone. Total thickness of the La Martre Falls Formation in this area is estimated to be about 345 feet.

In the area west of the south end of Hislop Lake (*see* Section 11 in Appendix; Fig. 9 in pocket) the exposed parts of the La Martre Falls Formation consist of thinly bedded, laminated red dolomite weathering reddish brown; mottled greyish red and pink shale; green shale; red, platy, fissile shale; red sandy and silty ripple-marked dolomite containing salt crystal moulds; and grey, finely crystalline, flaggy weathering, limonitic dolomite and edgewise conglomerate towards the top. The relatively thick covered intervals probably consist of shale or other recessive rock types. The total thickness of the La Martre Falls Formation is estimated to be about 200 feet in this area.

In the extreme northern part of the map-area, west of Faber Lake (*see* Section 10 in Appendix), the exposed parts of the La Martre Falls Formation consist of arkose, sandy and pebbly dolomite immediately overlying Precambrian rocks; succeeded by medium grey, silty, sandy, and argillaceous medium grey dolomite commonly weathering a light yellowish grey. Some beds show primary slumping, brecciation, ripple-marking, and scour structures, as well as salt crystal moulds, attesting to shallow water and subaerial deposition. The approximate thickness of the La Martre Falls Formation in this area is estimated to be about 280 feet.

On Old Fort Island, 75 miles southeast of the selected type area (*see* Section 1 in Appendix), the covered interval between the highest exposed beds of the Old Fort Island sandstone and the base of the Chedabucto Lake dolomite is about 90 feet. The thickness of this interval is probably close to the actual thickness of the La Martre Falls Formation in this latter area.

Along the west shore of the North Arm of Great Slave Lake south of Old Fort Island to Redrock Point the uppermost 30 feet of the La Martre Falls Formation is exposed (*see* Section 14 in Appendix). This interval consists mainly of green to black, very soft, fissile shale; some thin beds of medium-grained, soft, white quartzose sandstone; a few thin beds of dark brownish grey sandy dolomite; and minor thin beds and veinlets of yellowish orange stained gypsum. The upper contact with the Chedabucto Lake dolomite is transitional but sharp.

La Martre Falls Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	69PI	1	—	On prominent peninsula on the west side of Faber Lake. Loose blocks overlying the Precambrian
	54PI	1	—	0.6 mile west of unnamed bay of Faber Lake. Loose blocks overlying the Precambrian
	55PI	1	10	Between stations 59PI and 54PI west of Faber Lake
10	56PI	1	2	Between stations 59PI and 54PI west of Faber Lake
	57PI	1	6	Between stations 59PI and 54PI west of Faber Lake
	58PI	1	12	Between stations 59PI and 54PI west of Faber Lake
	59PI	1	14	East side of mesa 2 miles west of small bay on Faber Lake
11	45DD & 46DD	2	130	East side of mesa 4 miles west of the south end of Mazenod Lake
	119NC	3	17.5	West side of small lake 2 miles bearing 250T from the north end of Hislop Lake
	120NC	3	2	2.4 miles bearing 226T from the north end of Hislop Lake
12	108NC	3	*c.* 16	2.8 miles bearing 236T from the north end of Hislop Lake
	109NC	3	149	4 miles bearing 241T from the north end of Hislop Lake
	101NC	3	38	3.2 miles bearing 270T from the south end of Hislop Lake
13	345NB to 353NB	4	117+	*Type composite section:* Rivière la Martre canyon between falls and 1 mile below the falls
1	327NB	8	*c.* 90	Not exposed but covered interval between Old Fort Island and Chedabucto Lake Formations is about 90 feet thick
	314NB	8	12	Redrock Point. La Martre Falls Formation overlain by Chedabucto Lake Formation
14	317NB	8	31.4	Point 3 miles south of Redrock Point. La Martre Falls Formation overlain by Chedabucto Lake Formation
15	325NB	8	27	Small peninsula 4.2 miles northwest of Spruce Point. La Martre Falls Formation overlain by Chedabucto Lake Formation

Age and correlation

In the type section of the La Martre Falls Formation graptolite fragments were collected in beds 17.5 feet down from the top of the formation. These were

identified as *Diplograptus* sp. and dated as Wilderness Stage (Middle Ordovician) or later by G. W. Sinclair of the Geological Survey of Canada.

The following fauna was collected from an interbedded mudstone and shale unit between 20.5 to 32.5 feet down from the top of the formation:

Ischadites sp.
bryozoans
worm borings
Desmograptus sp.
square crinoid stems
undet. echinoderms
Sowerbyella sp.
Lingulasma sp.
Hyolithes sp.
Sinuites sp.
Conularia sp.
orthoceraconic cephalopod
asaphid trilobite pygidium
calymenid trilobite

This assemblage, according to G. W. Sinclair, indicates an Ordovician age, younger than the Chazyan. As the overlying fossiliferous Chedabucto Lake Formation is dated as Upper Ordovician, the upper 30 feet or so of the La Martre Falls Formation in this type area is dated as Middle Ordovician. No other fossils except fucoidal markings and stromatolites were noted in the type section below the interval for the above collection. Fucoidal markings were noted also near the base, and stromatolites 90 feet below the top of the composite section of the La Martre Falls Formation in the area west of Faber Lake. On the above evidence all of the La Martre Falls Formation is provisionally dated as Middle Ordovician.

Mazenod Member

The name Mazenod Member is proposed for a relatively thin rock unit consisting mainly of dolomite and oolitic dolomite occurring within the lower part of the La Martre Falls Formation in the northern part of the Great Slave Lake region. The name is after Mazenod Lake near which the most complete section is exposed. Locally it overlies ridges and knobs of Precambrian rocks. This rock unit was designated map-unit 8 in a preliminary report on the Horn River map-area by Douglas and Norris (1960). Rocks of the Mazenod Member are discontinuously exposed in a narrow sinuous belt near and more or less parallel to the western edge of the Precambrian Shield extending from just north of Rivière la Martre northward to the southwest edge of Faber Lake where it disappears beneath lake level.

The distribution, thicknesses, and localities of measured sections of incompletely exposed sequences of the Mazenod Member are indicated in the table below.

Outcrop Data for Mazenod Member of the La Martre Falls Formation

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
3	121NC	2	46.5	On neck of land separating Faber and Sarah Lakes
	91NC	2	25.5	Near middle of west shore of Mazenod Lake
4	82PI	2	40	1 mile bearing 248T from southwest end of Mazenod Lake
	84PI	2	40	Between 85PI and 82PI southwest of the southwest end of Mazenod Lake
	85PI	2	5	2.2 miles bearing 235T from southwest end of Mazenod Lake
5	92NC	3	25.6	Between Mazenod and Squirrel Lakes
	117NC & 118NC	3	12	Near the northwest shore of Hislop Lake
6	83NC	3	26.6	Small mesa mid-way between Rabbit and Hislop Lakes
7	73NC	4	9	Edge of Precambrian inlier 8.4 miles on bearing 182T from southwest tip of Tumi Lake
8	74NC	4	21	Southwest edge of small lake 6.6 miles bearing 109T from southwest tip of Tumi Lake
	75NC	4	5.9	Edge of Precambrian inlier 13 miles bearing 008T from La Martre Falls
9	76NC	4	4.5	Edge of Precambrian inlier 12.4 miles bearing 007T from La Martre Falls
	77NC	4	10	Edge of Precambrian inlier 13 miles bearing 007T from La Martre Falls
	82NC	4	5	South flank of Precambrian quartz stockwork 11.4 miles bearing 010T from La Martre Falls
	78NC	4	1	Southwest flank of Precambrian quartz stockwork 11.6 miles bearing 008T from La Martre Falls
	79NC	4	4	Southwest flank of Precambrian quartz stockwork 11 miles bearing 005T from La Martre Falls
	81NC	4	3	South flank of Precambrian quartz stockwork 10.8 miles bearing 007T from La Martre Falls
	80NC	4	12	Southwest flank of quartz stockwork 10.8 miles on bearing 005T from La Martre Falls
	95NC	4	6.5	South flank of Precambrian ridge 7 miles bearing 351T from La Martre Falls
	94NC	4	3	5.6 miles north of La Martre Falls
	355NB	4	talus blocks	Flank of Precambrian inlier 3 miles bearing 029T from La Martre Falls

The Mazenod Member consists of grey, nodular bedded dolomite; conspicuous orange-brown weathering, variably calcareous oolitic dolomite; and grey, medium-grained dolomite with interbeds of quartzose sandstone showing ripple structures and fucoidal markings towards the top. Where the Mazenod Member overlies ridges and knobs of the Precambrian, the basal beds consist of a boulder conglomerate of angular fragments of igneous rocks which grade upward into a

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conglomeratic sandy dolomite and light grey slightly calcareous sandstone. A short distance away from the Precambrian ridges and knobs these beds grade laterally to dolomite.

In the type section (Section 4 in Appendix) beds underlying the Mazenod Member are poorly exposed but consist of green shale and possibly gypsum or alum. This lithology is typical of the La Martre Falls Formation and appears to represent a tongue of lentil which may pinch out northward. The green shale may be underlain by sandstone of the Old Fort Island Formation suggested by the presence of sandstone fragments found near the base of the escarpment on which the green shale is poorly exposed.

A complete section of the Mazenod Member is not exposed at any one place. However, it appears to be thickest in the north, being about 70 or more feet in the type area southwest of Mazenod Lake. To the southeast it appears to pinch out and becomes unrecognizable within the lower part of the La Martre Falls Formation.

Age

Except for fucoidal markings noted in the upper unit of the type section, the Mazenod Member appears to be unfossiliferous. Its age is presumed to be Middle Ordovician or Older.

Chedabucto Lake Formation

The name Chedabucto Lake Formation is proposed for a resistant dolomite unit which overlies the La Martre Falls Formation and is unconformably overlain by the Middle Devonian Chinchaga Formation. Locally, as in the area 1.5 miles west of the middle of the west shore of Marian Lake, it rests directly on the Precambrian. Rocks included in the Chedabucto Lake Formation were designated as map-unit 10 in the preliminary report on the Horn River map-area by Douglas and Norris (1960). The type section is composite and compiled from outcrops in the vicinity of Chedabucto Lake (*see* Section 22 in Appendix).

The Chedabucto Lake Formation first appears as a lentil immediately south of Alexander Point that seems to merge and lose its identity southward within the upper 50 feet or so of red beds assigned to the Mirage Point Formation (*see* Fig. 4). North of this locality it thickens rapidly to form a conspicuous rock unit. Exposures are numerous because of the resistant nature of this unit, but there are no complete sections at any one place. The outcrop belt of the Chedabucto Lake Formation in the area between Alexander Point to about opposite the north end of Marian Lake is mainly less than seven miles wide. Northwest of Marian Lake the outcrop belt abruptly widens, reaching a maximum width of 26 miles west-southwest of Faber Lake. The formation also outcrops on Rae Point on the east shore of the North Arm of Great Slave Lake.

The Chedabucto Lake Formation consists of a thick-bedded, to massive, highly resistant, scarp-forming, fine-grained, granular, in places minutely vuggy, medium brown dolomite, commonly weathering a pale orange or orange-brown in the south, and a yellowish brown and grey in the north. Purplish red mottling

is particularly prevalent in the southern part of the outcrop belt becoming less conspicuous north of the La Martre Falls area. Chert in the form of small blebs, anastomosing thread-like tracery, and nodules, is present in some beds. Chert is most abundant in the upper part of the formation in the northern part of the outcrop belt, and in the lower part of the formation in most sections in the south. Fossils where present are generally silicified. The basal part of this unit forms the protective capping of a prominent scarp in the area which can be traced more or less continuously from just south of Redrock Point to west of Faber Lake at 64° latitude. A few thin layers of intraformational conglomerate are present in some of the northern sections.

The lower contact of the Chedabucto Lake Formation is sharp but transitional. The upper contact is unconformable with a variety of Middle Devonian rock types including evaporites, limestone, and in places brecciated limestone of the Chinchaga Formation resting on the Chedabucto Lake Formation at different places. Where the Chedabucto Lake Formation directly overlies the Precambrian, the basal dolomite contains angular fragments of the underlying rock and glassy quartz. Fossils were collected from the dolomite within a few inches of the contact with Precambrian rocks at one locality (station 286NB).

Distribution of outcrops, thicknesses, and detailed measured sections included in the Appendix are indicated in the table below.

Chedabucto Lake Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	78PI	1	4.5	30.4 miles bearing 041T from mouth of Rivière Grandin
	77PI	1	*c.* .55	25.4 miles bearing 048T from mouth of Rivière Grandin
	79PI	1	6	28 miles bearing 021T from mouth of Rivière Grandin
	80PI	1	38	25.2 miles bearing 015T from mouth of Rivière Grandin
	76PI	1	10	19.2 miles bearing 036T from mouth of Rivière Grandin
	81PI	1	6	22.4 miles bearing 006T from mouth of Rivière Grandin
16	49PI	1	5	0.8 mile north of Rivière Grandin and 15.2 miles north of the mouth of the river (air distances)
	52PI	1	3	South bank of Rivière Grandin 13.8 miles upstream (air distance) from the mouth
	46PI	1	28	Southwest bank of Rivière Grandin, 14.4 miles upstream from the mouth (air distance)
	53PI	1	15	0.3 mile south of Rivière Grandin and about 14 miles upstream from the mouth of the river
	74PI	1	15	0.6 mile west of a point on Rivière Grandin 9.4 miles upstream from the mouth
	73PI	1		East bank of Rivière Grandin, 5.4 miles (air distance) upstream from the mouth

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Chedabucto Lake Formation Outcrop Data—(Cont.)

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	46DD	2	11.5	East side of mesa, 4 miles west of the south end of Mazenod Lake
	115NC	2	14.5	10.8 miles bearing 240T from the southwest end of Mazenod Lake
	114NC	2	9	12 miles bearing 245T from the southwest end of Mazenod Lake
	113NC	2	5	13.4 miles bearing 235T from the southwest end of Mazenod Lake
	71PI	2	5	3.8 miles northeast of station 72PI on northeast shore of Lac la Martre
	72PI	2	5	Northeast shore of Lac la Martre near mid-length of lake
	112NC	3	22	11.4 miles bearing 262T from the north end of Hislop Lake
	100NC	3	5	9.6 miles bearing 240T from the southeast end of Tumi Lake
	99NC	3	4	10.2 miles bearing 236T from the southeast end of Tumi Lake
	96NC	3	21	11.4 miles bearing 216T from the southeast end Tumi Lake
	70PI	3	6	Near middle of northeast shore of Lac la Martre
	97NC	4	2	10.4 miles bearing 351T from La Martre Falls
17	358NB & 360NB	4	*c.* 93	Between 2.6 and 2.8 miles east-southeast of La Martre Falls
	348NB	4	10	West canyon wall 0.4 mile below La Martre Falls
13	345NB, 346NB & 347NB	4	29.5	La Martre Falls vicinity
	363NB	4	4	Rapids 3.2 miles (air distance) above falls on Rivière la Martre
	289NB	5	19.5	8 miles bearing 297T from Fort Rae
	279NB	5	15	8 miles west-northwest of Fort Rae
	286NB	5	6 max.	9 miles bearing 295T from Fort Rae
	296NB	5	15.5	Near station 298NB
	298NB	5	2.5	9.4 miles bearing 292T from Fort Rae
	299NB	5	17	7.8 miles bearing 294T from Fort Rae
18	364NB	5	74	Escarpment 5 miles bearing 263T from the north end of James Lake
	305NB	5	12	10.2 miles bearing 293T from Fort Rae
19	306NB & 307NB	5	12.5	10.4 miles northwest of Fort Rae
	366NB	5	4	14.2 miles bearing 290T from Fort Rae
	336NB	5	25	12.4 miles bearing 268T from Fort Rae
20	370NB	6	49	Rae Point. Overlying beds of Chinchaga Formation exposed also at this locality
21	379NB	6	21.5	9.2 miles bearing 237T from Fort Rae. Overlying beds of Chinchaga Formation (10 feet) exposed also at this locality. Thickness of Chedabucto Lake Formation is probably nearly complete at this exposure

Chedabucto Lake Formation Outcrop Data—(Conc.)

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	70NC	7	3	Escarpment 4 miles due west of Whitebeach Point
22	71NC	7	87	Escarpment 3.8 miles bearing 274T from Whitebeach Point
	69NC	7	5	0.4 mile north of the north end of Whitebeach Lake
	68NC	7	1	Near north end of Whitebeach Lake
	67NC	7	33	Escarpment 3.4 miles bearing 300T from the north end of Chedabucto Lake
	61NC	7	10	Southwest shore near the south end of Scaup Lake
	60NC	7	10	Mid-southwest shore of Scaup Lake
	66NC	7	10	Northwest end of Scaup Lake
	62NC	7	11	Southwest shore of Scaup Lake, 10.6 miles bearing 257T from Whitebeach Point
	63NC	7	11.8	North facing escarpment 12 miles bearing 263T from Whitebeach Point
	64NC	7	4.7	North facing escarpment 12.6 miles bearing 263T from Whitebeach Point
	65NC	7	5	North facing escarpment 13.2 miles bearing 264T from Whitebeach Point
1	327NB	8	14	Old Fort Island. Composite section of Old Fort Island, La Martre Falls and Chedabucto Lake Formations
	329NB	8	25	Wrigley Point
	314NB	8	6.5	Redrock Point. Includes La Martre Falls and Chedabucto Lake Formations
	317NB	8	9	Point 3 miles south-southeast of Spruce Point. Section includes La Martre Falls and Chedabucto Lake Formations
	318NB	8	8	Unnamed bay north of Redrock Point
	319NB	8	5	North side of Spruce Point
15	325NB	8	9	Small peninsula 4.2 miles northeast of Spruce Point. Section includes both La Martre Falls and Chedabucto Lake Formations
	324NB	8	8	Northwest shore of bay immediately northwest of Spruce Point
23	312NB	9	2	2.8 miles bearing 251T from Alexander Point. Both the Mirage Point Formation and Chedabucto Lake Lentil are exposed here. This is the most southern exposure of the Chedabucto Lake dolomite which appears to be pinching out at this point within the upper part of the Mirage Point Formation.

The thickness of the Chedabucto Lake Formation varies from zero in the area south of Alexander Point to a maximum of about 250 feet in the area west of Faber Lake. Throughout the length of the outcrop belt considerable variation in thickness is apparent. Local thinning is evident in the area immediately north of Whitebeach Point northward to opposite the north end of the North Arm of Great

Slave Lake where the maximum thickness is estimated to be about 50 feet. Immediately north and south of this area the maximum thickness is estimated to be about 170 feet. The variation in thickness of the Chedabucto Lake Formation appears to be controlled in part by the underlying undulatory upper Precambrian surface; the formation is thicker over depressions and thinner over Precambrian high areas.

Fossils, age, and correlation

Most of the fossils obtained from the Chedabucto Lake Formation indicate an Upper Ordovician (Richmond) age. Some of these fossils particularly from the more northern sections have strong affinities with elements in the Beaverfoot Formation of the Canadian Rocky Mountains. Fossils from the Chedabucto Lake Formation from between roughly opposite Rae Point southward to where it becomes unrecognizable near Alexander Point within the upper part of the Mirage Point Formation are sparse and not too diagnostic. Most of these collections merely indicate either Middle or Upper Ordovician, but the presence of an angulate *Streptelasma* does point to an Upper Ordovician age.

Hume (1921, p. 34) listed fossils he collected in 1920 north of Redrock Point from beds here included in the Chedabucto Lake Formation and dated them as Silurian. On further study Hume (1926, p. 61) concluded that the fauna indicated an Ordovician, "Trenton or Richmond", rather than a Silurian age.

Fossils collected by Lord (1939, pp. 12-13; 1942, pp. 36-38) from beds here assigned to the Chedabucto Lake Formation outcropping on the south side of Rivière la Martre, 11 miles from its mouth, were identified by Alice E. Wilson of the Geological Survey of Canada and dated as Upper Ordovician (Richmond) age.

Fossils identified by G. W. Sinclair of the Geological Survey of Canada from La Martre Falls and Chedabucto Lake Formations are as follows: (Stratigraphic positions of individual collections are shown in the appropriate section in the appendix.)

Ischadites? sp.
Stromatocerium sp.
Bighornia sp.
Streptelasma sp.
angulate *Streptelasma*
small *Streptelasma*
streptelasmid coral
Calapoecia sp.
Catenipora sp.
Catenipora sp. A
indet. coral
Favistella sp.
favositoid coral
Foerstephyllum sp.
Palaeofavosites sp.
Palaeophyllum sp.
"Syringopora" sp.
worm borings
undet. bryozoans
Dinorthis columbia
Hebertella sp.
Lepidocyclas sp.
Leptaena cf. *nitens*
Leptaena? sp.
Lingulasma sp.
Rafinesquina sp.
Rhynchotrema capax
Rhynchotrema cf. *kananaskia*

large rhynchonelloid brachiopod
Skenidioides sp.
Sowerbyella sp.
indet. brachiopods
Conularia sp.
Hyolithes sp.
indet. gastropods
Liospira sp.
Lophospira sp.
Maclurites? sp.
Sinuites sp.
orthoceraconic cephalopod
Bythocypris sp.
asaphid trilobite, pygidium
calymenid trilobite, pygidium
Ceraurus sp.
Cybeloides sp.
Caryocrinus sp.
Cyclocystoides sp.
large *Glyptocystites*
ophiurians, fragmentary
undet. echinoderms
square crinoid stems
crinoid stems
undet. conodonts
Diplograptus sp.
Desmograptus sp.

Mirage Point Formation

The name Mirage Point Formation is proposed for a variable sequence of red beds which unconformably underlies the Middle Devonian Chinchaga Formation and transitionally overlies the basal Palaeozoic Old Fort Island sandstone, or in places in the subsurface unconformably overlies Precambrian rocks. Only the upper part of this unit is exposed discontinuously along the south end of the west shore of the North Arm of Great Slave Lake between Alexander and Gypsum Points; the lower part is covered by water. The proposed name for this formation is after Mirage Point near the southern end of the exposures. Mirage Point Formation corresponds to map-unit 11 of Douglas and Norris (1960). It also corresponds to Cameron's (1922a, p. 16) "red beds" present in the Northwest Windy Point No. 1 well, which he considered to be of Silurian age, and in part to map-unit 8 of Douglas (1959b).

The rocks outcropping in the vicinity of Gypsum Point and northward to Redrock Point have been described in varying detail by Cameron (1918, p. 25; 1922a, p. 19) and Hume (1921, pp. 33-35; 1926, pp. 59-60).

In outcrops (*see* Section 23) the Mirage Point Formation consists of a thinly interbedded sequence of dark dusky red, purplish and orange red dolomite, argillaceous dolomite, variably sandy dolomite, gypsiferous dolomite, ?dolomitic mudstone, very fine-grained dolomitic sandstone, green and red shale, gypsiferous shale, gypsum, and satin spar. On a fresh surface some of the harder beds, particularly the dolomites, exhibit a green mottling. Mud cracks are present along some bedding surfaces, and irregular veinlets of secondary fibrous gypsum penetrate many beds of the exposed sequence. The most complete outcrop section of this formation is on the northwest shore of Baker Bay where some 30 feet of beds are exposed. A total maximum thickness of about 180 feet of composite section may be represented in the outcrop belt.

In the subsurface in the immediate vicinity of Great Slave Lake the Mirage Point Formation has been completely penetrated by the Cominco Test G-1 and

G-4, and Northwest Windy Point No. 1 wells. The thicknesses represented in each of these wells are 188.6, 293.8, and 595 feet respectively. The well closest to the outcrop belt of the Mirage Point Formation is the Northwest Windy Point No. 1 located about 58 miles southwest of Gypsum Point. There, the Mirage Point Formation consists (*see* Cameron, 1922a, p. 16) of a sequence of red beds comprising shale, gypsum, anhydrite, and salt lying between 1,045 and 1,640 feet deep.

Mirage Point Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
23	268NB	9	*c.* 1	Shoreline 1 mile south-southeast of Foam Point. Present just below lake level
	269NB	9	*c.* 1	Shoreline 1.3 miles south of Foam Point
	267NB	9	15.5	Shoreline 1.6 miles northwest of Foam Point
	313NB	9	*c.* 1	North side of Alexander Point. Present just below lake level
	309NB	9	30	Northwest shore of Baker Bay
	310NB	9	14.5	Small peninsula 4 miles bearing 293T from Baker Point
	312NB	9	8.5	2.8 miles bearing 251T from Alexander Point
	308NB	9	—	3.5 miles bearing 251T from Baker Point. Red gypsiferous talus
	270NB	10	7	Mirage Point
	271NB	9	6.5	Gypsum Point

Mirage Point Formation Subsurface Data

Name of well	Thickness (feet)	Locality and comments
Cominco Test G-1	188.6	60°51′05″N, 114°24′30″W. Top, 982′; bottom, 1,170.6′
Cominco Test G-4	293.8	60°54′N, 114°46′W, 2,800′ southwest of Bay just east of Sulphur Point. Top, 1,033′; bottom 1,326.8′
Northwest Windy Point No. 1	595	61°19′N, 115°52′W. Top, 1,045′; bottom, 1,640′
Northwest Territories Escarpment Lake No. 1	75 incomplete	60°35′43″N, 116°13′W. Top, 2,010′; bottom of hole, 2,085′
Northwest Territories Desmarais Lake No. 1	190	60°48′N, 116°48′W. Top, 2,390′; bottom, 2,580′
Northwest Territories No. 1	40 incomplete	61°20′40″N, 117°37′W. 1.5 miles southeast of Fort Providence. Top, ?1,630′; bottom of hole, 1,670′
Briggs Foetus Lake No. 1	66.5	60°55′N, 118°31′W. Top, 2,666.5′; bottom, 2,733′
Briggs Rabbit Lake No. 2	58	60°54′03″N, 118°46′47″W. Top, 2,839′; bottom, 2,897′

In the Cominco Test G-1 and G-4 wells in the Pine Point area on the south side of the lake the Mirage Point Formation is considerably thinner presumably because the wells penetrate shelf sequences closer to the edge of the Precambrian Shield. In these wells the Mirage Point Formation consists of red and green beds of silty mudstone, quartz siltstone, dolomite, gypsiferous and silty dolomite, gypsum, anhydrite, and an upper brecciated unit of angular fragments of dolomitic silty mudstone and dolomite in a matrix of clay and gypsum.

Other wells west and northwest of the Pine Point area penetrate red beds and reach the Precambrian basement but show considerably thinner sequences. Such wells include: Northwest Territories No. 2, about 70 feet thick; Northwest Territories Desmarais Lake No. 1, about 190 feet thick; and questionably Briggs Foetus Lake No. 1, about 66.5 feet thick; and Briggs Rabbit Lake No. 2, about 58 feet thick. Parts or all of the sequences in the latter two wells may belong in the Chinchaga Formation.

Age and correlation

The Mirage Point Formation in the southern and southwestern parts of the Great Slave Lake region occupies the stratigraphic interval of the combined Chedabucto Lake and La Martre Falls Formations in the north. The ages of the Chedabucto Lake Formation and the upper part of the La Martre Formation are well dated by fossil evidence. Therefore, the age of the Mirage Point Formation is presumed to range from Middle Ordovician or Older, to Upper Ordovician.

A possible Upper Ordovician age for the uppermost 50 feet or so of beds of the Mirage Point Formation immediately south of Alexander Point is based on the field evidence that the fossiliferous Chedabucto Lake Formation pinches out southward in this vicinity within this interval consisting of unfossiliferous evaporitic red beds (*see* Fig. 4). Excluding the Mazenod Member, the La Martre Falls Formation in the north has many lithological similarities in common with the Mirage Point Formation of the south.

Middle Devonian

Middle Devonian rocks outcrop in a northwest-trending belt varying between 55 and 65 miles wide extending from the southeast to the northwest corners of the Great Slave Lake region. The belt underlies the West Arm of Great Slave Lake where most of the better exposures occur along and near its shores. The southwest side of the belt is limited by overlying Upper Devonian strata which intersects the western tip of the West Arm of the lake. In the northwest corner of the area the Middle Devonian belt is overlapped by a cover of Tertiary (?), Cretaceous, and possibly older rocks of Cartridge Mountain. North of the lake its eastern contact is with underlying Upper Ordovician strata; south of the lake its eastern boundary is obscured by deposits of the Slave River delta.

The Middle Devonian succession within the Great Slave Lake region is exceedingly complex and illustrates many abrupt facies changes as well as shifting depositional environments throughout Middle Devonian time. The terminology and

relationships of the many rock units within the area are illustrated in a general way by Figure 3. In the southern part of the outcrop belt the succession is predominantly evaporitic. The Chinchaga Formation is a basal evaporite unit present throughout most of the region. It contains a thin limestone and brecciated limestone unit, the Hay Camp member, near its base. The Fitzgerald dolomite outcrops only on Slave River, south of the area covered by this report, where it immediately overlies the La Loche sandstone, and if the Fitzgerald extends northward into the Great Slave Lake region it probably forms the basal beds of the Chinchaga Formation. Overlying the Chinchaga Formation is another relatively thin unit named the Little Buffalo Formation consisting of two members, a lower 'Dolomite' Member, and an upper 'Dolomite and Limestone'. It is succeeded by a relatively thick evaporitic unit named the Nyarling Formation, in turn overlain by a relatively thin limestone, the Slave Point Formation.

In the Cominco Concession area, all Middle Devonian units above the evaporitic Chinchaga Formation are carbonate rocks. The succession there in ascending sequence comprises: the Chinchaga, Pine Point, Presqu'ile, Sulphur Point, and Slave Point Formations. The Pine Point Formation consists of a basal Limestone Member outcropping in the Fort Resolution area which pinches out southwestward, overlain by a relatively thick Fine-grained Dolomite Member. Northward, or towards the south shore of Great Slave Lake, parts of the Fine-grained Dolomite Member grade or intertongue with a dark-coloured Bituminous Shale and Limestone Member and a Brown Limestone Member at the top. The Presqu'ile Formation is restricted to a coarsely recrystallized, vuggy, massive dolomite of probable reefoid origin overlying the Pine Point. Limestones overlying the top and flanks of the coarse dolomite and below the Amco Shale, are here named the Sulphur Point Formation. The Slave Point Formation consisting of stromatoporoidal limestone, finely fragmental limestone, and fine-grained to dense limestone, is present in the western part of the Cominco Concession area. In the Concession area the base of the Slave Point is arbitrarily taken as the base of the Amco Shale. Where the Amco Shale is undeveloped the contact between the Slave Point and Presqu'ile Formations is taken between limestone and coarse dolomite.

On the north flank of the coarsely recrystallized dolomites of the Presqu'ile Formation, along the south shore of Great Slave Lake, the Middle Devonian sequence comprises (in ascending sequence): the Chinchaga, Pine Point, Sulphur Point, and Slave Point Formations. The Pine Point Formation here consists of a basal Fine-grained Dolomite Member, a dark coloured Bituminous Shale and Limestone Member, and a shale member named the Buffalo River by Campbell (1950, 1957). Both the Bituminous Shale and Limestone and Buffalo River shale members grade or intertongue laterally, at least in some directions, with the Fine-grained Dolomite Member. The Sulphur Point Formation consists of limestones and dolomites that overlap the flanks of the coarse dolomite and are at least in part the lateral equivalent of the dolomite.

On the northwest side of Great Slave Lake between Mirage Point and Sulphur Bay the Middle Devonian succession indicated by outcrops consists of the Chinchaga, Pine Point, Presqu'ile, and Sulphur Point Formations. Only the lower and

upper parts of the Pine Point Formation are exposed. The lower part consists of limestone and argillaceous limestone named the Lonely Bay Member. It is separated by a covered interval, presumed to consist mainly of shale, and probably a tongue of the Horn River Formation, from an unnamed Upper Limestone Member at the top. The Presqu'ile Formation outcropping in the Sulphur Bay area consists of coarsely recrystallized vuggy dolomite overlying and intertongued with fine-grained dolomite. To the south, along the south shore of Windy Bay the Presqu'ile dolomite grades and intertongues with limestone of the Sulphur Point Formation. Only a foot or so of limestone strata is exposed at low water level in the vicinity of Slave Point, the locality after which the Slave Point Formation was named by Cameron. Unconformably overlapping the west flank of the Presqu'ile dolomite is a thin sequence of limestones and dolomite formerly assigned by Cameron (1922a) to the Slave Point Formation but here excluded because it contains Upper Devonian fossils.

A short distance north of the Deep Bay area most of the Pine Point, and all of the Presqu'ile, Sulphur Point, and Slave Point carbonate sequences are missing and their place taken by shale named the Horn River Formation by Whittaker (1922) from outcrops on Horn River in the northwestern part of the map-area.

The youngest Middle Devonian strata outcropping in the Great Slave Lake region is a reefoid limestone named the Horn Plateau Formation. It outcrops on the east flank of Horn Plateau and contains an unique late Middle Devonian fauna.

Representative total thicknesses of the Middle Devonian succession are about 1,020 feet for the west end of the Cominco Concession area on the south side of Great Slave Lake, and about 1,275 feet in the area immediately southwest of Windy Point on the northwest side of the lake.

Chinchaga Formation

The name Chinchaga Formation was proposed by Law (1955a, b) for the basal unit of the Elk Point Group in the subsurface of northwestern Alberta. The type section of the formation is in California Standard's Steen River No. 2-22 well (lsd. 2, sec. 22, tp. 117, rge. 5, W. 6th mer.) in the interval between 5,475 and 5,680 feet. Typically this unit consists of light grey to brown anhydrite with minor amounts of brown to brownish grey, cryptocrystalline dolomite. This unit can be traced in the subsurface from northwestern Alberta into the Great Slave Lake region where it has been referred to as the Fitzgerald dolomites by Cameron (1922a, p. 16) and as the Fitzgerald Formation by Law (1955b, Fig. 5) and Campbell (1957, p. 162). In the outcrop belt of the Great Slave Lake region, beds assigned to the Chinchaga Formation consist mainly of evaporites, some dolomite, and dolomite and limestone breccia, which form the basal part of the Middle Devonian succession. In the northern and central parts of the outcrop belt the Chinchaga Formation unconformably overlies the Upper Ordovician Chedabucto Lake dolomite and red beds of the Mirage Point Formation respectively. Immediately southeast of the Great Slave Lake region on Slave River the Fitzgerald dolomite, here considered

the basal member of the Chinchaga Formation, overlies the La Loche sandstone (*see* Norris, 1963) of uncertain age but presumably Middle Devonian or Older. The Chinchaga Formation is overlain by a variety of Middle Devonian rock units, the Little Buffalo Formation in the south, a number of different facies of the Pine Point Formation in the central part of the belt, and by the Lonely Bay Formation in the north.

In the preliminary report on the Great Slave Lake area Douglas (1959b) indicated beds here referred to the Chinchaga Formation as map-unit 9; and in the Horn River map-area to the north Douglas and Norris (1960) indicated them as map-unit 12.

North of Great Slave Lake the Chinchaga Formation is discontinuously exposed in a belt the eastern margin of which is a short distance west of and more or less parallel to the North Arm of the lake. The belt averages about 16 miles wide at the south end and gradually widens to a maximum width of 36 miles immediately north of Lac la Martre where most of it disappears beneath a cover of Cretaceous rocks capping Cartridge Mountain. In the area south of Great Slave Lake the western limit of the Chinchaga outcrop belt is marked by an irregular eastward facing escarpment capped by resistant beds of the overlying Little Buffalo Formation which more or less follows the west side of Little Buffalo River. East of the escarpment Chinchaga rocks are covered by deposits of the Slave River delta except for a few scattered exposures.

Chinchaga Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	47DD	3	7	West shore of Lac la Martre. Loose blocks of limestone along beach
	386NB	3	—	Prominent peninsula on west shore near south end of Lac la Martre
	84NC	3	14	Near north tip of Big Island in Lac la Martre
	387NB	4	5	South shore of Lac la Martre
19	336NB	5	*c.* 25	12.4 miles bearing 254T from Fort Rae. See also station 366NB
24	368NB	5	8	Outlier 12 miles bearing 254T from Fort Rae
25	365NB	5	11	18.8 miles bearing 288T from Fort Rae. Upper beds of Chedabucto Lake Formation overlain by basal beds of Chinchaga Formation
	367NB	5	30	13 miles bearing 252T from Fort Rae
	337NB	5	16	16 miles bearing 266T from Fort Rae
26	338NB	5	*c.* 53.5	18.2 miles bearing 263T from Fort Rae
	382NB	5	7	29.6 miles bearing 281T from Fort Rae
	338NBa	5	5	Banks of Duport River, 26.6 miles bearing 255T from Fort Rae
	372NB	6	17	Rae Point
20	371NB	6	42	Rae Point
	370NB	6	13	Rae Point
	374NB	6	3	Rae Point. Not visited; observed from the air
21	379NB	6	*c.* 3	9.2 miles bearing 237T from Fort Rae

Chinchaga Formation Outcrop Data—(Conc.)

Section No. n Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	375NB	6	55	9.8 miles bearing 288T from Pointe du Lac
	344NB	6	*c.* 15	16.2 miles bearing 282T from Pointe du Lac. Observed from air on low pass in a helicopter
27	343NB	6	*c.* 73	17.8 miles bearing 264T from Pointe du Lac. Breccia here contains stromatoporoids
	340NB	6	22	24.8 miles bearing 267T from Pointe du Lac
	341NB	6	2	Escarpment 24.6 miles bearing 262T from Pointe du Lac
	323NB	8	2	5 miles northwest of Spruce Point
	335NB	8	*c.* 54	5.8 miles west-northwest of Wrigley Point. *Cladopora* sp.
	377NB	8	14	5 miles west of Old Fort Island
28	321NB	8	*c.* 83	Bay immediately north of Spruce Point
	331NB	8	1	16 miles west of McIver Point
	330NB	8	*c.* 10	20 miles west of Baker Point. Chinchaga Formation overlain by Lonely Bay Formation
	333NB	8	4	22 miles west-northwest of Redrock Point
	308NB	9	7	3.6 miles bearing 251T from Baker Point. Chinchaga Formation underlain by Mirage Point Formation
23 & 29	311NB	9	*c.* 45	1.6 miles bearing 237T from McIver Point
	196NB	13	7	7 miles south-southwest of Pointe Ennuyeuse
	27BI	14	12	West bank of Little Buffalo River 16.8 miles bearing 250T from Brûlé Point
	192NB	15	*c.* 5	Exposure on east facing escarpment; 25.4 miles bearing 296T from Bell Rock
	BI	15	*c.* 30	Exposure in Sass River gully where it cuts through escarpment 34.4 miles bearing 303T from Bell Rock
	BI	15	*c.* 30	Exposure in tributary stream gully of Sass River; 33.4 miles bearing 301T from Bell Rock
	35BI	16	35	Bell Rock on the south bank of Slave River. Brecciated limestone of the Hay Camp Member in fault contact with limestone, shale, and gypsum, all of the Chinchaga Formation
	29BI	16	21	Escarpment 10.4 miles bearing 272T from Bell Rock
30	30BI	16	*c.* 3	Base of escarpment near 29BI
	193NB	16	*c.* 57	Exposure on north facing escarpment 15.4 miles bearing 271T from Bell Rock
	176NB to 188NB	16	*c.* 80	*Composite section*: Canyon below main falls on Little Buffalo River
		16	3	Base of main falls on Little Buffalo River

The Chinchaga outcrop belt is characterized by numerous playa lakes with rounded outlines, sloughs, and relatively low, flat, plain-like areas. The relatively large Lac la Martre basin in the northern part of the region has formed mainly within the relatively soft evaporitic rocks of this unit.

The Chinchaga Formation is mainly gypsum (*see* Fig. 4), easily eroded and does not produce good outcrops. The gypsum is generally white, or banded light to dark grey, and weathers to a material of soft, powdery, or putty-like consistency when moistened. In places the gypsum beds are contorted and brecciated. Besides gypsum, the Chinchaga Formation contains a variety of carbonate rocks that form resistant units at and near the base, middle, and upper parts of the formation. Most of the carbonate units change facies rapidly and most are brecciated. One of the more complete sequences of the lower beds of the Chinchaga Formation outcrops on Rae Point at stations 370NB to 374NB inclusive (Section 20 in Appendix). There they consist of thickly bedded to massive, pale brown, extremely vuggy, gypsiferous limestone, succeeded by a poorly exposed interval of thinly bedded, light grey weathering limestone, and overlain by massive, cliff-forming, pale brown limestone. Within a distance of about 10 miles west-southwest of Rae Point these lower beds change to gypsum and brecciated gypsum (station 375NB; Section 27 in Appendix).

Brecciated limestones and dolomites near the middle of the Chinchaga Formation were observed at four localities west of the North Arm of Great Slave Lake at stations 338NB, 343NB, 377NB, and 335NB. The thickest section of the breccia is exposed at station 343NB where 48 feet of the unit is in sight. It consists of coarse angular fragments up to 2½ feet in diameter of dark brown, fine-grained to aphanitic, sparsely fossiliferous limestone, weathering medium grey.

Gypsiferous carbonate beds at and near the top of the Chinchaga Formation outcrop at several places. The main localities are at stations 340NB, 332NB, and 331NB. These upper beds consist of dark and pale grey laminated gypsiferous limestone; vuggy gypsiferous limestone and gypsiferous shale; hard, aphanitic dolomite; and occasional thin beds of laminated silty limestone. In places some of the beds are brecciated.

Thicknesses of the Chinchaga Formation north of the lake, on line of sections 5, 6 and 8 showing the more complete exposures, are about 325, 280, and 310 feet respectively (*see* Fig. 5).

Between the south flank of the reef area on the south side of Great Slave Lake to 60° latitude the Chinchaga Formation consists mainly of evaporites with a thin limestone and brecciated limestone unit near the base called the Hay Camp Member, and a very thin dolomite unit about 100 feet down from the top. On Slave River, south of the Great Slave Lake region a sequence of unnamed 'Evaporites' lies between the top of the Fitzgerald dolomite and the base of the Hay Camp Formation (Norris, 1963). These evaporites are here considered part of the Chinchaga Formation. At Bell Rock about 12 feet of this unit is exposed immediately underlying the Hay Camp Member. It consists of white gypsum interbedded with greenish grey shale (Section 30 in Appendix). Camsell (1917a, p. 139) and Cameron (1922a, p. 18) reported four feet of thinly bedded, impure, grey gypsum underlying shaly limestone (Hay Camp Member) outcropping on the point on the east bank of Slave River just below Pointe Ennuyeuse. These beds are apparently exposed only during periods of low water level and were not seen when the area was traversed during early June, 1957, by W. B. Brady and the writer. The contact

between the top of the Fitzgerald dolomite and the basal evaporites of the Chinchaga Formation is nowhere exposed. Within the Great Slave Lake region a covered interval of unknown thickness separates the top of the Hay Camp Member exposed at two places on Slave River and the numerous evaporite exposures along the base of the lower escarpment west of Fort Smith. This interval is estimated to be about 150 feet thick but may be considerably less. Rocks of this interval underlie the northward continuation of the 'Salt Plains' west of Fitzgerald. Within this plains area gypsum outcrops 7 miles west-southwest of Pointe Ennuyeuse.

Along the base and face of the lower escarpment within the Great Slave Lake region west of Fort Smith a thin sequence representing about 40 feet of gypsum is exposed at several places. These beds consist of laminated white, light to dark brown, thinly bedded gypsum which on weathering disintegrates to a whitish grey powder and small chip-like fragments (Section 30 in Appendix). Immediately south of the Great Slave Lake region these or adjacent beds below, contain rock salt (Norris, 1963).

A few feet of hard beds capping the lower escarpment are also exposed at several places. They consist of pale brown, fine-grained, in places granular, medium-bedded dolomite, containing a sparse Middle Devonian fauna.

Overlying the hard beds of the lower escarpment is another sequence of evaporites of which about 85 feet is exposed in the canyon below the falls on Little Buffalo River. It is parts of this sequence that are discontinuously exposed at numerous places along the face of the upper escarpment north and south of Little Buffalo River falls. In the Little Buffalo River canyon some 85 feet of thick-bedded and laminated white, light to dark grey gypsum, in places interbedded with varicoloured argillaceous gypsum is exposed. Within the lower part of the sequence some of the gypsum is brecciated; and some gypsum beds contain irregular inclusions of green, brittle, hackly fracturing shale. The top of the gypsum beds of the Chinchaga Formation is in sharp even contact with overlying dolomite beds of the Little Buffalo Formation.

The maximum total thickness of the Chinchaga Formation in this southern area is estimated to be about 430 feet, but there are large covered intervals and the actual thickness may be of the order of 300 feet, which would be more comparable to the thicknesses obtained to the north.

Wells closest to the outcrop belt of the Chinchaga Formation and penetrating this unit include Northwest Windy Point No. 1, Cominco Test G-4 and G-1.

In the Northwest Windy Point No. 1 well the Chinchaga Formation lies between 770 and 1,045 feet depths (275 feet thick) and consists of gypsum and anhydrite units at base and middle, grey dolomitic limestone with gypsum, and light brown dolomitic limestone at the top (Cameron, 1922a, pp. 15-16).

In the Cominco Test G-4 well on the south side of the lake, the Chinchaga Formation lies between 709.5 and 1,033 feet depths (323.5 feet thick) and consists of banded anhydrite and argillaceous dolomite in the lower part, succeeded by banded dolomite and anhydrite with occasional lenses of green shale, and a thin unit of silty dolomite at the top.

In the Cominco Test G-1 well located about 13 miles east-southeast of the G-4 well, the Chinchaga Formation lies between 675 and 982 feet deep (307 feet thick) where the lithology is essentially similar to that in the G-4 well.

Fossils, age, and correlation

The Chinchaga Formation is sparsely fossiliferous because of the evaporitic nature of most of the unit. Stromatoporoids, vague indeterminable outlines of brachiopods, and indeterminable cup corals occur in brecciated limestone near the middle of the formation at station 343NB (line of Section 6, Fig. 4). Within roughly the same interval of the Chinchaga Formation numerous *Cladopora*-like organisms occur within a limestone overlying dolomite and dolomite breccia at station 335NB (line of Section 8, Fig. 4). South of Great Slave Lake a poorly preserved fauna consisting of ?*Spinatrypa* sp. cf. ?*S. andersonensis* (Warren), and ?*Anatrypa* sp., were collected from a dolomite unit near the middle of the Chinchaga Formation at stations 192NB and 193NB (line of section 16, Fig. 4). A poorly preserved brachiopod, suggestive of *Emanuella* sp. was collected from brecciated limestone of the Hay Camp Member at Bell Rock on Slave River. Middle Devonian fossils were reported by Camsell (1917a, p. 139) and Cameron (1922a, p. 18) from grey shaly limestone overlying gypsum outcropping immediately below Pointe Ennuyeuse. These limestone beds are low in the Chinchaga Formation and possibly correlative with the Hay Camp Member at Bell Rock.

In addition, a number of Middle Devonian fossils have been collected from Hay Camp beds, as well as provisionally dated Middle Devonian fossils from the still lower Fitzgerald dolomite, both outcropping on Slave River southeast of the Great Slave Lake region (*see* Norris, 1963). The Chinchaga Formation is overlain throughout most of the area by fossiliferous beds of Middle Devonian (Givetian) age. On the basis of the above evidence the Chinchaga Formation is dated as Middle Devonian. The presence of ?*Anatrypa* sp. suggests a possible lower Middle Devonian (Eifelian) age for part of the Chinchaga Formation because in the lower Mackenzie basin this form occurs in beds well below *Stringocephalus* sp.

Cameron (1918, p. 25), Hume (1921, p. 33; 1926, pp. 61-62), and Foerste (1926), on the basis of fossils collected from brown dolomite talus two miles southwest of Gypsum Point dated the beds immediately overlying the red beds (Mirage Point Formation) as Silurian. No evidence was found to substantiate this dating either here or in any other part of the area mapped.

Hay Camp Member

The name Hay Camp Formation was applied by the writer (1963) to a partly brecciated limestone unit outcropping on Slave River which overlies evaporites and is unconformably overlain by a limestone unit named the La Butte Formation. Rocks of lithology similar to the Hay Camp Formation, underlain and presumed to be overlain by evaporites, outcrop at Bell Rock on Slave River a few miles west of Fort Smith. These rocks are referred to the Hay Camp, here reduced to member status within the Chinchaga Formation.

The Bell Rock exposure has been known for a long time as it is on the downstream end of a well-travelled portage around a series of rapids on Slave River between Fitzgerald and Fort Smith, and has been described by Camsell (1917a, p. 139) and Cameron (1922a, p. 18). Bell Rock consists of a small squarish knob of rock about 30 feet back from the edge of the south bank of Slave River. The section is best exposed on the north side of the knob along a steep cliff where about 35 feet of limestone breccia on the east side is in vertical fault contact with gypsum and shale overlain by contorted limestone and shale on the west (*see* Section 30 in Appendix). The breccia is massive and contains a variety of coarsely angular fragments comprising pale brown aphanitic limestone, dark brown laminated limestone, dark grey laminated limestone containing brecciated fragments, and an occasional fragment of light buff brown, fine-grained dolomite which seem to be more abundant towards the top. The matrix of the breccia consists of finer fragments of the same material.

Equivalent unbrecciated but contorted beds of the Hay Camp Member on the west side of the fault consist of thinly bedded, pale brown, very fine-grained in part vuggy limestone; interbedded with soft brown shale and nodular limestone. These beds conformably overlie a sequence, 12 feet exposed, of gypsum interbedded with greenish grey shale.

There is a vague suggestion that the brecciated limestone sequence may be overlain by a thin veneer of unbrecciated limestone, but, because of poor exposure at the top of Bell Rock this cannot be definitely proven without excavating. This veneer, if present, may be in part equivalent to beds called the La Butte Formation on Slave River to the south.

A second exposure north of Bell Rock of beds here assigned to the Hay Camp Member was reported by Camsell (1917a, p. 139) and Cameron (1922, p. 18) to outcrop on the point on the east side of the river immediately below Pointe Ennuyeuse. The section at this locality consists of grey, shaly fossiliferous limestone underlain by 4 feet of thin-bedded, impure, grey gypsum.

Fossils and age

The fossils and age of the Hay Camp Member are discussed under the Chinchaga Formation.

Little Buffalo Formation

In the southeastern part of the region a carbonate unit lying between evaporitic beds of the Chinchaga Formation (below) and Nyarling Formation (above) and roughly equivalent to the lower part of the Pine Point Formation to the north, is here named the Little Buffalo Formation. These beds were discussed but unnamed in an earlier report by Norris (1963) dealing with the Devonian stratigraphy of northeastern Alberta and northwestern Saskatchewan. In the preliminary report by Douglas (1959b) covering the Great Slave map-area, these beds were included in the basal part of map-unit 10. The unit is named after Little Buffalo River where it is exposed in the immediate vicinity of the falls where the river cuts through an eastward facing escarpment, some 28 miles west of Fort Smith. The resistant

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carbonate beds cap the escarpment and can be traced from south of 60° latitude, the southern limit of the Great Slave Lake region, north-northwest for a distance of about 50 miles. The relief of the escarpment is highest in the south, being about 160 feet west of Fort Smith, and gradually diminishes in height northward to where it disappears as a topographic feature in the vicinity of Nyarling River.

The Little Buffalo Formation consists of two main rock units, informally designated as members; a lower 'Dolomite', and an upper 'Limestone and Dolomite'. The unnamed 'Dolomite' Member is completely exposed at the lower or main falls on Little Buffalo River where it is close to 56 feet thick (*see* Section 30 in Appendix). It consists mainly of pale to dark brown, aphanitic to medium-grained, thick-bedded to massive dolomite; some massive, coarsely vuggy dolomite; some carbonaceous laminated dolomite near the base; and banded dark grey to black, in part brecciated, carbonaceous limestone at the base. The contact with the top 3 feet of the underlying evaporite beds of the Chinchaga Formation, exposed near the base of the falls, is sharp and appears to be conformable.

The unnamed 'Limestone and Dolomite' Member of the Little Buffalo Formation conformably overlies the 'Dolomite' Member and is the resistant capping rock of the upper escarpment. A succession about 40 feet thick of this unit is discontinuously exposed on Little Buffalo River between the lip of the lower falls to just above the upper falls, a meandering river distance of about three-quarters of a mile. The lower 20 feet of this succession consists mainly of medium brown, aphanitic, rubbly thin-bedded fossiliferous limestone separated by argillaceous limestone and shale partings of the same colour. A recessive unit 2.9 feet thick of brown, medium-grained granular dolomite is present about 12 feet above the base. A covered interval of about 2 feet separates the rubbly bedded fossiliferous limestone from overlying medium to dark brown, fine- to coarse-grained, irregularly bedded gypsiferous dolomite. About 15 feet of this upper unit is discontinuously exposed in the vicinity of the upper falls. A short distance westward the Little Buffalo Formation is overlain by evaporites of the Nyarling Formation but the contact is not exposed.

Little Buffalo Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
30	185NB	16	*c.* 4.7	East bank of Little Buffalo River, 0.3 mile above the main falls
	186NB	16	*c.* 15	North bank of Little Buffalo River immediately east of a right angle bend in river and opposite a small falls with a four foot drop; 0.2 mile above the main falls
	187NB	16	*c.* 14	East bank of Little Buffalo River 0.1 mile above main falls
	188NB	16	*c.* 88	Main falls on Little Buffalo River 21 miles bearing 275T from Bell Rock on the south bank of Slave River

Fossils, age, and correlation

Fossils identified from Little Buffalo Formation are as follows:

sponge spicules
undet. cup coral
?*Gypidula* sp.
Atrypa sp. cf. *A. arctica* Warren
Atrypa sp. cf. *A. perfimbriata* Crickmay
Spinatrypa sp.
Emanuella meristoides (Meek)
cf. *Emanuella* sp.
Mastigospira sp.
undet. gastropods
undet. pelecypods
cf. *Michelinoceras* sp.
Dechenella sp.
crinoid ossicles

The lower 'Dolomite' Member of the Little Buffalo Formation appears to be unfossiliferous. Some beds, particularly the limestones, of the upper 'Limestone and Dolomite' Member of the formation are richly fossiliferous. A composite list of all fossils collected from the Little Buffalo Formation is presented in the accompanying table.

The Little Buffalo Formation is tentatively dated as Middle Devonian (Givetian) age because some of its fauna, particularly *Mastigospira* sp. and *Atrypa* sp. cf. *A. perfimbriata,* are commonly associated with *Stringocephalus* sp. at a number of localities elsewhere in western Canada.

Many of the forms present in the upper member of the Little Buffalo Formation are present also in the La Butte Formation outcropping on Slave River in northeastern Alberta, and in the lower part of the Methy Formation outcropping on the upper reaches of the Clearwater River in northwestern Saskatchewan (*see* Norris, 1963) suggesting that these rock units are probably of roughly the same age.

The lower 'Dolomite' Member of the Little Buffalo Formation is not represented on Slave River, and, contrary to a suggestion made earlier (Norris, 1963), it is probably younger than the Hay Camp Formation.

The Little Buffalo Formation although of different facies is probably approximately equivalent, on the basis of stratigraphic position, to the basal Limestone Member of the Pine Point Formation outcropping in the Fort Resolution area, and to the Lonely Bay Member of the Pine Point Formation and Lonely Bay Formation outcropping on the northwest side of Great Slave Lake.

The stratigraphic position of the Little Buffalo Formation between two evaporitic sequences, the Chinchaga and Nyarling Formations, is analogous to that of the Keg River Formation between the evaporitic Chinchaga and Muskeg Formations in the subsurface of northwestern Alberta.

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Lonely Bay Formation

The name Lonely Bay Formation is applied to a resistant carbonate unit conformably overlying the evaporitic Chinchaga Formation and overlain by shale and limestone of the Horn River Formation. It is essentially the northwestward equivalent of the unit called the Lonely Bay Member of the Pine Point Formation immediately northeast of Lonely Bay on the northwest side of Great Slave Lake (*see* p. 58 of this report). It corresponds with the basal part of map-unit 13 of Douglas and Norris (1960). The outcrop belt from the arbitrary cut-off with the Lonely Bay Member, 12 miles north of Lonely Bay, to the vicinity of the headwaters of Duport River is between 4 to 10 miles wide and trends roughly northwest. Beyond Duport River the position and width of the belt is largely conjectural. In the south the outcrop belt is characterized by relatively high flat ground and contrasts strongly with the terrain on each side which is low, flat, and on which there are numerous lakes, sloughs, and muskegs. Northwest of Duport River these distinctions become less evident.

The best exposures of the Lonely Bay Formation like those of the Lonely Bay Member of the Pine Point Formation to the south, are along the prominent escarpment marking the northeast side of the southern part of the belt. The lower part of the Lonely Bay Formation consists (*see* Sections 27, 28, 33, and 34) of massive dark brown aphanitic in part stylolitic limestone; thinly bedded light grey fine-grained to aphanitic limestone, weathering orange-brown; irregularly thin-bedded light olive grey to medium grey, fine-grained limestone; medium-bedded grey

Lonely Bay Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
32	383NB	5	19.5	Sink-hole 42.7 miles bearing 264T from Fort Rae
33	342NB	6	42	Outlier 21.4 miles bearing 264T from Pointe du Lac. Includes upper beds of Chinchaga Formation
27	341NB	6	23	Escarpment 24.6 miles bearing 262T from Pointe du Lac. Includes upper beds of Chinchaga Formation
	332NB	8	13	17 miles west of Alexander Point. Includes upper part of Chinchaga Formation
28	330NB	8	81	20 miles west of Baker Point. Lower 20 feet of section is gypsum of the Chinchaga Formation
	331NB	8	35	16 miles west of McIver Point. Lower 23.1 feet of this section is gypsum of the Chinchaga Formation
34	53NC	8	32	24 miles west of McIver Point
	52NC	8	*c.* 4	27 miles west of Alexander Point
	51NC	8	3	30 miles west of Redrock Point

aphanitic slightly dolomitic limestone; and thinly bedded pale brown slightly argillaceous limestone. About 20 feet of younger beds are exposed in a sink-hole lake about 24 miles south of the south end of Lac la Martre. The section there (*see* Section 32) consists of massive, dark to medium brown, fine-grained, fetid limestone, overlain by irregularly thin-bedded medium brown, fine-grained to aphanitic limestone interbedded with nodular limestone.

The lower contact with the evaporitic Chinchaga Formation is exposed at several localities (*see* Sections 27, 28, 33, and 34) and appears to be structurally conformable. The contact with overlying shale of the Horn River formation is not exposed.

The total thickness of the Lonely Bay Formation is estimated to be about 120 feet at the southern end of its outcrop belt; in the northwestern part of the region it probably thickens to about 280 feet on the basis of the width of the belt it is presumed to occupy.

Fauna, age, and correlation

Fossils identified from the Lonely Bay Formation are as follows:

calcareous sponge
stromatoporoids
undet. colonial corals
Alveolites sp. G
Aulopora sp.
Syringopora sp. D
undet. cup corals
Atrypa sp.
Spinatrypa sp. cf. *S. lata* (Warren)
Spinatrypa sp.
?*Emanuella* sp.
undet. brachiopods
?*Tentaculites* sp.
cf. *Euomphalus* sp.
undet. gastropods
crinoid ossicles

As with the Lonely Bay Member of the Pine Point Formation, the Lonely Bay Formation marks the earliest appearance of relatively abundant Middle Devonian fossils on the north side of Great Slave Lake. A comparison with the fossil list for the Lonely Bay Member of the Pine Point Formation to the south indicates an absence of corals and stromatoporoids from the latter unit. Of the corals, *Alveolites* sp. G has not been recognized elsewhere, and *Syringopora* sp. D occurs in the Middle Devonian ("Ramparts Formation") of the Quiet Lake map-area, northeastern British Columbia. The brachiopod fauna of the Lonely Bay Formation is much less abundant both numerically and in variety than it is in the Lonely Bay Member. With the possible exception of *Productella* sp., all of the brachiopods from both these units range considerably higher and also lower in the Middle

Devonian succession of the Great Slave Lake area, and thus are of little help for precise correlation. Of some significance is the apparent absence of *Stringocephalus* sp. in both these units.

On the basis of stratigraphic position, both the Lonely Bay Formation and Member are possibly roughly equivalent to the Limestone Member of the Pine Point Formation in the Resolution area, and possibly in part equivalent to the Little Buffalo Formation south of Great Slave Lake. The upper contacts of these units are probably not equivalent throughout the area. On the basis of the fauna, and field relations to other rock units of the Middle Devonian succession of the Great Slave Lake area, the Lonely Bay Formation (and Member to the south) are tentatively assigned a Middle Devonian, possibly lower Givetian age.

Horn River Formation

The name Horn River shale was proposed by Whittaker (1922, pp. 51-52) for shales outcropping discontinuously along the banks of Horn River for a distance of about 9.5 miles (air distance) above the mouth of Ferguson Creek (*see* Fig. 2). At four localities along the river between 5.4 to 6 miles (air distance) above the mouth of Ferguson Creek limestone beds overlie the shale which Whittaker (1922, pp. 51-52) referred to the Pine Point Formation. In a preliminary report on the Horn River map-area (Douglas and Norris, 1960), the exposures on Horn River were included in the Horn River Formation (map-unit 14). A thin sequence of limestone outcrops also on Clive River near the northwest edge of the Great Slave Lake region (*see* Fig. 2) which were included in map-unit 13

Horn River Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	1PI to 45PI inclusive	5	5 to 12 total *c.* 35	Shale is exposed at all these stations on banks of Horn River for a stretch of about 9.5 miles (air distance) above mouth of Ferguson Creek
53	29PI to 32PI inclusive	5	total *c.* 15	Limestone overlying shale at these stations on banks of Horn River 5.4 to 6 miles above the mouth of Ferguson Creek
	173MD	not plotted	*c.* 8	Clive River, about 5 miles (air distance) downstream from point of intersection with 63°N. Limestone is brought to surface by a gentle anticline
	174MD	not plotted	*c.* 15	Clive River, about 9.5 miles (air distance) downstream from point of intersection with 63°N; section measured on north bank of river immediately below rapids
				The sequence exposed here is the best of a series of outcrops brought to the surface by gentle folding between stations 173MD and 174MD

Horn River Formation Subsurface Data

Name of well	Thickness (feet)	Locality and comments
Punch Deep Bay No. 5	145	61°26′N, 117°11′W. Top, 860′; bottom, 1,005′
Punch Deep Bay No. 2	?24	61°21′N, 116°56′W. Top, 760′; bottom, ?784′
Punch Deep Bay No. 7	210	61°23′N, 116°55′30″W. Top, 630′; bottom, 840′
Punch Deep Bay Nos. 6 and 3	318	61°22′30″N, 116°52′W. Top, 590′; bottom, 908′
N.W.T. Deep Bay No. 3	?348	61°20′N, 116°42′30″W. Top, ?477′; bottom, 825′

Picks by Helen R. Belyea (*in* Thoms and Coad, 1960, p. 9).

(Douglas and Norris, 1960). All of the above beds are here assigned to the Horn River Formation and the eastern or lower contact of this formation is considered to lie farther to the northeast than formerly mapped. The Horn River Formation is here redefined to apply to a unit consisting largely of dark shales variably interbedded with limestones, which overlies limestones of the Lonely Bay Formation or lower part of the Pine Point Formation, and is unconformably overlain by green shales of the Fort Simpson or Hay River Formation, or by reefoid limestone of the Horn Plateau Formation. The shale exposed on Horn River is dark grey in colour, mainly non-calcareous, soft, fissile, rubbly bedded, and weathers into small irregular flakes, and is everywhere well jointed. Orange and rusty brown iron staining and sulphurous encrustations are common in some outcrops. Some 35 feet of composite section is estimated to be present in the outcrop area; the lower contact is not exposed. Similar beds are believed to underlie a large area east of the Horn River outcrop area suggesting a much greater overall thickness for this unit.

A thin sequence of limestone (about 14 feet exposed) sharply overlies the shale as broken ledges along the top of the banks of Horn River at four localities. It consists of irregularly medium- to thick-bedded, in part richly fossiliferous medium grey limestone and nodular limestone, weathering light grey.

Discontinuous, gently folded limestone exposures representing about 15 feet of section occur along a four-mile stretch of the upper reaches of Clive River between 28 and 32 miles due west of Windflower Lake. The beds consist of olive grey to brownish grey, aphanitic to fine-grained, rubbly bedded, in part richly fossiliferous limestone. This sequence appears to be slightly older than the shale exposed on Horn River some 80 miles to southeast.

In the subsurface the Horn River Formation makes its appearance abruptly in the area immediately north of the northwest end of Deep Bay where it seems to have developed at the expense of the Slave Point and Presqu'ile Formations (*see* Horn River Formation Subsurface Data). Furthermore, the Sulphur Point Formation is greatly reduced in thickness or missing entirely, and the Pine Point Formation is considerably thinner. In the small area north of Deep Bay so far explored

by drilling (*see* Fig. 2) the Horn River Formation varies from 145 feet thick in Punch Deep Bay No. 5 well to 318 feet thick in the Punch Deep Bay No. 6 well.

In the subsurface, beds assigned to the Horn River Formation consist of dark brown to brownish grey, black, chunky to flaky, in part slightly calcareous shale alternating and interbedded with buff grey, aphanitic, variably argillaceous limestone. Silty beds are present in the lower part of the formation at some places. The upper contact is drawn arbitrarily where the colour of the shale changes to green, generally a greenish grey. The lower contact is placed where the lithology changes from shale to limestone, argillaceous limestone, or silty limestone forming the upper beds of the Lonely Bay or lower part of the Pine Point Formation in the Deep Bay area.

Fossils, age, and correlation

No megafossils have been collected from the shale beds exposed on Horn River except for fragmentary organisms suggestive of *Styliolina* sp. reported by Whittaker (1922, p. 52).

Fossils collected from shale beds assigned to the Horn River Formation in the Northwest Territories Deep Bay No. 3 well at a depth of 370 feet comprise:

Styliolina sp.
Atrypa sp.
ostracods

In the same well from a depth of 405 feet, fossils from shale beds include:

Styliolina sp.
ostracods

Fossils identified from Limestone of the Horn River Formation are as follows:

undet. sponge
?*Tentaculites* sp.
?*Buchiola* sp.
cf. *Ontaria* sp.
undet. orthoconic nautiloid
Schizophoria sp.
Productella spp.
Atrypa sp. cf. *A. arctica* Warren
Atrypa sp. cf. *A. perfimbriata* Crickmay
Spinatrypa sp. cf. *S. andersonensis* (Warren)
Spinatrypa sp. cf. *S. lata* (Warren)
Hadrorhynchia sandersoni (Warren)?
cf. *Leiorhynchus castanea* (Meek)
Leiorhynchus castanea (Meek)
Emanuella meristoides (Meek)
undet. brachiopods
Dechenella (*Dechenella*) sp.
crinoid ossicles
undet. organic fragments

The presence of cf. *Leiorhynchus castanea* and *Hadrorhynchus sandersoni*? in the limestone beds on Horn River, and *Leiorhynchus castanea* in the limestone beds on Clive River, suggest that these exposed parts of the Horn River Formation are more or less equivalent to the upper part of the Pine Point Formation as developed in the immediate vicinity of Great Slave Lake.

The Horn River Formation is dated as Middle Devonian (Givetian) age.

Pine Point Formation

The name Pine Point limestones was proposed by Cameron (1918, pp. 25, 26) to apply to what he thought was the lower part of the Middle Devonian succession in the Great Slave Lake area. The name was applied to strata exposed in the vicinity of Resolution and at Pine Point on the south shore of the lake, and to strata exposed on Ketsicta(?) Point on the north shore. He (p. 26) described the formation as thin-bedded, bituminous, dark coloured, fine-grained limestone and limy shales with a thickness of about 100 feet. In the table of formations of his later publication (1922a, p. 13), he described the Pine Point as: "Soft, grey, shaly limestones, blue to black thin-bedded hard limestones, grey to brown shaly limestones" with a thickness of 595 feet in the Northwest Windy Point No. 1 well, unconformably overlying the Fitzgerald dolomites dated as Silurian, and conformably overlain by the Presqu'ile dolomites. Cameron (1922a) described Pine Point strata outcropping on the south side of Great Slave Lake, near Resolution, on Mission Island (actually a fine-grained dolomite), in the vicinity of Pine Point, near crest of hills south of Pine Point, and at two places in Little Buffalo River valley. He described Pine Point strata outcropping on the northwest side of the lake, between Jones and House (?) points, on low hills west of Moraine Point, and on the mainland north of Kolon(?) Island and about House(?) Point. Unfortunately the precise localities of some of the places on the northwest side of the lake mentioned by Cameron are not known because many of his place names were never adopted by the Canadian Board on Geographical Names. Since Cameron's report (1922a), data obtained by drilling in the Great Slave Lake area by a number of companies clearly shows that some of the limestone facies included by Cameron in the Pine Point formation are the lateral equivalents of some of the dolomites which he has assigned to the overlying Presqu'ile Formation. This subsurface data shows also the relationship of some of the other facies within the Pine Point not evident from outcrop data, as well as facies not represented in outcrops. The Pine Point formation is perhaps the most variable unit of the Middle Devonian containing at least five or more distinct facies some of which will no doubt be given formational status in the future.

The Pine Point Formation is here defined as the rocks occupying the stratigraphic interval between the top of the evaporites of the Chinchaga Formation and the base of the coarse dolomite of the Presqu'ile Formation as restricted, or the base of the limestones of the Sulphur Point Formation, the approximate stratigraphic equivalent of the Presqu'ile Formation. On the south side of Great Slave Lake the Pine Point Formation contains the following units designated as members

which grade or intertongue with one another: (1) Limestone Member, (2) Fine-grained Dolomite Member, (3) Bituminous Shale and Limestone Member, (4) Brown Limestone Member, and (5) Buffalo River Shale Member. All of the above are well represented on outcrops except the Buffalo River Shale Member.

On the northwest side of Great Slave Lake the Pine Point Formation contains the following units: (1) a basal limestone named the Lonely Bay Member, and (2) an argillaceous Upper Limestone Member present along and near the shore between Jones and Moraine points. A covered interval presumed to consist of shale and probably a tongue of the Horn River Formation separates these two members. Tracing the Pine Point Formation southwestward away from the outcrop belt into the subsurface of the Deep Bay area, is mainly conjecture based on available information. There (e.g., N.W.T. Deep Bay No. 3 well), strata possibly equivalent to the Pine Point appear to be overlain by strata suggestive of the Horn River Formation.

The various facies of the Pine Point Formation of the outcrop belt are described below and their relationships illustrated in a general way by Figure 3.

Limestone Member (Resolution Area)

In the eastern and central parts of the Cominco Concession of the Resolution area the basal beds of the Pine Point Formation consist of a thin limestone unit. This unit immediately underlies fine-grained granular dolomites comprising the major upper part of the Pine Point Formation in the reef area. The limestone unit is in part exposed in the vicinity of Fort Resolution where it is estimated to be about 110 feet thick. Underlying Palaeozoic beds are not exposed although knobs of Precambrian rocks outcrop a short distance north and northeast of Fort Resolution. However, subsurface data indicates that evaporites of the Chinchaga Formation immediately underlie this Limestone Member along the reef belt west of Fort Resolution.

In outcrops (*see* Section 39 in Appendix) this unit consists of medium brown, thin- to thick-bedded, hard, aphanitic, conchoidally fracturing limestone, weathering mainly a light brownish grey; interbedded with minor nodular argillaceous limestone, and shale, all of the same colour.

In the subsurface from 2.5 to 67.4 feet of the upper part of this limestone unit has been penetrated by a number of shallow diamond drill test holes between Dawson Landing and Little Buffalo River. East of Paulette Island these upper beds are brownish grey, very fine-grained limestone with minor irregular dark shaly partings. West of Paulette Island these upper beds of the Limestone Member consist of dark grey fossiliferous shaly limestone.

In the Cominco Test G-1 well this limestone unit is close to 83 feet thick. The lower part of the unit (35 feet thick) consists of light brownish grey to brown, fine-grained to aphanitic, in part stylolitic limestone with thin irregular partings and beds of fragmental limestone and shale. The upper part (47.7 feet thick) consists of greyish brown, aphanitic to fine-grained limestone, containing irregular dark bituminous shaly partings. The limestone unit in this well is underlain by 7.7 feet

of finely granular dolomite containing bituminous shaly material sharply overlying silty dolomite which may or may not properly belong in the basal part of the Pine Point Formation.

Across strike and on the north flank of the reef area, as in the Cominco Test G-4 well located about 13 miles northwest of the G-1 well, the stratigraphic equivalent of the Limestone Member consists of cherty fine-grained dolomite.

About 51 miles along strike west-southwest of the G-1 well, in the Frobisher Hay River No. 8 well, the upper 58 feet of the Limestone Member has been penetrated. There, the section consists mainly of dark brownish grey, finely crystalline shaly limestone and limestone, containing in some places black shale partings. A few feet of dark brown finely crystalline dolomite is present near the top of the sequence suggesting that the contact with the overlying fine-grained dolomite member of the Pine Point Formation is transitional.

Outcrop Data on Limestone Member of the Pine Point Formation (Resolution Area)

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
39	99NB	11	15.8	North end of rock quarry 0.8 mile north of Fort Resolution Settlement
	98NB	11	16	South end of rock quarry 0.6 mile north of Fort Resolution Settlement
	103NB	11	3	Fort Resolution wharf area

Subsurface Data on Limestone Member (Resolution Area) of the Pine Point Formation

Name of well	Thickness (feet)	Locality and comments
Cominco Test G-1	82.7	60°51′05″N, 114°24′30″W. Top, 592.3′; bottom, 675.0′
D4	2.5 & 6.2	Line DC. Top, 214′; bottom, 216.5′. Top, 219.8′; bottom, 226′ (incomplete). Shaly limestone
D5	2.7	Line DC. Top, 210.3′; bottom, 213.0′ (incomplete). Dark grey shaly limestone; fossiliferous
D15	49	Line DC. Top, 205.0′; bottom, 254.0′ (incomplete). Buff to medium grey fine-grained limestone with numerous dark shaly interbeds
D59	20.6	Line DI. Top, 282.0′; bottom, 302.6′ (incomplete). Brownish grey, very fine-grained limestone with argillaceous partings
D58	45.7	Line DJ. Top, 209.6′; bottom, 255.3′ (incomplete). Brownish grey, fine-grained limestone with dark shaly partings.

Subsurface Data on Limestone Member (Resolution Area) of the Pine Point Formation—(Conc.)

Name of well	Thickness (feet)	Locality and comments
D62	67.4	Line DJ. Top, 212.6′; bottom, 280.0′ (incomplete). Light brown, very fine-grained limestone. Limestone in dolomite above. Numerous carbonaceous layers
D48	20.5	Line DD. Top, 192.5′; bottom, 223.0′. Chocolate brown fine-grained limestone
D50	25.4	Line DD. Top, 170.2′; bottom, 125.6′ (incomplete). Limestone
D53	20.3	Line DG. Top, 157.7′; bottom, 178.0′ (incomplete). Grey, very fine-grained limestone with shaly partings
D56	39.8	Line DG. Top, 177.4′; bottom, 217.2′ (incomplete). Brownish grey limestone with dark shaly partings. Limestone in dolomite sequence above
D55	15.0	Line DH. Top, 137.0′; bottom, 152.0′ (incomplete). Brownish grey, very fine-grained limestone with irregular shaly partings.
D57	41.8	Line DH. Top, 165.8′; bottom, 207.6′ (incomplete). Brownish grey, very fine-grained limestone with dark shaly partings.
Frobisher Hay River No. 8	58 incomplete	60°42′N, 115°52′W. Top, 1,019′; bottom, 1,072′.

Fossils, age, and correlation

Fossils collected from exposures of the Limestone Member of the Pine Point Formation include the following:

stromatoporoids
Tentaculites sp.
Atrypa sp. cf. *A. arctica* Warren
Atrypa sp. (medium costate)
Emanuella sp.
crinoid ossicles

Cameron (1922a, p. 20) because of the conspicuous abundance of *Atrypa reticularis,* var. a (*Atrypa* sp. cf. *A. arctica* Warren) referred to these beds as the *Atrypa reticularis* zone. However, in this zone he included the fauna of younger dolomite beds outcropping on Mission Island which are here assigned to the overlying member of the Pine Point Formation.

On the basis of stratigraphic position the Limestone Member of the Pine Point Formation appears to be approximately equivalent to the Lonely Bay Member of the Pine Point Formation on the north side of Great Slave Lake, and to the Little Buffalo Formation to the south. All of these units are somewhat similar to one

another lithologically except for the lower part of the Little Buffalo Formation. They all overlie the Chinchaga Formation but in different areas are overlain by different lithologies.

The fossils in the Limestone Member of the Pine Point Formation are not particularly diagnostic for precise correlation but do indicate a Middle Devonian age.

Bituminous Shale and Limestone Member

Discontinuous exposures of the Bituminous Shale and Limestone Member of the Pine Point Formation occur along the south shore of Great Slave Lake from 0.7 mile east of Isle du Mort to 0.7 mile east-southeast of Dawson Landing wharf, and also along the shores of Green and McKay Islands about 2 miles out from the mainland. This is the type area and typical facies of Cameron's Pine Point Formation. Cameron (1917, pp. 71-72) described sections exposed in the vicinity of Pine Point and on the off-shore islands northeast of Pine Point. These beds have also been penetrated by two diamond-drill holes located about 5.5 miles southwest of Pine Point. There, the beds are present on the south-southeast flank of a west-southwest trending syncline plunging in the same direction but are covered by a thick veneer of drift (*see* Fig. 7, section G-H).

Two main types of lithology are present. One consists of dark strongly calcareous bituminous shale thinly interbedded with medium to dark brown, fine-grained to aphanitic, in part nodular limestone (*see* Sections 41, 43, and 44 in Appendix). These beds are richly fossiliferous, particularly the bituminous calcareous shale. It is these beds that outcrop in the vicinity of Pine Point and on Green and McKay Islands. The other lithology, presumed to be higher in the sequence, outcrops discontinuously along the shore immediately east of Dawson Landing wharf (Section 42 in Appendix). It consists of medium to dark brown, irregularly thin-bedded, very fine-grained to aphanitic, in part petroliferous limestone, weathering a medium brownish grey. Fossils, especially brachiopods, are extremely abundant. Along the shore east of Dawson Landing wharf these beds are in contact, possibly faulted, with fine-grained dolomite described elsewhere.

Shallow diamond-drill holes about 5.5 miles southwest of Pine Point show 140 feet (incomplete) of fossiliferous shaly limestone overlain by a northward-thinning wedge of fine-grained, dense and sandy textured dolomite (about 103 feet thick); succeeded by about 20 feet (top eroded) of medium crystalline porous dolomite of the Fine-grained Dolomite Member. The limestone sequence immediately east of the wharf is separated by a covered interval of about 100 feet from higher beds of the Brown Limestone Member exposed along the escarpment from 1 to 1.5 miles southwest of the wharf. Beds of the Brown Limestone Member are presumed to be in part the facies equivalent of the Fine-grained Dolomite Member present south of the presumed fault (*see* Fig. 7).

Along the shore west of Isle du Mort the Bituminous Shale and Limestone Member appears in part to underlie and intertongue with the shale of the Buffalo River Member of the Pine Point Formation. In the Cominco Test G-4 well, on the east side of Sulphur Point, the Bituminous Shale and Limestone Member is pre-

sumably in part equivalent to a sequence of bituminous limestone (114.5 feet thick) between 358 and 472.5 feet depths that underlies the Buffalo River shale member.

The Bituminous Shale and Limestone Member is not to be confused with argillaceous limestone and limestone beds present in diamond-drill holes 5 to 6 miles southeast of Dawson Landing wharf at 80 to 100 feet depths. There, the latter beds underlie the Fine-grained Dolomite Member and are about 80 feet below the E Shale marker-beds (*see* Fig. 7, sections A-B and I-J). The Bituminous Shale and Limestone sequence exposed in the vicinity of Pine Point is very likely equivalent to beds well above the E Shale markers (*see* Fig. 7; both the Cominco

Outcrop Data for Bituminous Shale and Limestone Member of the Pine Point Formation

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	64NB	11	−0.5	Shoreline immediately east of Dawson Landing wharf
	65NB	11	−0.5	Shoreline 0.2 mile east of Dawson Landing wharf
	66NB	11	1.1	Shoreline 0.3 mile east of Dawson Landing wharf
42	67NB	11	*c.* 1	Shoreline 0.4 mile east of Dawson Landing wharf
	68NB	11	0.3	Shoreline 0.6 mile east of Dawson Landing wharf
	69NB	11	0.5	Shoreline 0.7 mile east of Dawson Landing wharf
	20BI	11	*c.* 1	Discontinuously exposed for a distance of 1,000 feet along the northwest shore of Green Island
	24BI	11	2	Shoreline on the north side of McKay Island 0.4 mile from the east tip
41	23BI	11	under water	Near tip of peninsula on the north side of McKay Island
	21BI	11	*c.* 3	North shore of McKay Island, 0.4 mile from the west tip
	22BI	11	*c.* 2	North shore and near west tip of McKay Island
	63NB	11	*c.* 1	Shoreline 1.4 miles west-northwest of Dawson Landing wharf
	62NB	11	*c.* 0.5	Shoreline 1.5 miles west-northwest of Dawson Landing wharf
	61NB	11	*c.* 3	Loose blocks on shoreline 1.6 miles west-northwest of Dawson Landing wharf
43	60NB	11	6	Shoreline 1.9 miles west-northwest of Dawson Landing wharf
	59NB	11	*c.* 7.5	Shoreline 2 miles west-northwest of Dawson Landing wharf
	58NB	11	1.3	Shoreline 2.2 miles west-northwest of Dawson Landing wharf
	57NB	11	5	Shoreline 2.5 miles west-northwest of Dawson Landing wharf

Outcrop Data for Bituminous Shale and Limestone Member of the Pine Point Formation—(Conc.)

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
44	95NB	11	?	Large loose blocks along shore 2.4 miles southwest of Pine Point
	94NB	11	?	Large loose blocks along shore on small peninsula separating two shallow bays 1.3 miles southwest of Pine Point
	93NB	11	?	Large loose blocks at head of shallow bay 1.1 miles southwest of Pine Point
	56NB	11	2	Exposed along shore of bay 0.6 mile southsoutheast of Pine Point
	55NB	11	?	Large loose blocks along shore of bay 0.5 mile southeast of Pine Point
	92NB	11	?	Large loose blocks along shore 0.9 mile southwest of Pine Point
	91NB	11	?	Large loose blocks along shore 0.5 mile southwest of Pine Point
	90NB	11	?	Large loose blocks along shore 0.4 mile southwest of Pine Point
	52NB	11	*c.* 3	Exposed along shore 0.3 mile southwest of Pine Point
	53NB	11	*c.* 1	Exposed near tip of Pine Point

Subsurface Data for Bituminous Shale and Limestone Member of the Pine Point Formation

Name of well	Thickness (feet)	Locality and comments
Cominco D.D.H. 109	140 incomplete	Located 17,000 feet bearing 190T from Isle du Mort. Shaly limestone, abundant brachiopods; top, 85′; bottom, 133′; thickness, 48′. Shaly limestone; top, 133′; bottom of hole, 225′; thickness, 92′ (incomplete).
Cominco D.D.H. 129	81 incomplete	Located 17,500 feet bearing 187T from Isle du Mort. Shaly limestone, abundant brachiopods; top (eroded), 56′; thickness (incomplete), 30′. Shaly limestone; top, 56′; bottom of hole, 107′; thickness, 51′ (incomplete).
Cominco Test G-4	114.5	Located 2,000 feet southwest of shore of bay immediately east of Sulphur Point at approximately 60°54′N, 114°46′W. Top, 358′; bottom, 472.5′. Bituminous limestone.

Test G-1 and G-4 wells). The name E Shales was introduced by Campbell (1950, p. 93) for thin, distinctive, closely spaced and fairly widespread shaly beds occurring within the Fine-grained Dolomite Member of the Pine Point Formation described elsewhere in this report.

Fossils and age

Fossils collected from beds of the Bituminous Shale and Limestone Member are listed in the accompanying table showing their relative abundance and other data. This member contains the most richly fossiliferous rocks of the Great Slave Lake region. It provided many of the fossils collected by some of the early explorers passing through the Great Slave Lake area some of which were described and illustrated by Meek (1867). Kindle (1916, p. 248) reported on a collection of fossils from the Pine Point locality made by Camsell (1915, p. 56) in 1914 which Kindle dated as Middle Devonian. Cameron (1922a, pp. 14, 20) listed fossils collected in 1916 and 1920 respectively from this facies outcropping in the vicinity of Pine Point and referred to these beds as the *Martinia richardsoni* [=*Emanuella meristoides*] zone because of the extreme abundance of this form. Warren (1944, pp. 127-128) redescribed and illustrated *Martinia* [=*Emanuella*] *sublineata* Meek from the Pine Point (type) locality. Specimens illustrated by Warren and Stelck (1956, Plate IV) as part of their "*Ambocoelia meristoides* fauna" are undoubtedly mainly from the Pine Point locality together with forms more common in younger beds south of Pine Point.

Many of the fossils appear to be facies controlled as they are absent or sparsely represented in contemporaneous beds of different facies outcropping elsewhere in the area. Such fossils are: *Styliolina* sp. (occurring sparsely in younger Brown Limestone Member), *Centroceras* sp., *Lingula minuta* Meek, *Lingula* sp., *Nervostrophia* sp. I, *Devonoproductus* sp. D (=*Productus*? of Meek), *Devonoproductus* sp. E, *Chonetes aurora* Hall, *Chonetes* sp. D, *Leiorhynchus* sp. A Merriam, and *Warrenella kirki* (Merriam). Most of the remaining fauna is less restricted, occurs in a variety of facies types, and is longer ranging.

The fauna of the Bituminous Shale and Limestone Member is contemporaneous with beds containing *Stringocephalus* elsewhere in the area and is dated as Middle Devonian (Givetian) age. In the Great Slave Lake region the latter form ranges in other facies from below to above the Bituminous Shale and Limestone Member.

Fossils identified from Bituminous Shale and Limestone Member of the Pine Point Formation are as follows:

sponge spicules
Cladopora sp.
leptoinophyllid genus E
metriophyllid coral
Thamnopora sp. E
Thamnopora sp. F (=Favosites *polymorpha* of Meek)
Styliolina sp.
Tentaculites sp.
undet. pelecypods
Centroceras sp.
undet. orthoconic ammonoid
undet. inarticulate brachiopods
Lingula minuta Meek
Lingula sp.
Schizophoria mcfarlanei (Meek)
Schizophoria sp.
Chonetes aurora Hall
Chonetes sp. D
Productella sp. cf. *P.* sp. O
Productella sp.
? *Productella* spp.
Devonoproductus sp. D (=*Productus*? of Meek)
Devonoproductus sp. E
Nervostrophia sp. I

Atrypa sp. cf. *A. arctica* Warren
Atrypa sp. (unusually large, med. costate)
Atrypa spp.
Spinatrypa sp. cf. *S. andersonensis* (Warren)
Spinatrypa sp.
Emanuella meristoides (Meek)
Emanuella sp. cf. *E. meristoides* (Meek)
Emanuella sp.
Warrenella sp. cf. *W. franklini* (Meek)
Warrenella kirki (Merriam)
? *Warrenella* sp.
? *Leiorhynchus* sp. A Merriam
Leiorhynchus awokanak McLaren
Leiorhynchus sp.
Leiorhynchus castanea (Meek)
Hadrorhynchia sandersoni (Warren)
Cyrtina sp. cf. *C. panda* Meek
Cyrtina sp.
Dechenella sp.
? *Proetus* sp.
undet. trilobite fragments
undet. ostracods
? spathiocarid fragments
crinoid ossicles

Buffalo River Member

The name Buffalo River Formation was proposed by Campbell (1950, p. 94) for a unit consisting of green shale more than 100 feet thick penetrated by two drill holes of the American Metal Company of Canada immediately west of the mouth of Buffalo River (*see* Fig. 7, section C-D). In this area the shale lies between a southward thinning unit of fine-grained porous dolomite of the Fine-grained Dolomite Member of the Pine Point Formation (above) and a unit of argillaceous limestone of the Bituminous Shale and Limestone Member of the Pine Point Formation (below). Later, Campbell (1957, p. 169) defined the Buffalo River Member as bluish-grey to dark green, fissile, limy shale containing concretionary iron sulphide. He gave a thickness of 165 feet for the Buffalo River Member on data from the Cominco Test G-4 well in the Sulphur Point area. There, the shale lies between limestone of the Sulphur Point Formation (above) and Bituminous Shale and Limestone Member of the Pine Point Formation (below). The Buffalo River shale appears to wedge out southward. It is not known how far north the shale extends beneath the western part of Great Slave Lake.

The writer considers the Buffalo River shale to be a member of the Pine Point Formation. The upper boundary is raised above that selected by Campbell (1957) to include an additional 20.4 feet of strata comprising 7 feet of greyish brown limestone overlain by 13.4 feet of bluish-green fissile shale. So defined, the Buffalo River Member is 185.4 feet thick in the Cominco Test G-4 well which is designated as the type section of the member. The Buffalo River shale is presumably present near the surface in the drift-covered area along the south shore of Great Slave Lake between the east side of Presqu'ile Point and the west side of Isle du Mort. Green shale talus has been reported by Campbell (1950, p. 94) from this stretch of the shoreline.

In stratigraphic position the Buffalo River Member is probably roughly equivalent to the upper part of the Fine-grained Dolomite Member of the Pine Point Formation (described below) which has a maximum thickness of about

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460 feet in the eastern part of the Pine Point area (Cominco Test G-1 well). On the same basis the Buffalo River shale possibly correlates with 165 feet of grey shaly limestone present between 175 and 340 feet depths in the Northwest Windy Point No. 1 well on the northwest side of Great Slave Lake.

Subsurface Data for Buffalo River Shale Member of the Pine Point Formation

Name of well	Thickness (feet)	Locality and comments
Cominco Test G-4	185.4	2,000 feet southeast of shore of bay immediately east of Sulphur Point at approximately 60°54′N, 114°46′W. Top, 172.6′; bottom, 358′
The American Metal Co. of Canada Ltd.	*c.* 132	2.7 miles on bearing 162T from mouth of Buffalo River. Top, *c.* 330′; bottom, *c.* 462′
The American Metal Co. of Canada Ltd.	*c.* 114	3.5 miles on bearing 168T from mouth of Buffalo River. Top, *c.* 361′; bottom *c.* 475′

Brown Limestone Member

Beds equivalent to the upper part of the Fine-grained Dolomite Member of the Pine Point Formation are discontinuously exposed in a series of low escarpments between 1 and 1.7 miles southwest of Dawson Landing wharf where approximately 55 feet of section is represented (*see* Section 45 in Appendix). The beds consist of very dark to medium brown, fine-grained, mainly thinly bedded and laminated, in part petroliferous and argillaceous limestone. An occasional bed of brown, medium- to coarse-grained, vuggy dolomite is also present within the sequence. Most of the limestone beds contain a rich brachiopod fauna. This member is presumed to closely underlie the coarse replacement dolomite of the Presqu'ile Formation and is separated from the underlying Bituminous Shale and Limestone Member exposed in the vicinity of Dawson Landing by a covered interval of about 100 feet. Laterally, these beds presumably grade or intertongue with the upper part of the Fine-grained Dolomite Member of the Pine Point Formation, and it is possibly the lateral equivalent of part of the shale facies of the Buffalo River Member, present also in the near vicinity.

Fossils

The Brown Limestone Member contains the youngest Pine Point fauna collected on the south side of Great Slave Lake which is listed in the accompanying table. The most abundant form is *Warrenella* sp. cf. *W. franklini* (Meek). Other forms in this member that appear to have a restricted range include *Leiorhynchus awokanak* McLaren, and *Leiorhynchus* sp. cf. *L. castanea* (Meek).

Fossils identified from Brown Limestone Member of the Pine Point Formation are as follows:

Thamnopora sp.
? *Styliolina* sp.
Cyrtina sp.
Chonetes aurora Hall
Productella sp.
Devonoproductus sp. D (=*Productus*? of Meek)
Atrypa sp. cf. *A. perfimbriata* Crickmay
Emanuella meristoides (Meek)
Warrenella sp. cf. *W. franklini* (Meek)
Leiorhynchus awokanak McLaren
Leiorhynchus sp. cf. *L. castanea* (Meek)
Leiorhynchus sp.
? *Leiorhynchus* sp.
Dechenella sp.
crinoid ossicles
undet. organic fragments

Fine-grained Dolomite Member

The upper 460 feet of a total thickness of 540 feet for the Pine Point Formation in the Cominco Test G-1 well, on the south side of Great Slave Lake is composed of fine-grained dolomite. It overlies the Limestone Member of the Pine Point Formation and is overlain by dolomite of the Presqu'ile Formation. On the north flank of the Presqu'ile dolomite in the Cominco Test G-4 well (*see* Fig. 7, section E-F), the fine-grained dolomite is about one-half as thick, and forms the basal member of the Pine Point Formation. There, it lies between the Chinchaga Formation (below) and the Bituminous Shale and Limestone Member of the Pine Point Formation (above). Northwestward, as in the Northwest Territories Big Island No. 1 well, rock of this facies is only 20 feet thick and apparently pinches out in this vicinity within limestones of the bottom quarter of the Pine Point Formation.

Parts of this member are discontinuously exposed along the south shore of Great Slave Lake from just east of Dawson Landing wharf eastward to the mouth of Little Buffalo River. Immediately east of the wharf this member appears to be in fault contact with beds of the Bituminous Shale and Limestone Member of the Pine Point Formation. The Fine-grained Dolomite Member is also present on Mission, Round, Loutit Islands, the Burnt Island group consisting of three islands, Beaulieu Island, and probably underlies Moose, Deer, Birch, and Paulette Islands, where its presence is indicated by loose blocks. In a preliminary report covering the Great Slave Lake area, Douglas (1959b) included these rocks in map-unit 11b of the Pine Point Formation. Both Cameron (1918, 1922a) and Campbell (1950, 1957) included parts or all of this unit in the Presqu'ile Formation. On the northwest side of the lake, in the Windy Point—Sulphur Bay area, a similar but

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stratigraphically higher fine-grained dolomite underlies, overlies, and interfingers with massive coarsely recrystallized dolomite and is considered a part of the Presqu'ile Formation.

South of the recrystallized belt the Fine-grained Dolomite Member appears to grade or interfinger with evaporites of the lower part of the Nyarling Formation. On the north flank of the recrystallized belt, roughly the upper half of the Fine-grained Dolomite Member abruptly changes facies to Bituminous Shale and Limestone Member.

A short distance southwest of the mouth of Buffalo River (Fig. 7, section C-D) a number of drill holes have penetrated the upper part of this unit. There, the upper beds consist of sandy varicoloured dolomite and minor limestone, which in part overlies and interfingers with a southward-thinning wedge of the Buffalo River Shale.

In the eastern part of the recrystallized belt where this member is thickest the basal beds consist of grey, finely crystalline, compact, vuggy and fractured dolomite about 85 feet thick. In some places a thin bed of shaly limestone is present 10 feet above the base of the dolomite. The dolomite is in sharp contact with underlying dark argillaceous limestone (Limestone Member of the

Outcrop Data for Fine-grained Dolomite Member of the Pine Point Formation

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
			SOUTH SIDE OF GREAT SLAVE LAKE	
40	102NB	11	4.5	Mission Island
	99NB	11	loose blocks	Moose Deer Island
40	101NB	11	1.5	Mission Island; exposed as a pavement just above and below lake level
	98NB	11	2	Round Island, near east end
	97NB	11	loose blocks	Round Island, near west end
	88NB	11	1	Loutit Island
	89NB	11	loose blocks	Northeast island of Burnt Islands group
	17BI	11	1.5	Middle island of Burnt Islands group
40	16BI	11	loose blocks	Middle island of Burnt Islands group
	18BI	11	2	Southwest island of Burnt Islands group
	19BI	11	*c.* 2	Southwest island of Burnt Islands group
	25BI	11	2.5	Beaulieu Island
	79NB	12	loose blocks	Mouth of Little Buffalo River
	80NB	12	4	0.6 mile west of mouth of Little Buffalo River
	82NB	12	loose blocks	Birch Island
	77NB	12	loose blocks	5 miles west of mouth of Little Buffalo River
	74NB	12	loose blocks	2.7 miles east-southeast of Dawson Landing wharf
	73NB	12	loose blocks	2.6 miles east of Dawson Landing wharf
	72NB	12	loose blocks	2.4 miles east of Dawson Landing wharf
	71NB	12	loose blocks	2.2 miles east of Dawson Landing wharf
	70NB	12	loose blocks	2 miles east of Dawson Landing wharf

Subsurface Data for Fine-grained Dolomite Member of the Pine Point Formation

Name of well	Thickness (feet)	Locality and comments
Cominco Test G-1	459.7	60°51′05″N, 114°24′30″W. Top, 132.6′; bottom, 592.3′
Cominco Test G-4	237	2,000 feet southeast of shore of bay immediately east of Sulphur Point at approximately 60°54′N, 114°46′W. Top, 472.5′; bottom, 709.5′
Frobisher Hay River No. 8	119	60°42′N, 115°52′W. Top, 900′; bottom, 1,019′
Northwest Territories Escarpment Lake No. 1	160	60°35′42″N, 116°13′W. Top, 1,590′; bottom, 1,750′
Northwest Territories Big Island No. 1	20	61°08′N, 116°42′W. Top, 1,239′; bottom, 1,259′. A tongue or lentil within limestone of the lower quarter of the Pine Point Formation.

Pine Point Formation) described in another part of this report. Overlying the basal dolomite unit are two beds of green shale and argillaceous dolomite, 3 feet and 1 foot thick respectively, separated by 3 feet of dark brown dolomite. These shale beds were referred to as the E-2 (lower) and E-1 (upper) horizons by Campbell (1950, p. 93). The overlying interval between the top of E-1 horizon to the base of Presqu'ile Formation is about 310 or more feet thick and consists mainly of light brown, fine-grained, sandy or sugary textured, porous dolomite. Roughly the basal 20 feet of this unit is harder, finer grained, more compact, and greyish rather than light brown in colour. Coal-like carbonaceous material is present in this interval between 100 to 130 feet above the top of the E-1 horizon marker. The Fine-grained Dolomite Member is capped in most places of the Cominco Concession area (*see* Campbell, 1957, Fig. 1) by a unit averaging about 7 feet thick consisting of fine-grained dolomite containing numerous stromatoporoids, corals, and bryozoans. The contact with the overlying Presqu'ile Formation is only roughly parallel to horizon markers within the Pine Point and Presqu'ile Formations.

The relatively thick sequence in the Cominco Test G-1 well (*see* Douglas, 1959b, p. 40) between 132.6 to 592.3 feet depths (459.7 feet thick) is designated as the type section of this member.

Fossils

Fossils collected in place and loose from the Fine-grained Dolomite Member of the Pine Point Formation are recorded in the accompanying table. Fossils are relatively rare and those found are generally poorly preserved because of recrystallization. Moulds strongly suggestive of *Stringocephalus* sp. were noted near the base of the member on Mission Island which is probably close to 120

feet above the base of the Pine Point Formation. A higher occurrence of *Stringocephalus* sp. in rocks probably within the lower part of the upper half of this member is recorded by Cameron (1922a, p. 22) from the middle island of the Burnt Islands group. These occurrences along with evidence presented elsewhere suggests that *Stringocephalus* ranges throughout most of this member as well as into the overlying beds of the Presqu'ile and Sulphur Point Formations. The remaining fauna is not unlike that occurring in much greater abundance in undolomitized parts of the Pine Point Formation.

Fossils identified from the Fine-grained Dolomite Member of the Pine Point Formation are as follows:

undet. stromatoporoids
Cladopora sp.
Favosites sp.
undet. coral
undet. bryozoa
? *Gypidula* sp.
? *Atrypa* sp.
Atrypa sp. (finely costate)
Atrypa sp. (med. costate)
Spinatrypa sp.
Hadrorhynchia sp. cf. *H. sandersoni* (Warren)
Emanuella sp. cf. *E. meristoides* (Meek)
? *Stringocephalus* sp.
Stringocephalus sp.
crinoid ossicles
undet. organisms

Lonely Bay Member

The rank of the Lonely Bay Formation is reduced to member status within the Pine Point Formation on the northwest side of Great Slave Lake. The name is applied to a basal carbonate unit of the Pine Point Formation which conformably overlies the evaporitic Chinchaga Formation and is overlain by a tongue of the Horn River Formation which wedges out to the south in this area. Beyond an arbitrary cut-off, 12 miles northwest of Lonely Bay, this unit is referred to as the Lonely Bay Formation described in another part of this report. The Lonely Bay Member underlies a northwest-trending belt between 8 to 9 miles wide which intersects the east side of Lonely Bay. Lower parts of the member outcrop at several localities along a prominent irregular east-facing escarpment marking the east side of the outcrop belt. These lower beds (*see* Sections 36, 37, and 38) consist of irregularly thick- to thin-bedded pale brown limestone weathering light grey; rubbly-bedded medium brown aphanitic in part richly fossiliferous argillaceous limestone with shale partings; and medium brown very hard aphanitic conchoidally fracturing slightly dolomitic limestone. Oil staining is present in places along fractures in some beds. Younger beds of

the Lonely Bay Member are exposed in a sink-hole a short distance north of Lonely Bay (*see* Section 35) and consist of thickly bedded to massive medium brown fine-grained limestone weathering light to medium grey. The total thickness of the Lonely Bay Member is estimated to be about 120 feet.

Outcrop Data for Lonely Bay Member of the Pine Point Formation

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
35	275NB	9	23	Sink-hole 27 miles bearing 268T from Gypsum Point
36	273NB	10	*c.* 45	2.2 miles northwest of Long Island. Beds discontinuously exposed
37	274NB	10	*c.* 27	6 miles west-northwest of Long Island. Beds discontinuously exposed
38	272NB	10	11.5	5 miles west of Long Island
	198NB	10	*c.* 1	Peninsula at east end of Lonely Bay

Fossils

Fossils from the Lonely Bay Member of the Pine Point Formation are listed in the accompanying table showing their relative abundance and other data. This fauna is discussed in another part of this report under the Lonely Bay Formation.

Fossils identified from Lonely Bay Member of the Pine Point Formation are as follows:

Productella sp.
Atrypa sp. cf. *A. arctica* Warren
Spinatrypa sp. cf. *S. lata* (Warren)
Spinatrypa sp.
Emanuella meristoides (Meek)
? *Emanuella* sp.
cf. *Euomphalus* sp.
undet. gastropods
cf. *Paracyclas* sp.
Michelinoceras sp.
undet. trilobite fragments
crinoid ossicles

Horn River Tongue

Along the northwest shore of Great Slave Lake a covered interval presumed to be about 100 feet thick separates the Lonely Bay Member from the Upper Limestone Member of the Pine Point Formation. This covered interval occupies a belt extending from the western half of Lonely Bay to immediately west of Moraine Point. On the basis of topography, talus fragments seen on Northwest Point, and well data immediately northwest of Deep Bay, it is presumed that a

tongue of soft beds of shale and argillaceous limestone of the Horn River Formation (described elsewhere) extends southeastward to occupy this interval. Among a mixture of loose pebbles, cobbles, and boulders seen on Northwest Point were fragments of dark shale and argillaceous limestone containing numerous *Tentaculites* sp. which may have come from this interval.

Upper Limestone Member (Moraine Point to Cranberry Islands area)

About 215 feet of the upper part of the Pine Point Formation is discontinuously exposed east of the Presqu'ile Formation area on the northwest side of the lake (*see* Fig. 8). The older beds of the sequence outcrop near and along the shore between opposite Shoal Point southward to the south side of Jones Point. Younger beds of the sequence outcrop on the east side of the Middle and South Cranberry Islands, on Gooseberry Island just below water level, and along the east edge of the Presqu'ile Formation north of the northeast end of Sulphur Bay and east of Prairie Lake. Contrary to Cameron (1918, pp. 26, 27) and Hume (1927, pp. 93-94) who considered these beds as part of the Slave Point Formation, this sequence underlies the Presqu'ile dolomite. A covered interval about 100 feet or more thick separates the above sequence from the Lonely Bay Member of the Pine Point Formation.

Outcrop Data for Upper Limestone Member of the Pine Point Formation

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	200NB	9	*c.* 8	4.4 miles bearing 254T from Moraine Point. Beds exposed are approximately equivalent to strata at 39NC
46	201NB	10	*c.* 1	North shore of Caribou Bay 1.8 miles southwest of the tip of John Point
	36NC1	10	*c.* 1	North shore of Caribou Bay 2 miles southwest of John Point
	37NC	10	*c.* 1	North shore of Caribou Bay 2.5 miles southwest of John Point
	202NB	10	*c.* 1	North shore of Caribou Bay 2.7 miles southwest of John Point
	38NC	10	*c.* 1	North shore of Caribou Bay 3 miles southwest of John Point
	39NC	10	+ 1	North end of bay between Caribou and René points, 1.4 miles north northwest of René Point
	40NC	10	*c.* 1	Shoreline of bay 1 mile northwest of René Point
	41NC & 277NB	10	*c.* 11	René Point
	276NB	10	*c.* 1	Northwest shore of Jones Bay 0.6 mile southwest of René Point
	54NC	10	*c.* 1	Shoreline 1.4 miles southwest of Jones Point
	43NC	10	*c.* 1	South shore of Jones Bay 1.1 miles west southwest of Jones Point

Outcrop Data for Upper Limestone Member of the Pine Point Formation —(Cont.)

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
46	42NC1	10	3.2	Small peninsula near west end of the south shore of Jones Bay 1.7 miles west southwest of Jones Point
	57NC	10	20.5	North shore and 0.3 mile west of east tip of small bay on the east side of Prairie Lake
	55NC	10	4.5	Near south end of small lake 6.4 miles bearing 287T from René Point
	56NC	10	16	6.6 miles bearing 285T from René Point, and 0.3 mile from tip of bay on the east side of Prairie Lake
	250NBb	10	3.2	1.5 miles bearing 350T from the northeast end of Sulphur Bay
	33DD	10	1	Southeast end of Middle Cranberry Island
	32DD	10	5	Northeast shore, 0.4 mile northwest of the east tip of South Cranberry Island
	31DD	10	3	Northeast shore 0.8 mile northwest of the east tip of South Cranberry Island

The lower part of the Upper Limestone Member (*see* Section 46) consists of thinly bedded, fine-grained to aphanitic, pale brown to light grey limestone, ?dolomitic limestone, and nodular limestone; in places thinly interbedded with calcareous shale and mudstone, and coarser-grained bioclastic limestone. The sporadic presence of ripple and fucoidal markings in some beds suggests that at least part of this sequence is of very shallow water origin. The upper beds of the member that immediately underlie the Presqu'ile dolomite are richly fossiliferous and consist of thinly bedded, medium-grained, light olive grey bioclastic limestone; thinly interbedded with calcareous shale.

As Cameron (1918, pp. 26, 27) at first thought that these beds formed the east limb of a broad anticline and overlay the Presqu'ile Formation he included them in the Slave Point Formation. It is clear, however, from his later report (Cameron, 1922a, pp. 21, 23) that he altered this earlier interpretation and recognized that this sequence is stratigraphically lower than the Presqu'ile Formation and part of the Pine Point Formation.

Fossils and correlation

Fossils collected from the Upper Limestone Member of the Pine Point Formation are listed in the accompanying table. The presence of *Leiorhynchus castanea* (Meek), *Hadrorhynchia sandersoni* (Warren), and other fossils, suggest a correlation with the upper but not necessarily uppermost part of the Horn River Formation as developed on Horn and Clive Rivers to the northwest, and with the upper part of the Pine Point Formation on the south side of Great Slave Lake.

Fossils identified from Upper Limestone Member of the Pine Point Formation are as follows:

undet. sponge
stromatoporoids
Coenites sp. C
Coenites sp.
Grypophyllum gracile Wedekind
worm burrows
Schizophoria sp.
?*Productella* sp.
Atrypa sp. R
Atrypa sp. cf. *A.* sp. R
Atrypa sp.
Spinatrypa sp. cf. *S. lata* (Warren)
Spinatrypa sp. cf. *S. borealis* (Warren)
Spinatrypa sp. A
Emanuella meristoides (Meek)
Hadrorhynchia sandersoni (Warren)
Leiorhynchus castanea (Meek)
Leiorhynchus sp.
Cyrtina sp.
cf. *Bellerophon* sp.
undet. gastropods
undet. pelecypods
crinoid ossicles

Nyarling Formation

The name Nyarling Formation is proposed for a unit consisting mainly of evaporites lying between Little Buffalo Formation (below) and the Slave Point Formation. It is discontinuously and poorly exposed in a northwest-trending belt about 28 miles wide between the northern boundary of Alberta and the south flank of the Presqu'ile dolomite about 10 miles south of the south shore of Great Slave Lake. This belt is characterized by a relatively flat terrain with large areas of muskeg, playa lakes, and sink-holes. The name of the unit is after Nyarling River, the main tributary of Little Buffalo River draining the outcrop belt within the area covered by this report. Neither the lower nor upper contacts are exposed. The exposed parts of the Nyarling Formation consist mainly of gypsum with a minor amount of brown, thinly bedded, fissile, fine-grained to aphanitic limestone which in part contains dark brown carbonaceous streaks (*see* Section 31 in Appendix).

The Nyarling Formation corresponds to most of map-unit 10 of Douglas (1959b) excluding the basal carbonate beds formerly included in the map-unit.

The Nyarling Formation is possibly the stratigraphic equivalent of the upper four-fifths of the Pine Point Formation, all of the Presqu'ile and Sulphur Point Formations, and in places, it appears to be equivalent to the lower part of the Slave Point Formation. The Nyarling Formation appears to occupy roughly the stratigraphic position of Law's (1955a,b) combined Muskeg and Watt Mountain Formations and Fort Vermilion Member of the Slave Point Formation of northwestern Alberta.

The maximum thickness of the Nyarling Formation is calculated to be about 420 feet assuming a southwest regional dip of 13 feet per mile. Data to the north and south suggests that the regional dip may be greater than this.

No fossils have been found in the Nyarling Formation; its age on the basis of stratigraphic position is Middle Devonian.

Nyarling Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	42DD	14	5	On road connecting Salt River and Hay River Settlement, 54.8 miles bearing 280T from Bell Rock
31	37DD	15	2.5	Playa lake near escarpment, 46 miles bearing 282T from Bell Rock
	38DD	15	12.5	Exposure on escarpment, 46.6 miles bearing 282T from Bell Rock
	39DD	15	8	Bulldozed gypsum exposed on winter road connecting Salt River and Hay River Settlement, 50 miles bearing 280T from Bell Rock
	40DD	15	13	Exposure in sink-hole, 50.8 miles bearing 280T from Bell Rock
	41DD		*c.* 10	Bulldozed blocks of gypsum on winter road, 51.6 miles bearing 280T from Bell Rock

Presqu'ile Formation

Cameron (1918, pp. 25-26) proposed the name "Presqu'ile dolomites" for strata exposed at Presqu'ile Point and on the Burnt Islands east of Pine Point on the south side of Great Slave Lake. On the northwest shore he included the dolomitic strata exposed in the vicinity of Windy Point and on the shores of Sulphur Bay. At this time he described the formation as consisting of two members (p. 26): "an upper, thin-bedded, dolomitic limestone highly fossiliferous and carrying the diagnostic fossil *Stringocephalus burtoni,* and a lower member composed of a coarsely crystalline porous and cavernous dolomite."

Later, Cameron (1922a, pp. 21-23) described the Presqu'ile as: ". . . . hard, fine-grained bituminous dolomites and dolomitic limestones interbedded with softer, thin-bedded, grey limestones. Some beds are completely recrystallized dolomites." At the same time he described in more detail exposures at a number

of localities comprising: (*a*) beds capping the escarpment south of Pine Point—coarse-grained dolomitic limestones; (*b*) vicinity of lead-zinc deposits about 9 miles southeast of Presqu'ile Point—coarsely crystalline cavernous, massive dolomite; (*c*) middle island of the Burnt Islands group—dolomitic limestone similar to Presqu'ile Point; (*d*) Presqu'ile Point—dolomitic limestone; (*e*) Brûlé Point (now called Burnt Point), southeast of Windy Point—limestone and dolomitic limestone; (*f*) vicinity of Nintsi (Windy) Point—coarsely crystalline porous dolomite; and (*g*) vicinity of Sulphur Bay and hills to the north—coarsely crystalline porous dolomite.

The results of diamond-drill holes in the Pine Point area and in the southern part of the Windy and Sulphur Bays area have been summarized by Campbell (1950, 1957) and by Malcolm (1956) respectively. It has been shown that strata included in the Presqu'ile Formation by Cameron interfinger laterally with rocks assigned to both the overlying and underlying formations. Furthermore, it is evident that Cameron included three main facies types in his Presqu'ile Formation comprising the following: (1) coarsely recrystallized dolomite; (2) limestone and dolomitic limestone, in part the undolomitized equivalent of strata of facies type 1; and (3) fine-grained granular dolomite typified by strata on the middle island of the Burnt Islands group. Of these three facies types, the coarsely recrystallized dolomite appears to be the least variable and is relatively widespread in the subsurface round the southwest end of Great Slave Lake. The undolomitized equivalent of facies type 2, typified by strata at Presqu'ile Point, is not easily differentiated from limestone strata of the overlying Slave Point Formation. The fine-grained dolomite (facies type 3) although widespread, and easily recognizable as a lithologic unit, exhibits extreme variation in stratigraphic position and thickness from place to place.

Inclusion of the fine-grained dolomite facies in the Presqu'ile Formation would more or less equate the lower part of the Presqu'ile to all or part of the Pine Point Formation in some areas. If this facies is excluded from the Presqu'ile, the Presqu'ile is restricted to the upper part of the stratigraphic interval between the top of the Chinchaga Formation and the base of the Slave Point Formation. The latter of the two choices, although not completely satisfactory, is adopted in this report, in order to retain some legacy of Cameron's scheme of classification.

The name Presqu'ile Formation is restricted mainly to a light coloured coarsely recrystallized variably vuggy massive dolomite which is generally presumed to have replaced reefal limestone. Campbell (1957, p. 167) referred to this unit as the "reef core". It overlies various facies of the Pine Point Formation and is overlain by the Sulphur Point or Slave Point Formations. The Presqu'ile Formation also includes darker coloured, fine-grained, granular-bedded dolomites in the Sulphur-Windy Bays area, which surround and interfinger with the coarsely recrystallized dolomite. The coarsely recrystallized dolomite on some flanks grades to and interfingers with undolomitized reefal and associated limestone facies which are here excluded from the Presqu'ile Formation and named the Sulphur Point Formation.

Coarsely recrystallized dolomite of the Presqu'ile Formation outcrops in two main localities in the Great Slave Lake area (*see* Figs. 7, 8). The smaller of the two is only one or two square miles in extent and is located 9 miles southeast of Presqu'ile Point on the south side of Great Slave Lake. It underlies a much larger area in this vicinity along two east-northeast-trending anticlinal folds but is largely covered by Pleistocene and Recent drift. The larger of the two outcrop areas is on the northwest side of Great Slave Lake where it is up to 4 miles wide and is 21 miles long. This belt trends north and extends from near Windy Point northward through Windy and Sulphur Bays and some of the off-shore islands to a point about 9 miles west of Moraine Point. Part of the west side of this belt is remarkably straight and is probably in part faulted (*see* Fig. 8, section C-D); the east side is highly irregular. The west margin of the belt represents an abrupt wedging-out of the coarse-grained dolomite facies within argillaceous limestone and has been referred to as a reef front. The irregular east side has formed by erosion of the coarse-grained dolomite facies resting on argillaceous limestone.

In the Pine Point area the coarsely recrystallized dolomite appears to wedge-out southward within fine-grained dolomite (below) and limestone (above) which in turn is presumed to pass into evaporites of the Nyarling Formation within a relatively short distance. The coarsely recrystallized dolomite pinches out northward within fine-grained dolomite (below) and limestone (above) which in turn is presumed to pass into shale (below) and limestone (above) along the south shore of Great Slave Lake (*see* Fig. 7, section G-H).

In the subsurface the coarsely recrystallized dolomite underlies an arcuate or crescent-shaped area more or less fringing the southwest end of Great Slave Lake. The formation appears to have a maximum thickness of 260 feet in Northwest Territories Desmarais Lake No. 1 well located about 35 miles west of Hay River Settlement (*see* Table of Subsurface Data; and Douglas, 1959b, p. 49).

In the outcrop area southeast of Presqu'ile Point, the Presqu'ile Formation is generally mottled light to medium grey, in places purplish grey, very coarsely to medium crystalline, variably vuggy to cavernous, massive to vaguely thick-bedded, and weathers very light brown to light grey. Galena, sphalerite, and minor marcasite are present in places and appear to be most abundant along or more or less parallel to vague bedding planes. Campbell (1957) has demonstrated from numerous shallow drill holes in the Pine Point area that the upper surface of the coarse dolomite is highly irregular especially in the east central part of the area. North, south, and especially west, the upper contact becomes more even. The maximum thickness penetrated in this area is about 230 feet.

On the northwest side of Great Slave Lake the coarsely recrystallized dolomite facies appears to be essentially the same as it is on the south side of the lake. In this area oil is present filling cavities in parts of this unit. Small oil seeps occur in the vicinity of Horncastle Point, along the mid north shore of Sulphur Bay, and elsewhere north of the bay. These have been recorded by McConnell (1891, p. 75), Cameron (1917, p. 74; 1918, p. 27; 1922a, p. 37), Hume (1921, p. 35), and others. Galena, sphalerite, marcasite, and chalcopyrite, are present in very minor amounts.

Presqu'ile Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
			SOUTH SIDE OF GREAT SLAVE LAKE	
	41NB	12	10	Old prospect trench 9.6 miles southeast of Presqu'ile Point
	7NB	12	4	8.8 miles southeast of Presqu'ile Point
47	2NB	12	*c.* 12	Sickle-shaped sink-hole 8.6 miles southeast of Presqu'ile Point
	4NB	12	2	9 miles southeast of Presqu'ile Point
			NORTHWEST SIDE OF GREAT SLAVE LAKE	
48	257NB	10	103	1 mile north of Sulphur Bay. Fine-grained dolomite overlain by coarsely crystalline dolomite
	258NB & 260NB	10	25	1.3 to 1.4 miles north of Sulphur Bay
	255NB	10	*c.* 18.5	0.6 mile north of Sulphur Bay
	256NB	10	*c.* 13	0.7 mile north of Sulphur Bay
49	264NB	10	87	1.6 miles northwest of Sulphur Bay
	30DD	10	2	Northwest tip of South Cranberry Island
	49NC	10	?5	South shore of Windy Bay 1.7 miles west-northwest of Horncastle Point
	203NB1	10	2	North side of Horncastle Point
	204NB	10	16	North side of Horncastle Point. An oil seep present at this locality
	206NB1	10	*c.* 15	Horncastle Point
	210NB	10	*c.* 8	0.5 mile southeast of Horncastle Point
	209NB	10	*c.* 3	0.3 mile southeast of tip of Horncastle Point
	208NB	10	*c.* 7	0.2 mile southeast of the tip of Horncastle Point
	207NB	10	6.5	0.1 mile southeast of the tip of Horncastle Point
	212NB	10	*c.* 5	0.7 mile southeast of the tip of Horncastle Point
	211NB	10	*c.* 13.5	0.6 mile southeast of the tip of Horncastle Point
	213NB	10	*c.* 15	1.1 miles southeast of the tip of Horncastle Point
	214NB	10	5.5	1.3 miles southeast of the tip of Horncastle Point
	215NB	10	10+	1.4 miles southeast of the tip of Horncastle Point
	216NB	10	*c.* 12	1.2 miles southeast of the tip of Horncastle Point
	217NB	10	3	1.8 miles southeast of the tip of Horncastle Point
	59NC1	10	15	Area immediately east of Prairie Lake
	59NC3	10		Area immediately east of Prairie Lake
	59NC2	10	64	Area immediately east of Prairie Lake
	44NC3	10		Area immediately east of Prairie Lake
	35DD	10	loose blocks	North shore of North Cranberry Island
	34DD	10	2	Southeast point of North Cranberry Island
	44NC	10	57	2 miles east-southeast of the south end of Prairie Lake
	245NB	10	9	0.4 mile northeast of the northeast end of Sulphur Bay
	249NB	10	1	1.2 miles north of the northeast end of Sulphur Bay

Presqu'ile Formation Outcrop Data—(Cont.)

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
			NORTHWEST SIDE OF GREAT SLAVE LAKE—*Cont.*	
50	250NB & 251NB	10	*c.* 66	1.2 miles north of the northeast end of Sulphur Bay. Lower part of section consists of argillaceous limestone of the Pine Point Formation
	197NBa	9	*c.* 15	9.2 miles bearing 272T from Moraine Point
	45NC2	9	*c.* 11	8.4 miles bearing 253T from Moraine Point
	45NC1	9	56	9.4 miles bearing 254T from Moraine Point

Presqu'ile Formation Subsurface Data

Name of well	Thickness (feet)	Locality and comments
Cominco Test G-1	119.6 incomplete	60°51′05″N, 114°24′30″W. Top (eroded), 13′; bottom, 132.6′
Frobisher Hay River No. 8	195	60°42′N, 115°52′W. Top, 705′; bottom, 900′
N.W.T. Escarpment Lake No. 1	65	60°35′43″N, 116°13′W. Top, 1,536′; bottom, 1,600′
N.W.T. Desmarais Lake No. 1	260	60°48′N, 116°48′W. Top, 1,560′; bottom, 1,820′

Fossils and age

On the south side of Great Slave Lake only vugs and vague traces suggestive of organic remains were noted within the coarsely recrystallized dolomite of the Presqu'ile Formation. Fossils collected from this facies and associated fine-grained dolomite on the northwest side of Great Slave Lake are presented in the accompanying table. Moulds strongly suggestive of stringocephalids were noted in both facies within about 35 feet of the base of the formation in outcrops north of Sulphur Bay. Most of the Presqu'ile fauna occurs in much greater abundance and generally much better preserved in some of the various facies of the Pine Point and Sulphur Point Formations and indicates a Middle Devonian (Givetian) age.

Fossils identified from Presqu'ile Formation are as follows:

stromatoporoids
Cladopora sp.
undet. corals
Productella sp.
Atrypa sp. R

Atrypa spp.
Spinatrypa sp. cf. *S. lata* (Warren)
Emanuella meristoides (Meek)
? *Warrenella* sp.
? *Stringocephalus* sp.—large moulds
cf. *Megalodon* sp.
cf. *Paracyclas* sp.
cf. *Euomphalus* sp.
undet. gastropods
undet. trilobite fragments
crinoid ossicles

Sulphur Point Formation

The name Sulphur Point Formation is proposed for the sequence of limestones and in places interbedded limestones and dolomites that overlies various facies of the Pine Point Formation and is in turn overlain by limestones of the Slave Point Formation, or locally in the subsurface by interbedded shale and limestone of the Watt Mountain Formation. As thus defined this unit is roughly the undolomitized equivalent of the Presqu'ile dolomite. However, in places, as on the south side of Great Slave Lake, a wedge of Sulphur Point limestone lies between the top of the coarsely recrystallized dolomite of the Presqu'ile Formation and the base of the Amco shale, the basal unit of the Slave Point Formation in this area. In certain places as in parts of the Deep Bay area the lower part of the Sulphur Point Formation appears to interfinger laterally with the upper part of the Pine Point Formation. The Sulphur Point Formation is equivalent to map-unit 13 of Douglas (1959b) except north of Sulphur Bay.

The sequence designated as map-unit 13 by Douglas (1959b, p. 42) in the Cominco Test G-4 well is selected as the type section of the formation. This well is close to outcrops of the formation, and although the uppermost beds are eroded, the upper contact is only a short distance to the west as indicated by shallow drill holes to the south and southwest (*see* Fig. 7).

Beds of the Sulphur Point Formation outcrop in two main areas in the Great Slave Lake area (*see* Figs. 7, 8). The thickest sequence is discontinuously exposed along the northwest shore of the lake between 1.5 miles northwest of the tip of Windy Point to immediately north of Burnt Point. On the north side of this area these beds are separated from coarsely crystalline dolomite by a fault of small displacement. A large number of diamond-drill holes across the peninsula of this area by the Windy Point Mining Company (Malcolm, 1956) conclusively demonstrates that the limestone beds are the lateral equivalent but not necessarily the time equivalent of the coarsely crystalline dolomite to the north. Many thinner sequences of these limestones outcrop discontinuously in two small areas on the south side of the lake. One is located immediately east of the tip of Presqu'ile Point, the locality after which the Presqu'ile Formation was named, and the other, to the west, in the vicinity of Sulphur Point.

A composite section (about 150 feet thick) of the Sulphur Point Formation outcropping in the Windy-Burnt Points area is given in the Appendix (Section 51). This sequence consists of stromatoporoidal limestone, argillaceous limestone, thinly bedded aphanitic limestone, and minor nodular dolomitic limestone and clastic limestone. Beds about 20 feet thick bearing numerous stromatoporoids in the upper part of the sequence form a prominent escarpment which extends for over 2 miles near the shoreline north of Burnt Point. Beds near the middle of the sequence are in places petroliferous. Drill holes in this area, mentioned above, have penetrated a thickness of between 135 to 160 feet. A covered

Sulphur Point Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
			NORTHWEST SIDE OF GREAT SLAVE LAKE	
51	219NB	10	*c.* 7	Shoreline 1.5 miles northwest of Windy Point survey monument
	220NB	10	*c.* 1	Shoreline 1.45 miles northwest of Windy Point survey monument
	221NB	10	0.3	Shoreline 1.4 miles northwest of Windy Point survey monument
	222NB	10	*c.* 1	Shoreline 1.3 miles northwest of Windy Point survey monument
	223NB	10	*c.* 1	Shoreline 0.9 mile northwest of Windy Point survey monument
	224NB	10	*c.* 1	Shoreline 0.5 mile northwest of Windy Point survey monument
	225NB	10	Talus	Shoreline 0.3 mile northwest of Windy Point survey monument
	226NB	10	*c.* 1	Shoreline 0.1 mile northwest of Windy Point survey monument
	227NB	10	0.5	Shoreline 0.07 mile southeast of Windy Point survey monument
	228NB	10	0.5	Shoreline 0.2 mile southeast of Windy Point survey monument
	229NB	10	0.5	Shoreline 0.3 mile southeast of Windy Point survey monument
	230NB	10	*c.* 1	Shoreline 0.6 mile southeast of Windy Point survey monument
	231NB	10	1.5	Escarpment about 37 feet high about 0.3 mile from lake shore 1.1 miles southeast of Windy Point survey monument
	232NB	10	*c.* 3	Shoreline about 1.1 miles southeast of Windy Point survey monument; huge loose blocks 50 feet out from shore
	233NB	10	0.5	Shoreline 1.3 miles southeast of Windy Point survey monument
	234NB	10	0.5	Shoreline 1.4 miles southeast of Windy Point survey monument
	235NB	10	0.5	Shoreline 1.8 miles south-southeast of Windy Point survey monument
	236NB	10	0.5	Shoreline 1.9 miles south-southeast of Windy Point survey monument

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Sulphur Point Formation Outcrop Data—(Cont.)

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
			NORTHWEST SIDE OF GREAT SLAVE LAKE—(*Cont.*)	
	237NB	10	0.7	Shoreline 2 miles south-southeast of Windy Point survey monument
	238NB	10	0.5	Shoreline 2.1 miles south of Windy Point survey monument
	239NB	10	9.5	Escarpment 36 feet high bordering shore 2.2 miles south of Windy Point survey monument
	240NB	10	—	Same escarpment as above 2.3 miles south of Windy Point survey monument
51	241NB	10	*c.* 26	Same escarpment as above bordering lake shore 2.6 miles south of Windy Point survey monument
	242NB	10	0.7	Shoreline 2.7 miles south of Windy Point survey monument
	243NB	10	Talus	Shoreline 2.75 miles south of Windy Point survey monument
	244NB	10	*c.* 1	Shoreline 2.8 miles south of Windy Point survey monument
	47NC	10	Talus	Uplands area 1.4 miles bearing 195T from Windy Point survey monument
			SOUTH SIDE OF GREAT SLAVE LAKE	
52	97NB	11	*c.* 3	1 mile east of Presqu'ile Point
	96NB	11	*c.* 1	Shore of bay immediately east of Presqu'ile Point
	118NB	11	7.5	East end of Sulphur Point
	117NB	11	2	Small anticlinal fold along shore 0.2 mile northwest of the east end of Sulphur Point
54	116NB	11	0.7	Northwest limb of anticlinal fold on shore 0.25 mile northwest of the east end of Sulphur Point
	114NB & 115NB	11	*c.* 1	Shoreline 0.3 mile northwest of the east end of Sulphur Point

interval estimated to be about 120 feet separates the top of the sequence here from the few feet of beds exposed in the vicinity of Slave Point, the locality after which the Slave Point Formation was named. There are neither outcrops nor drill holes between Burnt and Slave Points to show the relationship between these two stratigraphic units.

A discontinuous sequence of about 7.5 feet of limestone beds is exposed in the vicinity of Presqu'ile Point (*see* Section 52 in Appendix). The sequence consists of richly fossiliferous limestone and argillaceous limestone that possibly correlates with beds about 35 feet above the base and contact with the Buffalo River shale member of the Pine Point Formation in the Cominco Test G-4 well.

Sulphur Point Formation Subsurface Data

Name of well	Thickness (feet)	Locality and comments
Cominco Test G-4	152.6 incomplete	60°54′N, 114°46′W, 2,800′ SW of shore of bay just east of Sulphur Point. Top (eroded), 20′; bottom, 172.6′
Northwest Windy Point No. 1	169 incomplete	61°19′N, 115°52′W. Near shore of Great Slave Lake, 30 miles north of Hay River. Top (eroded), 6′; bottom, 175′
Northwest Territories Deep Bay No. 4	39	61°19′N, 116°48′W. Top, 786′; bottom, 825′
Northwest Territories Deep Bay No. 2	214	61°18′N, 116°48′W. Top, 681′; bottom, 895′
Northwest Territories Deep Bay No. 1	?347	61°16′N, 116°45′W. Top, 628′; bottom, ?975′
Northwest Territories Big Island No. 1	245	61°08′N, 116°42′W. Top, 805′; bottom, 1,050′
Northwest Territories Big Island No. 2	?170	61°07′N, 116°52′W. Top, ?910′; bottom, ?1,080′

The discontinuous and presumably younger sequence exposed in the vicinity of Sulphur Point (*see* Section 54) is about 7.5 feet thick. It consists of brown stylolitic limestone, slightly sandy and carbonaceous limestone, oolitic limestone, and argillaceous limestone.

In the Great Slave Lake region, the Sulphur Point Formation appears to be distributed on the flanks of the coarsely recrystallized dolomite of the Presqu'ile Formation. Two wells, the Cominco Test G-4 and Northwest Windy Point No. 1, are on the east flank or concave side of the Presqu'ile dolomite which has an arcuate shaped distribution pattern discussed elsewhere. Several wells including Northwest Territories Deep Bay No. 4, and No. 1, and Northwest Territories Big Island No. 2, penetrate the Sulphur Point Formation on the northwest flank of the coarse replacement dolomite.

The Sulphur Point Formation has a maximum thickness of 347 feet in Northwest Territories Deep Bay No. 1 well.

Immediately north of the Deep Bay area the Sulphur Point Formation abruptly changes facies from a white stromatoporoidal limestone to brown and black shales of the Horn River Formation.

Fossils

Stringocephalus burtini Defrance was collected from beds exposed on the east side of Presqu'ile Point by E. M. Kindle and E. J. Whittaker in 1917 (Field Note Books; Kindle, 1921, pp. 21, 24), by Cameron (1922a, pp. 14, 22) in 1916 and 1920, and by Oil Company geologists, but was not collected from this locality by the writer (*see* fauna for station 96NB). Part of the beach in this vicinity was still covered by drifted snow when traversed on May 19, 1957. Another important element of this fauna is *Hypothyridina cameroni* Warren, which Warren (1944a, p. 115) records as having been collected from beds exposed in the Presqu'ile Point vicinity.

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Fossils identified from Sulphur Point Formation are as follows:

algal 'buns'
Stromatoporella sp.
undet. stromatoporoids
Amphipora ramosa (Phillips)
Amphipora sp.
Aulopora sp.
Cladopora sp.
Coenites sp.
Grypophyllum gracile Wedekind
leptoinophyllid genus E
Thamnopora sp. F (=*Favosites polymorpha* Goldfuss of Meek)
Thamnopora sp. G
undet. corals
Atrypa sp. cf. *A. perfimbriata* Crickmay
Spinatrypa sp. cf. *S. lata* (Warren)
Emanuella meristoides (Meek)
Emanuella sp. F
? *Emanuella* sp.
? *Warrenella* sp. cf. ? *W. franklini* (Meek)
? *Warrenella* sp.
Hypothyridina cameroni Warren
? *Leiorhynchus* sp.
Stringocephalus sp.
undet. brachiopods
undet. gastropods
? *Buchiola* sp.
crinoid ossicles

Watt Mountain Formation

The name Watt Mountain Formation was proposed by Law (1955a,b) for a variable unit comprising shale, siltstone, sandstone, arkose, limestone breccia, anhydrite, and dolomite, lying between the Muskeg Formation (below) and the Slave Point Formation (above) in the subsurface of northwestern Alberta where it has a maximum thickness of 155 feet. The type section of the Watt Mountain Formation is California Standard's Steen River No. 2-22 well (lsd. 2, sec. 22, tp. 117, rge. 5, W 6 mer.) in the interval 4,454.5 to 4,513 feet depths (Law, 1955b, p. 1953).

The Watt Mountain Formation is not recognizable in outcrops in the Great Slave Lake region although it may be present in the subsurface in some wells (*see* accompanying table) in the southwest sector of the area where the name has been used by some geologists in the oil industry in company reports. It appears to have a discontinuous distribution because it is unrecognizable or not developed in some wells located close to some of those listed in the accompanying table.

Where present in the Great Slave Lake area it lies between the top of the Sulphur Point Formation and the base of the Slave Point Formation. Beds assigned to the Watt Mountain Formation in the Deep Bay area consist of green, waxy shale interbedded with greenish grey and light greyish brown limestone. Its maximum thickness in this area is close to 25 feet.

Watt Mountain Formation Subsurface Data

Name of well	Thickness (feet)	Locality and comments
	NORTH TO SOUTH	
Northwest Territories Deep Bay No. 2....	18	61°18′N, 116°48′W. Top, 655′; bottom, 673′. Green waxy shale interbedded with greenish grey limestone with green shale partings
Northwest Territories Deep Bay No. 1....	13	61°16′N, 116°45′W. Top, 615′; bottom, 628′. Green waxy pyritic shale, and light greyish brown limestone
Northwest Territories Big Island No. 1....	25	61°08′N, 116°42′W. Top, 780′; bottom, 805′. Interbedded buff limestone, buff pyritic shale; and dark brownish grey calcareous shale; and green shale
Briggs N.E. Tathlina Lake No. 1.....	10	60°46′01″N, 117°19′45″W. Top, 2,135′; bottom, 2,145′. Vuggy argillaceous limestone with green shale partings
Briggs Foetus Lake No. 1.....	?16	60°55′13″N, 118°31′49″W. Top, ?2,460′; bottom, ?2,476′. Brecciated limestone
Briggs Rabbit Lake No. 2.....	?13	60°54′53″N, 118°49′37″W. Top, ?2,647′, bottom, ?2,660′. Brecciated limestone with green shale partings

Beds assigned to the Watt Mountain Formation are present in Briggs Foetus Lake No. 1, Briggs Rabbit Lake No. 2, and other nearby wells. The beds consist of brecciated limestone in places associated with green shale partings. The Middle Devonian sequence in this area, however, is a condensed one as it is located over a broad Precambrian high.

Law (1955b, p. 1951) correlated the Watt Mountain Formation of northwestern Alberta with the Amco Shale and those beds underlying the Amco down to the top of the coarse vuggy dolomite in the Cominco Concession area described by Campbell (1950, 1957). In the present report the beds between the base of the Amco Shale and the top of the coarse replacement dolomite are assigned to the Sulphur Point Formation and are described elsewhere in this report. Unfortunately, the Amco Shale as a marker bed is of limited value because of its restricted distribution. Furthermore, its exact relationship to the unit referred to the Watt Mountain Formation in the Deep Bay-Big Island area is not known because it has not been positively identified in wells in between these two areas, for example, in the Frobisher Hay River No. 8.

Slave Point Formation

The name Slave Point limestones was proposed by Cameron (1918, pp. 25, 26) for the upper part of the Middle Devonian succession outcropping on the south side of the lake from Presqu'ile Point to High Point, and on Buffalo River; and on the northwest side of the lake at Slave Point and along the shore between House (since renamed, probably Jones) and Moraine Points. The beds exposed between Jones(?) and Moraine Points actually underlie the Presqu'ile Formation and are part of the Pine Point Formation. Cameron described the formation as consisting of thin-bedded, medium-grained, dark grey, and slightly bituminous limestones and estimated its thickness at about 160 feet. Later, Cameron (1922a, pp. 13, 14, 15, 23-24) limited the area of Slave Point exposures to those in the vicinity of Sulphur Point and Buffalo River on the south side of the lake; and in the vicinity of Slave Point, and on the crest of hills north of Sulphur Bay on the northwest side of the lake. His revised estimate of thickness for the formation was 200 feet. The exposures north of Sulphur Bay properly belong in the lower part of the Hay River Formation.

Campbell (1950, pp. 89-91) described the Slave Point Formation as encountered in closely spaced drill holes southwest of Pine Point on the south side of the lake. He defined the Slave Point Formation as the interval between the base of the Upper Devonian Hay River shale and the base of marker beds called the C-1 horizon. As thus defined the lower part of the Slave Point Formation contained about 146 feet of dolomite of typical Presqu'ile facies in the area west of Buffalo River (*see* Fig. 7). He pointed out that the contact between limestone and underlying coarse dolomite is fairly even and sharp west of Buffalo River and highly irregular and generally stratigraphically lower eastward. Another complication is the convergence of the interval between the Amco Shale and the C-1 marker, being 190 feet in the vicinity of Buffalo River and decreasing to 130 feet 15 miles to the east. Furthermore, in the eastern part of the recrystallized belt the basal 86 feet or so of the Slave Point Formation contains an intercalation of lithologies characteristic of both the Slave Point and Presqu'ile Formations.

In a later publication Campbell (1957) again defined the Slave Point Formation as the interval between the base of the Hay River shale and the top of the uppermost *Charophyta* zone in the Presqu'ile Formation. He described the Slave Point Formation as consisting (in descending sequence) of: an upper unit (24 feet thick) of finely granular, buff-coloured limestones containing abundant stromatoporoids; a middle unit (80 feet thick) composed mainly of finely fragmental limestone containing minor argillaceous and carbonaceous material; a lower unit (130 feet thick) of grey or brown, fine to dense limestone, in part thinly bedded and argillaceous, and in part richly fossiliferous. A distinctive 11-foot bed called the Amco Shale is present about 30 feet above the base. This definition and description of the Slave Point Formation was based on subsurface data along the recrystallized belt of the Presqu'ile Formation. However, difficulty arises when one attempts to trace Slave Point strata northward and southward into and away from the flanks of the recrystallized dolomite of the Presqu'ile Formation.

In the Pine Point area the base of the Slave Point Formation is arbitrarily selected as the base of the Amco marker bed. Near the mouth of Buffalo River this bed is within a limestone between 30 and 45 feet above the top of the coarse dolomite. Where the Amco marker is missing, as in the Frobisher Hay River No. 8 well, the base of the Slave Point is arbitrarily chosen as the top of the coarse dolomite. The Amco marker bed can be mapped only over the coarsely recrystallized dolomite belt in the area of closely spaced drilling. Tracing the Amco marker bed northward without the aid of drill holes is guesswork, but it probably intersects the shore between Breynat and Sulphur Points (*see* Fig. 7). The limestone beds below the Amco marker outcropping at Sulphur and Presqu'ile Points are assigned to the Sulphur Point Formation; those in the vicinity of Breynat Point and along the lower stretch of Buffalo River are above the Amco marker and belong to the Slave Point Formation.

According to Helen R. Belyea (personal communication, 1961) in many wells west and southwest of the outcrop belt the base of the Slave Point is taken as the top of a characteristic low self potential electric and extremely high gamma ray 'kicks'. These correspond to a change in lithology from dense limestone of the basal Slave Point to a blue green waxy shale and limestone or dolomite locally brecciated. This pick also corresponds to the base of the Slave Point as used by Law (1955a, b) and has been generally adopted by geologists in western Canada. In the Pine Point area the beds containing green waxy shale occur in an interval more than 42 feet thick below the Amco marker (Campbell, 1950, pp. 90, 91).

The thin sequences of Slave Point beds exposed from 1.8 to 2.5 miles east of Breynat Point consist of light to medium brown and greyish brown, fine- to medium-grained, thinly bedded limestone, in part dolomitic and in part brecciated (*see* Section 54). Some of the beds contain streaks of black carbonaceous material. These beds are presumed to be about 15 to 20 feet above the Amco Shale. Still higher beds of the Slave Point Formation are exposed at four main localities along the lower stretch of Buffalo River. They consist of massive, quartzose sandy limestone; light brown aphanitic limestone, thinly interbedded with fine-grained granular limestone containing dark carbonaceous streaks; massive light brown limestone; coarse-grained clastic limestone; and dark grey to black medium-grained sandy limestone (*see* Section 54). A thin bed of flat pebble limestone conglomerate is present near the top of the discontinuously exposed sequence.

Immediately west of the lower part of Buffalo River the thickness of the Slave Point Formation, shown by drill holes penetrating the interval between the base of the Hay River shale and the base of the Amco Shale is close to 200 feet (*see* Fig. 7, section A-B and C-D).

The Slave Point beds outcropping at Gypsum Cliffs on Peace River south of the Great Slave Lake region have been described by Norris (1963). The most southern exposures of the Slave Point Formation in the region are to be found some 15 to 16 miles north of the northern boundary of Alberta (*see* Fig. 2, stations 31NC and 32NC; and Fig. 9). There, the exposed beds consist of yellowish grey argillaceous and gypsiferous limestone; thinly interbedded with gypsum and light olive grey to greenish grey mudstone, and minor nodular chert. The total

thickness is presumed to be relatively thin because the outcrop belt is only about 6 miles wide (*see* Section 57).

To the north the belt broadens and within it are scattered exposures, mainly in sink-holes, for a distance of about 30 miles. About midway along the belt typical exposures consist of yellowish grey, medium-grained to aphanitic, massive to thinly bedded argillaceous limestone (*see* Section 56). The most northerly sink-hole is located about 24 miles bearing 175T from Presqu'ile Point and in it some 58 feet of Slave Point beds are exposed. The sequence (Section 55) consists of brown fine-grained bituminous limestone; light and dark brown brecciated limestone; fissile shaly limestone; and soft, dark brown shale at the base of the exposure.

Within this southern part of the Great Slave Lake region the lower boundary of the Slave Point Formation is taken at the top of the evaporitic sequence of the Nyarling Formation.

Less than 2 feet of Slave Point beds are exposed as a pavement just above and below lake level immediately north of Slave Point (Fig. 2, station 48NC; Fig. 8), the locality after which Cameron named the formation. The strata there consist of very thinly bedded, medium- to coarse-grained dolomitic limestone containing numerous stromatoporoids and other organic fragments some of which appear to have been eroded.

Slave Point Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
			NORTHWEST SIDE OF GREAT SLAVE LAKE	
	48NC	10		Tip of peninsula 0.3 mile north-northeast of Slave Point
			SOUTH SIDE OF GREAT SLAVE LAKE	
54	106NB	11	*c.* 1.5	East side of small bay 2.2 miles east of the west tip of Breynat Point
	105NB	11	loose fragments	West side of small bay 2 miles east of the west tip of Breynat Point
	119NB	11	3	West bank of Buffalo River immediately below 'Lower' Mellor Rapids, 5.6 miles (air distance) upstream from mouth
	120NB	11	6.3	East bank of Buffalo River immediately below 'Upper' Mellor Rapids, 9 miles upstream (air distance) from mouth
	121NB	11	3.5	East bank of Buffalo River 2 miles above 'Upper' Mellor Rapids and 11 miles upstream (both air distances) from mouth
	107NB	11	*c.* 1.5	Small peninsula 2.5 miles east of the west tip of Breynat Point
	123NB	11	?4	West bank of Buffalo River 2.1 miles above 'Upper' Mellor Rapids and 11.1 miles upstream from mouth (both air distances); not visited

Slave Point Formation Outcrop Data—(Cont.)

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
			SOUTH SIDE OF GREAT SLAVE LAKE—(*Cont.*)	
55	9DD	12	57.5	Sink-hole 24 miles bearing 175T from Presqu'ile Point
	34NC	13	*c.* 10	47.6 miles bearing 237T from Pte. Ennuyeuse; seen from air but not visited
56	33NC	13	27.4	52.6 miles bearing 242T from Pte. Ennuyeuse
	34NC	13	*c.* 10	53 miles bearing 243T from Pte. Ennuyeuse; seen from air but not visited
	34NC	13	*c.* 10	53 miles bearing 240T from Pte. Ennuyeuse; seen from air but not visited
	34NC	13	*c.* 30	56.6 miles bearing 235T from Pte. Ennuyeuse; seen from air but not visited
	34NC	13	*c.* 35	58 miles bearing 231T from Pte. Ennuyeuse; seen from air but not visited
	34NC	13	*c.* 10	56.4 miles bearing 242T from Pte. Ennuyeuse; seen from air but not visited
	1NC & 2CD	13	*c.* 10	57.2 miles bearing 234T from Pte. Ennuyeuse
57	32NC	14	*c.* 14	Near road connecting Salt River and Hay River Settlement; 71 miles bearing 281T from Bell Rock
	31NC	14	*c.* 8	Near road connecting Salt River and Hay River Settlement; 75 miles bearing 282T from Bell Rock

Slave Point Formation Subsurface Data

Name of well	Thickness (feet)	Locality and comments
Frobisher Hay River No. 8	123	60°42′N, 115°52°W. Top, 582′; bottom, 705′
Northwest Territories Escarpment Lake No. 1	210	60°35′43″N, 116°13′W. Top, 1,310′; bottom, 1,520′
Northwest Territories Desmarais Lake No. 1	?60	60°48′N, 116°48′W. Top, ?1,510′; bottom, 1,560′
Northwest Territories Deep Bay No. 1	215	61°16′N, 116°45′W. Top, 390′; bottom, 605′
Cominco Test G-2	214	Mile 16, Mackenzie Highway, 60°40′30″N, 115°56′42″W. Top, 761′; bottom, 975′
Northwest Territories Deep Bay No. 2	310	61°18′N, 116°48′W. Top, 345′; bottom, 655′
Punch Deep Bay No. 4	240 incomplete	61°19′N, 116°51′W. Top, 370′; bottom of hole, 610′
Northwest Territories Deep Bay No. 4	213	61°19′N, 116°48′W. Top, 232′; bottom, 405′
Northwest Territories Big Island No. 1	170	61°08′N, 116°42′W. Top, 540′; bottom, 710′
Northwest Territories Big Island No. 2	190	61°07′N, 116°52′W. Top, 670′; bottom, 860′

Fossils and age

Fossils identified from Slave Point Formation are as follows:

stromatoporoids
Stromatopora sp.
Cladopora sp.
Atrypa sp.
Atrypa sp. (med. costate)
Atrypa sp. cf. *A. independensis* Webster
Emanuella sp. C
Emanuella sp. F
? *Emanuella* sp.
undet. brachiopods
undet. pelecypods
crinoid ossicles

The most diagnostic fossils of the Slave Point Formation appear to be *Emanuella* sp. C and *Emanuella* sp. F. The former is present also in Slave Point beds at Gypsum Cliffs on Peace River in northern Alberta, and appears to be absent in older Devonian strata. *Emanuella* sp. F, however, is present also in strata assigned to the Sulphur Point Formation outcropping between Windy and Burnt Points on the northwest side of the lake. The stromatoporoids which are relatively abundant in some beds may on closer study prove useful for differentiating the Slave Point Formation from older and younger strata. One specimen of *Hypothyridina cameroni* Warren has been collected from core 5 feet from the top of the Slave Point Formation from a depth of 530 feet in the Frobisher Hay River No. 5B well (60°42′N, 115°52′W).

The beds overlying the west flank of the Presqu'ile Formation north of Sulphur Bay from which Cameron (1922a, p. 24) obtained his main collection of Slave Point fossils are Upper Devonian in age and here excluded from the Slave Point Formation. On the basis of this fauna Cameron correlated the Slave Point with the Manitoba Formation of the Manitoba section. Kindle (in Cooper *et al.,* 1942) dated the Slave Point Formation of the Great Slave Lake area as lower Upper Devonian, presumably on the basis of the fauna mentioned above.

The Slave Point Formation as here restricted is tentatively considered to be of Middle Devonian (Givetian) age.

Horn Plateau Formation

The name Horn Plateau Formation is proposed for reefal beds of late Middle Devonian age which are presumed to overlie the Horn River Formation and are presumed to be unconformably overlain by the Simpson shale (Hay River Formation) of early Upper Devonian age. In a preliminary report covering the Horn River area Douglas and Norris (1960) referred to these beds as map-unit 15. Beds of this formation were seen outcropping at only one locality, mainly around the periphery but also within a remarkably circular hill. The hill is about one-quarter mile in diameter, and is located about 2.5 miles west of the west side of Fawn Lake. Limestone strata exposed in stacks and pillars round

the periphery of the hill dip outward 6 degrees and more, suggesting a reef or domed structure. An incomplete section representing about 40 feet of strata was measured along the northern edge and near the centre of the hill. The base of these exposures is roughly 50 to 100 feet higher in elevation than the top of the limestone beds of the Horn River Formation exposed on Horn River some 16 miles to the northeast. Massive, very coarse-grained, light and medium brown, richly fossiliferous limestone of bioclastic origin is present in the lower part of the section. The clastic fragments are loosely cemented in a matrix of the same material, and the unit weathers into thin irregular layers from one to three inches thick. The numerous fossils found in the lower unit consist mainly of brachiopods, a few corals, and crinoid remains. These beds grade upward into more resistant, massive, pale brown, fine- to coarse-grained limestone, presumed to be of reefal origin. This upper unit contains an exceedingly rich coral fauna associated with some brachiopods.

Fauna, age and correlation[1]

Fossils collected from the exposed beds of the Horn Plateau Formation are listed in the accompanying table. Most of this fauna is unique in that it is distinct from anything seen to date in Devonian beds of the Mackenzie Basin. The coral designated leptoinophyllid genus E is present also in beds of the Sulphur Point Formation exposed in the vicinity of Presqu'ile Point where it is associated with *Stringocephalus* sp. Most of the corals are known elsewhere in beds definitely dated as Middle Devonian. Of the brachiopods, *Hypothyridina cameroni* Warren has been reported from Presqu'ile Point in beds of the Sulphur Point Formation (Warren, 1944a, p. 115), and it has been collected also from core of the upper part of the Slave Point Formation in the Frobisher Hay River No. 5B well (mentioned elsewhere). On this basis the exposed beds of the Horn Plateau Formation are tentatively dated as late Middle Devonian (Givetian) age. Both faunally and lithologically the exposed beds of the Horn Plateau Formation are distinct from the Slave Point Formation as developed on the south side of Great Slave Lake. It is presumed but not proven that the Horn Plateau Formation is slightly younger than the Slave Point Formation.

Fossils identified from Horn Plateau Formation are as follows:

Atelophyllum sp. B
"Cystiphylloides" sp. A (=*Lythophyllum* of authors)
Disphyllum sp. cf. *D. dyeri* Cranswick and Fritz
Favosites sp. C
Heliophyllum (*Keriophyllum*?) sp. A
leptoinophyllid genus E
Spongophyllum sp. cf. *S. planotabulatum* (Yoh)
Thamnopora sp.
undet. cephalopod (small fragment)
undet. pentamerid

[1] A more detailed account of the fauna and age of the Horn Plateau Formation is given in 'Fauna of the Devonian Horn Plateau Formation, District of Mackenzie'; *Geol. Surv. Can.*, Bull. 114, by D. J. McLaren and A. W. Norris, 1964.

Schizophoria sp.
Productella sp. U
Leptaena sp.
Schuchertella sp.
Athyris sp.
cf. *Emanuella* sp.
Ambocoelia sp. cf. *A. umbonata* (Conrad)
Atrypa sp. (young form)
Atrypa sp. S
Atrypa sp. T
Spinatrypa n. sp.
cf. *Adolfia* sp.
Hypothyridina cameroni Warren
cf. *Centronella* sp.
crinoid ossicles

Summary Discussion of Middle Devonian of the Area

The earliest tentatively dated Middle Devonian fossils of the region occur in the Fitzgerald dolomite member assigned to the basal part of the Chinchaga Formation. This member outcrops on Slave River immediately southeast of the Great Slave Lake region (*see* Norris, 1963). *Planetophyllum planetum* recently described by Crickmay (1960, pp. 2, 4) was collected from the basal beds of this unit. A younger, moderately fossiliferous carbonate unit, the Hay Camp Member, also within the lower part of the Chinchaga Formation, outcrops at several places within and outside the southeastern part of the region. Fossils from this member provide the earliest definite Middle Devonian dating. The Chinchaga Formation, exclusive of these two members, is sparsely fossiliferous because of the evaporitic character of most of the unit. The presence of ?*Anatrypa* sp. suggests that at least part of the Chinchaga Formation is possibly of lower Middle Devonian (Eifelian) age. The Chinchaga Formation is the most widespread within the Great Slave Lake region and can be traced from the outcrop belt into the subsurface of northwestern Alberta, the type locality of this unit.

The Chinchaga Formation is overlain by the Little Buffalo Formation in the south, by various members of the Pine Point Formation throughout the central part of the outcrop belt, and by the Lonely Bay Formation in the north. Only the upper part of the Little Buffalo Formation is fossiliferous. *Mastigospira* sp. and other fossils in this unit are present also in the La Butte Formation on Slave River immediately southeast of the report area, and in the lower part of the Methy Formation of northeastern Alberta. The Little Buffalo Formation on a regional basis occupies roughly the same stratigraphic position as the Keg River Formation in the subsurface of northwestern Alberta.

A thin unnamed Limestone Member forming the basal part of the Pine Point Formation in the Fort Resolution area contains *Atrypa* sp. cf. *A. arctica* Warren along with other fossils. The conspicuous abundance of this form referred to by Cameron (1922a, p. 20) as *Atrypa reticularis* var. a, prompted him to call these beds the *Atrypa reticularis* zone.

The basal unit of the Pine Point Formation on the northwest side of the lake consisting of resistant carbonates is named the Lonely Bay Member and northwestward the Lonely Bay Formation. Some of the lower beds of the Lonely Bay Member are characterized by *Productella* sp., *Atrypa* sp. cf. *A. arctica* Warren, *Emanuella meristoides* (Meek) and other organisms. Higher beds in the member contain numerous *Spinatrypa* sp. cf. *S. lata* (Warren) among other fossils. To the northwest where this unit is referred to as the Lonely Bay Formation a facies change occurs within it which is reflected in a change of fauna. As well as some of the brachiopods found in the member to the southeast, it contains the earliest relatively abundant Middle Devonian corals comprising *Alveolites* sp. G, *Aulopora* sp., and *Syringopora* sp. D. On the basis of stratigraphic position the Lonely Bay Member of the Pine Point Formation and Lonely Bay Formation north of Great Slave Lake appear to be approximately equivalent to the Limestone Member of the Pine Point Formation of the Fort Resolution area and to the Little Buffalo Formation on the south side of the lake. *Stringocephalus* sp. is conspicuously absent from all of these units, but some of the fossils, particularly *Mastigospira* sp., are commonly associated with *Stringocephalus* sp. elsewhere in western Canada.

By far the most abundant fauna of the Great Slave Lake area is present in the dark coloured Bituminous Shale and Limestone Member of the Pine Point Formation outcropping in the vicinity of Pine Point and Dawson Landing wharf, and on Green and McKay Islands. In this locality this member occupies roughly the middle fifth or more of the formation. Some of the characteristic brachiopods of this member comprise *Lingula minuta* Meek, *Schizophoria mcfarlanei* (Meek), *Chonetes aurora* Hall, *Chonetes* sp. D, *Productella* sp. cf. *P.* sp. O, *Devonoproductus* sp. D, (=*Productus*? of Meek), *Devonoproductus* sp. E, *Nervostrophia* sp. I, *Atrypa* sp. cf. *A. arctica* Warren, *Spinatrypa* sp. cf. *S. andersonensis* (Warren), *Emanuella meristoides* (Meek), *Warrenella* sp. cf. *W. franklini* (Meek), *Warrenella kirki* (Merriam), ?*Leiorhynchus* sp. A Merriam, *Leiorhynchus awokanak* McLaren, *Leiorhynchus castanea* (Meek), and *Hadrorhynchia sandersoni* (Warren). Corals in this member are next in abundance and include *Cladopora* sp., leptoinophyllid genus E, metriophyllid coral, *Thamnopora* sp. E, and *Thamnopora* sp. F (=*Favosites polymorpha* of Meek).

Immediately west of the Fort Resolution area a Fine-grained Dolomite Member overlies the basal Limestone Member of the Pine Point Formation, and locally, this facies makes up all of the formation. Despite the dolomitization, moulds strongly suggestive of *Stringocephalus* sp. associated with other fossils were evident near the base of the Fine-grained Dolomite Member on Mission Island. This is the earliest noted occurrence of *Stringocephalus* sp. in the Great Slave Lake region and it is within the lower two-fifths of the Pine Point Formation. *Stringocephalus* sp. associated with other fossils were collected by Cameron (1922a, p. 22) from beds within the upper half of the member outcropping on the middle island of the Burnt Islands group. Other characteristic fossils from this relatively thick member include *Hadrorhynchia* sp. cf. *H. sandersoni* (Warren), and *Emanuella* sp. cf. *E. meristoides* (Meek).

A Brown Limestone Member forms the upper part of the Pine Point Formation a short distance south of Dawson Landing wharf. It contains a rich brachiopod fauna of which *Warrenella* sp. cf. *W. franklini* (Meek) is the most abundant. Other important brachiopods include *Chonetes aurora* Hall, *Productella* sp., *Devonoproductus* sp. D (=*Productus*? of Meek), *Emanuella meristoides* (Meek), *Leiorhynchus awokanak* McLaren, and *Leiorhynchus* sp. cf. *L. castanea* (Meek).

On the northwest side of Great Slave Lake an entirely different facies, referred to as the Upper Limestone Member forms the upper part of the Pine Point Formation. Some beds within this sequence were undoubtedly deposited in a shallow water or subaerial environment. More important brachiopods present in this member include *Atrypa* sp. R, *Spinatrypa* sp. cf. *S. lata* (Warren), *Spinatrypa* sp. A, *Hadrorhynchia sandersoni* (Warren) and *Leiorhynchus castanea* (Meek).

In the southern part of the outcrop belt the interval between the Little Buffalo and Slave Point formations consists mainly of poorly exposed unfossiliferous evaporites, the Nyarling Formation. This relatively thick unit corresponds roughly with the Muskeg and Watt Mountain Formations and Fort Vermilion Member of the Slave Point Formation, in the subsurface of northwestern Alberta. Another abrupt facies change takes place immediately northwest of the northwest side of Great Slave Lake where most of the Pine Point, Presqu'ile, Sulphur Point and Slave Point carbonate sequences are replaced by a mainly shale sequence named the Horn River Formation by Whittaker (1922). Only the upper part of the Horn River Formation is exposed on Horn and Clive Rivers in the northwestern part of the map-area. Megafossils consisting mainly of brachiopods are relatively abundant in the exposed limestone beds but appear to be absent from exposed shaly parts of the formation. The presence of *Hadrorhynchia sandersoni* (Warren)?, and *Leiorhynchus castanea* (Meek), among other fossils, is the main evidence for suggesting that the exposed upper but not uppermost part of the Horn River Formation is more or less equivalent to the upper members of the Pine Point Formation in the near vicinity of Great Slave Lake. Both these species in the latter area were not found above the top of the Pine Point Formation.

The more or less equivalent carbonate Presqu'ile and Sulphur Point Formations overlie the Pine Point Formation in the immediate vicinity of Great Slave Lake. Most fossils in the Presqu'ile Formation have been obliterated by dolomitization and those found are generally poorly preserved. *Cladopora* sp. appears to have been exceedingly abundant along with some brachiopods. The presence of *Stringocephalus* sp. in the lower part of the Presqu'ile at several localities on the northwest side of the lake was suggested by moulds showing the typical stringocephalid shape and from which the cast of the fossils had been completely leached. As to be expected, fossils are much more abundant and better preserved within the undolomitized Sulphur Point Formation. Fossil groups represented include algae, stromatoporoids, corals, brachiopods, gastropods, pelecypods, and crinoids (*see* Fig. 6). The more important corals include *Grypophyllum gracile* Wedekind,

leptoinophyllid genus E, *Thamnopora* sp. F (=*Favosites polymorpha* Goldfuss of Meek), and *Thamnopora* sp. G. Of the brachiopods present in this formation *Emanuella* sp. F, ?*Warrenella* sp. cf. ?*W. franklini* (Meek), *Hypothyridina cameroni* (Warren), and *Stringocephalus* sp. are the most significant. Presqu'ile Point vicinity where a thin sequence of the Sulphur Point Formation is exposed is the main locality of *Stringocephalus* sp. and is also the type locality of *Hypothyridina cameroni* Warren.

The Slave Point Formation overlies the Nyarling, Sulphur Point, and Presqu'ile Formations, and except for stromatoporoids is sparsely fossiliferous. Its more diagnostic fossils are *Atrypa* sp. cf. *A. independensis* Webster, *Emanuella* sp. C, and *Emanuella* sp. F. The first two forms are present also in Slave Point beds of the Gypsum Cliffs section on Peace River in northeastern Alberta. The latter form occurs also in the underlying Sulphur Point Formation in the Great Slave Lake region. Beds overlying the west flank of the Presqu'ile dolomite north of Sulphur Bay which were included by Cameron (1922a, p. 24) in the Slave Point Formation contain lower Upper Devonian fossils and are here assigned to the Hay River Formation. The Slave Point Formation, as restricted in this report, is considered to be of late Middle Devonian (Givetian) age.

The Horn Plateau Formation is a local reef development outcropping at one locality in the northwestern part of the map-area where it presumably protrudes through or overlies the Horn River Formation. It contains an unique assemblage of fossils consisting mainly of brachiopods and corals. Some elements of the fauna range down into the Sulphur Point and Pine Point Formations, and some appear to be closely related to early Upper Devonian forms. Until the fossils of the Horn Plateau Formation are more thoroughly studied it is tentatively dated as very late Middle Devonian (Givetian) age.

Stringocephalus sp., the well-known guide fossil for the Givetian, has a collected distribution in the area ranging through roughly the upper four-fifths of the Pine Point Formation and into the lower third of the Sulphur Point and Presqu'ile Formations. Another important guide fossil in the Devonian of western Canada is *Leiorhynchus castanea* (Meek) the type locality of which is in the Anderson River area. In the Slave River map-area, this or a closely related form has a more limited collected distribution than *Stringocephalus* within roughly the upper third of the Pine Point Formation and equivalent strata. In other words it occurs within the upper part of the *Stringocephalus* teilzone.

Upper Devonian

Hay River Formation

A thin sequence of Upper Devonian limestone unconformably overlies coarse and fine-grained dolomite of the Presqu'ile Formation north of Sulphur Bay on the northwest side of Great Slave Lake (Fig. 8). These beds are exposed in small scattered areas mainly along the west flank of the Presqu'ile outcrops, but are also preserved as a thin veneer at a few places in depressions overlying the main body of the Presqu'ile Formation (*see* Fig. 8). This unit appears to unconformably

overlie the Presqu'ile Formation as it overlaps different lithologies as well as the west margin of the Presqu'ile Formation. It is clear from Cameron's account (1922a, pp. 23, 24) that he included these beds in the Slave Point Formation. In a preliminary report by Douglas (1959b) covering part of the Great Slave Lake area these beds were included in map-unit 13. Numerous shallow drill holes by the Windy Point Mining Company (Malcolm, 1956) indicate that beds of this unit underlie a much larger area than is apparent from outcrops but are largely covered by drift.

A thin exposed sequence (10.6 feet thick) unconformably overlying the west flank and feather edge of the Presqu'ile Formation consists of richly fossiliferous medium to dark grey, argillaceous limestone with shaly partings; interbedded with pale to medium brown, medium- to coarse-grained, more thickly bedded sparsely fossiliferous dolomite (*see* Section 49 in Appendix). Where examined, about one mile south of Prairie Lake, these beds strike north and dip up to 12 degrees west. Shallow diamond drill holes across the widest part of Prairie Lake (*see* Fig. 8, section A-B) indicate that this unit rapidly thickens westward to about 100 feet near the west edge of the lake. From east to west this unit overlaps the feather edge of coarsely crystalline dolomite of the Presqu'ile Formation, and richly fossiliferous argillaceous limestone of the Pine Point Formation. The Slave Point Formation as developed to the south is absent, presumably by erosion or non-deposition.

Another representative section of Hay River beds is exposed 0.2 mile east of a point on the east edge of Prairie Lake 0.7 mile south of the north end of the lake. There, the beds are present as a thin veneer, less than one foot thick, capping an escarpment of massive, coarsely crystalline mottled dolomite of the Presqu'ile Formation. The beds consist of light olive grey, fine-grained limestone containing a few indeterminable partly silicified organic remains.

Upper Devonian Hay River Formation Outcrop Data

Section No. in Appendix	Station	Line of Section	Thickness (feet)	Locality and comments
	59NC4	10	*c.* 1	0.2 mile east of a point on east edge of Prairie Lake 0.7 mile south of the north edge of the lake.
49	265NB	10	8.5	West flank of Presqu'ile dolomite about 1 mile south of the southeast edge of Prairie Lake; north of Sulphur Bay

Fossils, age, and correlation

Fossils identified from basal limestone beds of Hay River Formation exposed north of Sulphur Bay are as follows:

undet. cup corals
Cladopora spp.

undet. gastropods
Lingula sp. cf. *L. spatulata* Vanuxem
Schizophoria sp.
? *Cyrtina* sp.
Atrypa sp. cf. *A. clarkei* Warren
Atrypa sp. cf. *A. independensis* Webster
Atrypa spp.
Spinatrypa sp. cf. *S. albertensis* (Warren)
? *Spinatrypa* sp.
Ladogioides pax McLaren
? *Leiorhynchus* sp.
crinoid ossicles

On the basis of *Ladogioides pax* and associated fossils these beds undoubtedly correlate with the Firebag Member of the Waterways Formation of the Clearwater-Athabasca Rivers area, and with the Peace Point Member of the Waterways Formation of the Gypsum Cliffs section of northeastern Alberta. Fossils reported from the hills to the north and west of Slave Point by Koch (1959, p. 84) include *Cyrtina billingsi, Lingula spatulata,* and other forms, all indicating affinities with the lower part of the Waterways Formation of northeastern Alberta. Since these beds are early Upper Devonian in age they are excluded from the Slave Point Formation. The collections by the writer and Koch (1959) are undoubtedly from the same lithological unit and probably close to the locality where Cameron (1922a, p. 24) collected what he termed his most representative collection of Slave Point fossils.

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STRUCTURAL GEOLOGY

A preliminary account of the structure of the southern part of the Great Slave Lake region has been presented by Douglas (1959b) and for the northern part of the area by Douglas and Norris (1960).

The Middle Devonian and Older Palaeozoic rocks of the Great Slave Lake region form part of a general homoclinal succession trending northwest and dipping gently to the southwest throughout most of the area. There are, however, numerous local variations from this general pattern. The sediments comprising this succession were presumably laid down on a broad shallow platform or shelf fringing the southwest margin of the Precambrian Shield referred to by Webb (1951, 1954) as the Mackenzie Basin or Platform, or as the Alberta Shelf Region south of the Great Slave Lake area. It is presumed that the relief on the Precambrian surface was much the same as it is today along the southwestern margin of the Shield. These irregularities along with post Precambrian gentle flexuring and faulting probably accounted, at least in part, for the marked facies changes exhibited by the early Palaeozoic rocks within the area. The Palaeozoic outlier at Rae Point suggests that Ordovician and Middle Devonian deposits may have extended farther northeastward onto the Shield before subsequent erosion determined their present distribution.

The general regional slope of the Precambrian, immediately south of the lake is about 20 feet per mile in the direction 240T between Taltson River and the Cominco Test G-4 well; immediately north of the West Arm it is about 24 feet per mile in about the same direction measured between Whitebeach Point and Northwest Windy Point No. 1 well. Contour data suggest that the latter slope is probably along or near the axis of a Precambrian trough and probably related to basement faulting. A Precambrian arch named the Fort Rae arch (Douglas and Norris, 1960) appears to be present between Fort Rae and the northeast side of Horn Plateau trending about 250T. Two knobs of Precambrian igneous rocks protrude through the cover of Middle Devonian and Older Palaeozoic rocks and rise to about 200 feet above the surrounding terrain on the south flank of the arch. The nearest Precambrian exposures are 16 miles away at the western edge of the Precambrian Shield.

The present topography of the Precambrian basement in northern Alberta, immediately south of the west half of the Great Slave Lake region, has been indicated by Green (1958, Fig. 1) from available well data. The contours in this area trend about 335T and the average slope is about 34 feet per mile in a southwest direction. The top of the Precambrian is close to 5,000 feet below sea level at 60 degrees north latitude and 120 degrees west longitude.

Prominent Precambrian features are a number of faults in the west part of the East Arm of Great Slave Lake trending southwest (*see* Stockwell, 1936; Brown, 1950; Burwash, 1957; Douglas, 1959b) which, on the basis of aeromagnetic data, can be traced southwestward into the subsurface on the south side of Great Slave Lake. West of the Pine Point area other lineaments and faults in the subsurface with a similar southwest trend which have been indicated by Douglas (1959b) and Sikabonyi and Rodgers (1959, Fig. 4), from aeromagnetic and drilling data.

Lineaments evident on stripped surfaces of Ordovician and the lower part of Middle Devonian strata immediately west of the North Arm of Great Slave Lake and Marian Lake trend mainly between 218T and 235T, and between 136T and 166T. The trend of the former group is approximately parallel to most of the lineaments present in the subsurface on the south side of the lake apparent from aeromagnetic data. An occasional lineament in the southern part of this area trends about 095T. The trend of lineaments, comprising faults and quartz stockworks, within the western margin of the Precambrian Shield between the north end of Marian Lake and 64° latitude, is between 209T and 246T for more strongly developed systems, and between 133T and 180T for less well-developed systems (*see* Kidd, 1936; Lord, 1939, 1942; and McGlynn, 1957). Some of the quartz stockworks (giant quartz veins) extend beneath and in places protrude through the cover of Ordovician strata, particularly those with a 209T to 246T orientation. No evidence was found at any of the localities examined to suggest post Precambrian movement, but merely a wedging out of Ordovician strata against the ridges of Precambrian rocks.

The maximum thickness of Ordovician and/or Older Palaeozoic rocks is between 900 to 1,000 feet in the northwestern part of the Great Slave Lake region. On the basis of sparse well control, the succession thins in a south and southwesterly direction and wedges out along a southeasterly trending line extending from a short distance southwest of Mills Lake, through the northeast corner of Kakisa Lake and an unknown distance beyond. This line approximately marks the northeastern boundary of a high area during Ordovician time called the Tathlina Lake Uplift by Sikabonyi and Rodgers (1959, Fig. 4). On Slave River, immediately southeast of the map-area, Ordovician strata are absent and the Middle Devonian Fitzgerald dolomite rests on a thin sandstone or granite wash (La Loche Formation) immediately overlying the Precambrian (*see* Norris, 1963).

No Silurian nor Lower Devonian strata have been recognized in the area, suggesting that the area was uplifted throughout all or part of this time.

At Bell Rock in the extreme southeast corner of the Great Slave Lake region an outcrop of Middle Devonian strata shows faulting, and brecciation of strata on the east side of the fault. The fault strikes 020T and dips nearly vertically with the east side down relative to the west side. The apparent vertical displacement is about 12 feet or probably more.

The results of closely spaced drilling in the Pine Point Mines Limited area on the south side of Great Slave Lake has been described by Campbell (1950,

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1957). Within this area the drilling has demonstrated numerous closely spaced gentle flexures in the form of anticlines, synclines, domes, and basins, as well as minor faults, all trending more or less between 240T to 245T. The average plunge of the folds is 22.6 feet per mile to the southwest between the eastern edge of the Presqu'ile Formation and a point 13.7 miles to the southwest or nearly due south of Sulphur Point. The Precambrian faults subtended into the area on the basis of aeromagnetic data from the East Arm of Great Slave Lake trend about 225T and thus are at an oblique angle to the gentle folding evident in the Palaeozoic strata. This suggests that these features are tectonically unrelated. The trend of the long axis of the area of carbonate build-up (Presqu'ile Formation) seems more closely aligned with the gentle Palaeozoic folding than it is with the trend of the Precambrian basement lineaments. Bedding attitudes observed in outcrops on the south side of Great Slave Lake between Buffalo River and Fort Resolution exhibit considerable variability with no evident overall trend. Maximum dips of 8 degrees were observed on McKay Island (one of the Green Islands) and on the mainland about half-way between Pine Point and Dawson Landing wharf. A fault trending 231T is presumed to intersect the shoreline about 4,300 feet southeast of Dawson Landing wharf where fine-grained granular dolomite is present on the southeast side, and bituminous limestone is present along the shore to the northwest (*see* Fig. 7). On the basis of the known stratigraphic position of these units from nearby well data it is presumed that the strata on the northwest side have moved up relative to strata on the southeast side of the presumed fault. Drilling by the American Metal Company immediately west of the lower part of Buffalo River indicates two southwest-trending faults in Middle Devonian strata. One of these, about 8 miles south of the mouth of the river, has an apparent normal displacement of about 120 feet; the other, about 1.3 miles south of the mouth of the river, has a normal displacement of about 30 feet. In both these faults the northwest sides have moved down relative to the southeast sides.

The region immediately north and south of Sulphur Bay on the northwest side of Great Slave Lake is known in more detail than the immediate surrounding area because of closely spaced drilling done by the Windy Point Mining Company (Malcolm, 1956). In this area the general strike is close to north, more or less parallel to the long axis of the area of Presqu'ile Formation exposures. At the north end of the Presqu'ile exposures the general strike swings to the northwest, the more common regional strike. The overall dip in the Presqu'ile Formation area is 1 to 2 degrees in the west and southwest directions. Lineaments in Presqu'ile strata north of Sulphur Bay trend between 260T to 270T, the more common direction; one has a 319T orientation. One near the south end and east side of Prairie Lake with a surface trace of 269T is definitely a fault. It dips nearly vertically and has an apparent normal displacement of about 40 feet with the south side down.

Another minor fault was noted 1.3 miles north of the northeast end of Sulphur Bay (Station 250NB). This fault strikes 307T and dips nearly vertically.

On the basis of stratigraphic data the northeast side is up relative to the southwest side although total displacement is not determinable.

Part of the west margin of the Presqu'ile Formation northwest of Sulphur Bay is a remarkably straight line trending due north. This line marks the westward pinch-out of the Presqu'ile Formation in this area. Younger strata overlapping the Presqu'ile Formation immediately west of this line dip up to 12 degrees west. In the subsurface there is some evidence to suggest faulting along part of this line with the west side showing an apparent downward displacement of about 90 feet relative to the east side. An interesting feature apparent from the subsurface data is the overlap of Upper Devonian strata on both sides of the fault suggesting that the movement took place between post-Presqu'ile and pre-basal Hay River time (*see* Fig. 8, section C-D).

Lineaments in the Presqu'ile and Sulphur Point Formations immediately south of Sulphur Bay mapped by Malcolm (1956) trend between 294T and 301T. Some of these are definitely faults with apparent normal displacements up to 40 feet.

The Middle Devonian succession has a maximum thickness of about 1,300 feet along the southwestern edge of the outcrop belt and thins to less than 300 feet in the subsurface immediately southwest of Mills Lake, suggesting an uplifted area in that vicinity during Middle Devonian time. Structure contours on top of the Slave Point Formation in the subsurface immediately southwest of Great Slave Lake indicate a general strike of 315T and a general dip of 35 feet per mile to the southwest.

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APPENDIX
STRATIGRAPHIC SECTIONS

Section 1. Composite section of the Old Fort Island, La Martre Falls, and Chedabucto Lake Formations on Old Fort Island. Sections measured at stations 327NB and 328NB.

Unit		Thickness (feet) Unit	From base
	UPPER ORDOVICIAN		
	CHEDABUCTO LAKE FORMATION		
1	Dolomite, with some irregular argillaceous partings, pale brown, fine-grained, granular, massive; very resistant scarp-former; weathers pale orange.	14.5 exposed	14.5
	Sparsely fossiliferous; poorly preserved gastropods and crinoid ossicles (sample 327NB4). Unit forms the capping rock of the island, the top of which is about 135 feet above lake level. Total exposed thickness of the Chedabucto Lake Formation ..... 14.5 feet.		
	MIDDLE ORDOVICIAN		
	LA MARTRE FALLS FORMATION		
1	Covered interval ..... Soft beds of the La Martre Falls Formation are presumed to occupy most if not all of this interval. Approximate thickness of the La Martre Falls Formation ..... 90 feet.	*c.*90	*c.*90
	MIDDLE ORDOVICIAN OR OLDER		
	OLD FORT ISLAND FORMATION		
9	Sand, quartzose, fine- to medium-grained, pale brown, weathers white. Sand is derived from weathering of friable sandstone.	6.2	24.8
8	Sandstone, quartzose, fine- to medium-grained, soft, friable, white, beds up to 2.5 feet thick, weathers pale orange; partings and thin interbeds up to ½ inch thick of very soft, pale orange weathering siltstone. More resistant than unit 7 below	2.2	18.6
7	Siltstone and shale, pale green, weathering dark orange brown. ..... A soft recessive unit.	1.2	16.4
6	Sandstone and interbedded silty shale, sandstone beds irregular and up to 5 inches thick, very fine-grained, mottled white, pale green, and purplish red, weathering yellowish green. Silty shale is very soft, weathering rusty orange and in places a dusky red	2.3	15.2
5	Covered interval; talus of pale brown weathering quartzose sand and fragments of sandstone	2.3	12.9
4	Sandstone, ferruginous, very coarse-grained, fragments of well-rounded white quartz, even bed, weathering medium green and rusty orange	0.7	10.6
3	Covered; talus fragments of thinly bedded, white, quartzose sandstone	1.7	9.9

Unit		Thickness (feet) Unit	From base
	OLD FORT ISLAND FORMATION—*Cont.*		
2	Sandstone, quartzose, soft, friable, white, in irregular thin to medium beds, between 4 to 14 inches thick, weathers light grey and in places stained a medium orange	4.2 exposed	8.2
	Units 9 to 2 inclusive measured down to lake level at station 327NB near the southeast end of the island.		
1	Sandstone, quartzose, fine- to coarse-grained white, massive, cross-laminated on a large scale, weathers light grey to dark rusty orange brown	4 exposed	
	Unit measured down to lake level at station 328NB just south and near the eastern tip of Old Fort Island. At this station unit 1 is overlain by 15 feet of sandstone similar in lithology to that exposed in the lower part of the section at station 327NB.		
	Exposed thickness of the Old Fort Island Formation: 24.8 feet.		

Section 2. Station 326NB; shoreline on south side of Wrigley Point about mid-way up the west shore of the North Arm of Great Slave Lake.

	MIDDLE ORDOVICIAN OR OLDER		
	OLD FORT ISLAND FORMATION		
3	Sandstone, quartzose, fine-grained, in part slightly argillaceous, evenly thinly-bedded between 1 and 4 inches thick, white in lower and upper parts, olive green and white in middle part, weathers white and pale orange	4	6
2	Covered interval	1.5	2
1	Sandstone, quartzose, fine-grained, white to pale brown, evenly thinly-bedded up to 3 inches thick, weathers pale brown	0.5 seen	
	Pavement outcrop 6 inches and more below lake level.		
	Thickness of Old Fort Island Formation discontinuously exposed .....6 feet.		

Section 3. Station 121NC; section measured on the north side of a small mesa on neck of land separating Faber and Sarah Lakes.

	MIDDLE ORDOVICIAN OR OLDER		
	MAZENOD MEMBER OF LA MARTRE FALLS FORMATION		
4	Dolomite, sandy, speckled medium grey and light grey, coarse-grained, in slightly wavy beds 2 to 12 inches thick, beds pitted on weathered surface, weathers yellowish brown	8.9	46.1
	Unit 4 forms topmost unit of mesa and is recessed 25 to 50 feet back from the main escarpment.		
3	Dolomite, light grey with dark grey laminae, medium-grained, in slightly wavy beds 2 to 8 inches thick; scattered flecks of very light grey dolomite, unit weathers dark yellowish brown	15.6	37.2

Unit		Thickness (feet) Unit	From base
	MAZENOD MEMBER OF LA MARTRE FALLS FORMATION—*Cont.*		
2	Dolomite, argillaceous, light olive grey, with faint medium grey laminae, in wavy beds ½ to 2 inches thick; partings of strongly calcareous, dusty yellow mudstone; unit weathers pale yellowish brown, pitted weathered surface	5.3	21.6
	Unit moderately recessive.		
1	Dolomite, slightly argillaceous, mainly light olive grey but in places medium grey, medium-grained alternating with coarse-grained interbeds, weathers to thin wavy beds from 1 to 3 inches thick; partings of dusky yellow strongly calcareous mudstone. Most beds faintly laminated; a few beds contain intraformational pebbles of the same material; unit generally weathers to a yellowish brown; thinner beds are moderately recessive	16.3	
	Unit variably slumped and forms base of outcrop along the escarpment.		
	Thickness of Mazenod Member exposed .....46.1 feet.		

Section 4. Mazenod Lake Section—Stations 82PI to 85PI and 87PI; a composite section compiled from ledge exposures between 1 to 2.2 miles along an escarpment southwest of the southwest end of Mazenod Lake. The lower boundary of unit 3 was used as a marker horizon.

MIDDLE ORDOVICIAN OR OLDER

MAZENOD MEMBER OF LA MARTRE FALLS FORMATION

(Type section)

4	Dolomite, medium grey, medium-grained, irregularly bedded; arenaceous beds common, consisting of cross-bedded quartzose sandstone with ripple structures and fucoidal markings; dolomite beds are 3 to 14 inches thick; arenaceous beds are ½ to 2 inches thick; unit weathers orange brown	5	92
	Unit exposed at top of cliff at station 84PI.		
3	Dolomite, in part strongly calcareous, oolitic, light grey, medium-grained, weathering orange brown, ooliths replaced by medium-grained, dolomite rhombs, and bounded by calcareous cement; generally medium to thickly-bedded	35	87
	Unit forms most of the cliff face at station 84PI. Beds are inclined perhaps due to draping of sediments over Precambrian basement rocks which outcrop in the near vicinity.		
2	Dolomite, medium-grey, medium-grained, weathering orange brown, bedding surfaces somewhat nodular, beds up to 1 foot thick.	32	52
	Thickness of Mazenod Member exposed .....72 feet		
1	Covered interval to base of escarpment; green shale with white encrustation, possibly gypsum or alum occurs at the base of unit 2.	20	
	White coating is traceable along cliff-face from 84PI to 87PI and always occurs below dolomite of unit 2. The 20-foot covered interval is taken from station 82PI, but is estimated to be 15 feet greater to the southwest.		
	Thickness of La Martre Falls Formation represented.....92 feet.		

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Unit		Thickness (feet) Unit	From base
	?OLD FORT ISLAND FORMATION		
	At 82PI one small block of yellowish-white, medium-grained, non-calcareous sandstone associated with Precambrian float was noted in the 20-foot covered interval below unit 2. This may suggest presence of Old Fort Island sandstone in this area, or the sandstone may have been derived from unit 4 which outcrops at the top of the section to the southwest at station 84PI.		

Section 5. Station 92NC; section measured on southeast-facing escarpment on neck of land separating Mazenod and Squirrel Lakes.

MIDDLE ORDOVICIAN OR OLDER

MAZENOD MEMBER OF LA MARTRE FALLS FORMATION

5	Dolomite, slightly argillaceous, coarse-grained, light olive grey, in beds from ½ to 1½ inches thick, weathers orange-brown ..... Unit 5 forms a small escarpment recessed 300 feet back from the main escarpment.	5.5	25.6
4	Covered interval	4	20.1
3	Dolomite, argillaceous, coarse-grained, light olive grey, in wavy beds from 1 to 3 inches thick, weathers orange-brown, moderately recessive ..... Unit 3 caps the main escarpment.	5.1	16.1
2	Dolomite, slightly argillaceous, light grey, faintly laminated, medium-grained, in beds from 1 to 4 inches thick, numerous partings of strongly calcareous pale olive green mudstone	7.7	11
1	Dolomite, strongly sandy, yellowish grey, medium-grained, in beds from 1 to 2 inches thick; interbedded with equal amounts of dolomite, light grey, fine-grained, in beds from 1 to 2 inches thick; numerous partings of strongly calcareous, pale olive green mudstone ..... Unit 1 outcrops at base of escarpment. Thickness of Mazenod Member exposed.....25.6 feet.	3.3	

Section 6. Station 83NC; section measured on north face of small mesa mid-way between Rabbit and Hislop Lakes.

MIDDLE ORDOVICIAN OR OLDER

MAZENOD MEMBER OF LA MARTRE FALLS FORMATION

6	Dolomite, oolitic texture, argillaceous, light olive grey, in irregular thin beds from 2 to 3 inches thick, weathers orange-brown ..... Beds frost-heaved. Unit caps the mesa exposed 80 feet back from the face of main escarpment.	2.9	26.6
5	Covered interval	5.4	23.7
4	Dolomite, argillaceous, medium-grained, mottled light olive grey and light grey, in thin slightly wavy beds from 1 to 4 inches thick, weathers orange-brown	6.6	18.3
3	Dolomite, argillaceous, coarse-grained, light olive grey, massive, but having a slight bedded appearance on weathered surface, weathers orange-brown	3.2	11.7

Unit		Thickness (feet) Unit	From base
	MAZENOD MEMBER OF LA MARTRE FALLS FORMATION—*Cont.*		
2	Dolomite, argillaceous, light olive grey, coarse-grained, in thin beds from ½ to 2 inches thick, the more argillaceous beds are recessive weathering, unit weathers orange-brown	0.7	8.5
1	Dolomite, argillaceous, coarse-grained, mottled light grey and medium grey, massive, weathers orange-brown	7.8	
	Thickness of Mazenod Member exposed .....26.6 feet.		

Section 7. Station 73NC; section measured at edge of Precambrian inlier 8.4 miles on bearing 182T from southwest tip of Tumi Lake.

MIDDLE ORDOVICIAN OR OLDER

MAZENOD MEMBER OF LA MARTRE FALLS FORMATION

2	Dolomite, yellowish grey to mottled light olive grey and light grey, fine-grained in lower 2 feet, grading upwards to medium-grained and coarse-grained at top; unit appears massive from a distance but actually weathers into flaggy beds from 1 to 3 inches thick	4.5	9
1	Conglomerate, angular and subrounded boulders and pebbles of underlying igneous rock, matrix of dolomite, sandy, light olive grey, medium- to coarse-grained	4.5 max.	
	Unit varies in thickness from 2.5 to 4.5 feet along 20 feet of outcrop. Boulders range up to 3 feet in diameter.		
	Units 2 and 1 are flat-lying in a depression 50 feet below the tops of Precambrian knobs 100 feet northeast and southeast of the measured section.		
	Thickness of Mazenod Member exposed ..... 9 feet.		

PRECAMBRIAN

1	Granite porphyry, large phenocrysts of pink feldspar, minor quartz in groundmass.		

Section 8. Stations 74NC and 75NC; section measured on an escarpment near the southwest edge of a small lake 6.6 miles bearing 189T from the southwest tip of Tumi Lake (Station 74NC), and on a small terrace at edge of Precambrian inlier 13 miles bearing 008T from La Martre Falls.

MIDDLE ORDOVICIAN OR OLDER

MAZENOD MEMBER OF LA MARTRE FALLS FORMATION

7	Dolomite, argillaceous, oolitic, medium-grained, medium light grey, massive, but weathering into wavy laminae, cliff-forming	5.1	26.5
6	Dolomite, slightly argillaceous, light grey, massive, nodular, with recessive argillaceous layers, weathers orange-brown	0.8	21.4
	Units 7 and 6 exposed at station 75NC where unit 6 forms base of small terrace. Unit 6 immediately overlies beds of unit 5 exposed at station 74NC.		

75427—8½

Unit		Thickness (feet) Unit	From base
	MAZENOD MEMBER OF LA MARTRE FALLS FORMATION—*Cont.*		
5	Dolomite, argillaceous, medium-grained, mottled olive grey and light grey, in thin wavy beds from 1 to 3 inches thick, nodular weathering ..... Unit 5 caps the escarpment at station 74NC.	7.4	20.6
4	Dolomite, argillaceous, yellowish grey, recessive	1	13.2
3	Dolomite, faintly mottled light olive grey and light grey, medium-grained, in beds from 2 to 8 inches thick, some beds weathering into slightly wavy flagstones, others weathering to a honeycombed surface	8.4	12.2
2	Dolomite, slightly argillaceous, light grey, medium-grained, in beds from ¼ to 2 inches thick, moderately recessive	1.2	3.8
1	Dolomite, slightly argillaceous, medium light grey, medium-grained, in beds from 1 to 3 inches thick ..... Unit 1 is present at the base of the escarpment at station 74NC. Beds 7.5 feet thick similar to unit 1 are exposed nearby at station 72NC where the basal beds are about 50 feet above the Precambrian. Thickness of Mazenod Member exposed .....26.5 feet.	2.6	

Section 9. Station 76NC; section measured at edge of Precambrian inlier 12.4 miles bearing 007T from La Martre Falls.

MIDDLE ORDOVICIAN OR OLDER

MAZENOD MEMBER OF LA MARTRE FALLS FORMATION

1	Sandstone, arkosic, slightly calcareous, light grey, thinly-bedded, beds folded with undulations up to 4 feet in amplitude ..... Initial dip of sandstone is 4 degrees northeast. These beds thicken and grade laterally to argillaceous dolomite at station 74NC. Thickness of Mazenod Member exposed ..... *c.* 5 feet	*c.*5	

PRECAMBRIAN

1 Granodiorite, highly irregular upper surface.

Section 10. Composite section of the La Martre Falls Formation in area west of Faber Lake.

MIDDLE ORDOVICIAN AND ?OLDER

LA MARTRE FALLS FORMATION

15	Dolomite, light to medium grey and weathering yellowish grey; fine- to medium-grained, beds up to 4 inches thick with silty laminae; some scour structures present ..... Unit outcrops at station 59PI as a ledge on the east side of a mesa 2 miles west of Faber Lake. The nearest outcrop, measured across the strike, of the overlying beds of the Chedabucto Lake Formation is 4.4 miles away. The top of unit 15 projects immediately below the base of the Chedabucto Lake Formation assuming a westerly dip of 10 feet per mile.	14	280

Unit		Thickness (feet) Unit	From base
	LA MARTRE FALLS FORMATION—*Cont.*		
14	Covered interval is between 0 to about 76 feet depending upon interpretation	*c.*76	266
13	Dolomite, light medium grey, aphanitic, weathering light yellowish grey; containing numerous large 'bun-shaped' masses suggestive of stromatolites	2	190
12	Dolomite, silty to argillaceous, medium grey and weathering light yellowish grey, fine-grained to aphanitic; beds are ¼ to 3 inches thick; primary slumping, brecciation and small scale ripple marks present. Units 12 and 13 outcrop as a ledge at station 58PI	10	188
11	Covered interval	*c.*58	178
10	Dolomite, medium grey and weathering light yellowish grey, fine- to medium-grained, beds up to 4 inches thick; minor silty laminae present Unit 10 outcrops as a ledge at station 57PI.	6	120
9	Covered interval	*c.*57	114
8	Dolomite, silty and argillaceous, medium grey, weathering light yellowish grey	2	57
7	Covered interval	*c.*18	55
6	Dolomite, medium grey and weathering light yellowish grey, fine-grained, thinly-bedded minor silty laminae	8	37
5	Shale and sandstone, light grey and weathering reddish grey, cross-bedding and ripple markings less than 1 inch thick are common; salt crystal moulds up to 1 inch in diameter present in some layers Units 5 and 6 outcrop as a ledge at station 55PI.	2	29
4	Covered interval	*c.* 2	27
3	Dolomite, slightly sandy, medium-grey and weathering yellowish brown, medium-grained, thinly-bedded between ½ to 3 inches thick; fucoidal markings present in some beds Loose, angular, platy blocks suggesting local derivation in vicinity of station 54PI.	*c.* 2	25
2	Covered interval	c.21	23
1	Arkosic sandstone and pebbly dolomite Loose blocks at station 69PI on prominent peninsula on the west side of Faber Lake. The Precambrian outcrops in the near vicinity. Approximate thickness of La Martre Falls Formation 280 feet.	*c.* 2	

Section 11. Stations 45DD and 46DD; east side of small mesa west of the south end of Mazenod Lake.

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

1	Dolomite, grey, fine-grained, wavy laminae, thinly-bedded from ½ to 1 inch thick; containing silicified corals, including (sample 46DDa) angulate *Streptelasma* sp. Poorly exposed as a pavement and frost-heaved blocks along top of escarpment. Thickness of Chedabucto Lake Formation poorly exposed *c.* 3 feet.	*c.* 3	*c.* 3

Unit		Thickness (feet) Unit	From base
	MIDDLE ORDOVICIAN AND ?OLDER		
	LA MARTRE FALLS FORMATION		
18	Covered interval	2	179.87
17	Dolomite, finely crystalline, grey, laminated beds from 6 to 12 inches thick, flaggy weathering, limonite staining	2	177.87
16	Covered interval	2	175.87
15	Dolomite, and edgewise conglomerate Large loose blocks.	2	173.87
14	Dolomite, platy; and green shale Units 15 and 14 are not exposed but are represented in frost-heaved blocks on slope of escarpment.	1	171.87
13	Covered interval	?50	170.87
12	Dolomite, fine-grained, mottled light brownish grey to pinkish red; interbedded with red shale; beds average 1 inch thick; evenly and wavy laminated; shale beds contain abundant salt crystal moulds	2	120.87
11	Covered interval	15	118.87
10	Dolomite, aphanitic; grey; thinly interbedded with green shale	2 exposed	103.87
9	Covered interval	20	101.87
8	Shale, purplish red, fissile	0.17	81.87
7	Dolomite, sandy, fine-grained, laminated, in thin beds from ¼ to ½ inch thick, pale pinkish grey or pale red; ripple marks bearing 315T with asymmetric steep faces oriented northeast	1	81.7
6	Shale, medium red, platy and fissile, wavy bedding surfaces	0.5	80.7
5	Shale, greyish green, otherwise similar to unit 6 above	0.2	80.2
4	Dolomite, similar to unit 7, interbedded with mottled greyish red and pink shale	1	80
3	Shale, mainly red but some green, thinly interbedded with silty dolomite containing salt crystal moulds Unit poorly exposed.	1	79
2	Dolomite, red, laminated, thinly-bedded, 1 to 2 inches thick, weathering reddish brown to light brown	1	78
1	Covered interval to top of Mazenod Member Approximate thickness of the La Martre Falls Formation, above Mazenod Member .....180 feet.	*c.*77	

Section 12. Composite section of the La Martre Falls Formation compiled from scattered outcrops west of Hislop Lake.

	MIDDLE ORDOVICIAN AND ?OLDER		
	LA MARTRE FALLS FORMATION		
19	Covered interval to base of Chedabucto Lake Formation	?5	261
18	Sandstone, colour laminated light grey to light greenish grey, fine-grained, in beds ¼ to 2 inches thick; interbedded with an equal amount of shale, pale red, flaky weathering Top of unit 18 is about 15 feet below top edge of scarp.	12	256

Unit		Thickness (feet) Unit	From base
	LA MARTRE FALLS FORMATION—*Cont.*		
17	Covered interval	22	244
16	Sandstone, yellowish grey, faintly colour-laminated, porous, soft, very fine-grained, platy beds 1 to 2 inches thick Beds weather to a shingle. Units 18 and 16 outcrop at station 101NC, 2.2 miles bearing 270T from the south end of Hislop Lake.	2	222
15	Covered interval	?2	220
14	Shale, mottled maroon and green, with thin beds of sandstone; similar to unit 10	2	218
13	Covered interval	61	216
12	Shale interbedded with sandstone; shale is light greenish grey, flaky weathering; sandstone is light greenish grey, laminated, thinly-bedded from ½ to 1 inch thick	2	155
11	Covered interval	?52	153
10	Shale, mottled maroon and green, with thin beds of sandstone less than ½ inch thick A small outcrop 2 feet high and about 3 feet long. Units 14, 12, and 10, outcrop at station 109NC, 4 miles bearing 241T from the north end of Hislop Lake.	2	101
9	Covered interval	?10	99
8	Sandstone, medium to light grey, fine-grained, thinly-bedded 3 to 6 inches thick, weathering orange-grey	?2	89
7	Shale, mottled pale red and light greenish grey; with thin interbeds of sandstone less than ½ inch thick, laminated, yellowish grey and light greenish grey	5	87
6	Shale, pale red, flaky weathering Poorly exposed slumped exposures on face of terrace. Units 8, 7, and 6, were measured at station 108NC, 2.8 miles bearing 236T from the north end of Hislop Lake.	8	82
5	Covered interval	?33	74
4	Dolomite, argillaceous, mottled medium and light grey, fine-grained, in wavy beds from 1 to 2 inches thick, weathers yellowish brown Exposed in two outcrops along a wave-cut terrace, at station 120NC, 2.4 miles bearing 236T from the north end of Hislop Lake.	*c.* 2	41
3	Covered interval	?29	39
2	Dolomite, argillaceous, slightly sandy, light grey, fine-grained, in thin wavy beds from 1 to 3 inches thick, weathers yellowish brown Actual outcrop is 1½ feet thick, 150 feet back from shore of lake. Base of outcrop is 13 feet above lake level. A flaggy pavement of the same lithology at shore line is probably close to bedrock suggesting at least 15 feet of this unit. Station 119NC is located on west side of small lake 2 miles bearing 250T from north end of Hislop Lake.	9	10
1	Covered interval to top of the Mazenod Member Approximate thickness of La Martre Falls Formation above Mazenod Member .....260 feet.	?1	

Unit		Thickness (feet) Unit	From base

Section 13. Composite section of the La Martre Falls (type section) and Chedabucto Lake Formations outcropping on Rivière la Martre.

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

4	Dolomite, cryptograined, medium brown, stylolitic, thickly-bedded, with thin irregular separation planes spaced ½ to 2 inches apart, weathers very pale brown and pale orange.	1.5 exposed	183.5
	Beds exposed at rapids (station 363NB) 4 miles (river distance) above La Martre Falls. Loose angular blocks of cream-brown dolomitic limestone with stylolitic structures also present and possibly overlie unit seen in place.		
3	Covered interval	?150	182
2	Dolomite, finely granular texture, purplish red to pale brown, thickly-bedded, closely spaced irregular parting planes, extremely resistant; weathers pale orange and in places a dusky red; small veinlets of white calcite; sparsely fossiliferous (sample 345NBa): *Catenipora* sp.	2	32
	Exposed at rapids (station 345NB) 500 feet above La Martre Falls. Arbitrary contact with unit below.		
1	Dolomite, very fine granular texture, medium brownish grey, massive, highly resistant, weathers pale orange; sporadic layers of pale brown to black chert nodules; poorly preserved silicified fossils in upper 10 feet, comprising (sample 346NBa): *Streptelasma* sp., *Catenipora* sp., and crinoid ossicles	30	
	Gradational but distinct contact with unit below. The drop of La Martre Falls is over this unit. Measured at stations 345NB and 346NB.		
	Discontinuously exposed thickness of Chedabucto Lake Formation .....183.5 feet.		

MIDDLE ORDOVICIAN AND ?OLDER

LA MARTRE FALLS FORMATION

(type composite section)

21	Dolomite, shaly, silty, and sandy, dark greyish brown, fine-grained, granular, in even and irregular thin beds, weathers very dark grey, becoming more shaly towards base	6	117.3
	Considerably less resistant than unit above. Transitional contact with unit below and sharp contact with unit above.		
20	Shale, very dark grey to almost black, weathers pale olive green; disintegrates to small irregular fragments	2	111.3
19	Dolomite, silty, faintly cross-laminated dark and pale grey, very fine-grained, weathers light orange grey	2.5	109.3
	Sharp even contact with unit above; grades transitionally down into unit 18; slightly more resistant than units above and below.		
18	Dolomite, argillaceous, slightly limy, dark grey, in even and irregular thin-beds, more shaly towards base; recessive	2	106.8
	Very irregular lower contact; unit pinches and swells along strike between 1.5 to 2 feet thick.		

Unit		Thickness (feet) Unit	From base
	LA MARTRE FALLS FORMATION—*Cont.*		
17	Dolomite, slightly limy and argillaceous, pale brown, very fine-grained, granular, faint wavy laminae, massive, fairly resistant, weathers light orange brown. Beds of black dolomite 1.5 and 0.5 feet thick, 1 and 3.2 feet down from top containing dendritic markings of pale brown dolomite suggestive of worm borings or algae (sample 347NBb)	*c.*8	104.8
	Graptolite fragments (*Diplograptus* sp.) collected 3 feet from base.		
16	Mudstone and shale interbedded, slightly limy and in part dolomitic forming harder layers, light to medium greenish grey, fissile, weathers light greenish grey; sporadic marcasite nodules throughout; polished pebbles of black chert in thin layer 2 feet up from base. Fossiliferous (sample 347NBa)	*c.*12	96.8
	Ischadites sp. bryozoans worm borings *Desmograptus* sp. square crinoid stems undetermined echinoderms *Sowerbyella* sp. *Lingulasma* sp. *Hyolithes* sp. *Sinuites* sp. *Conularia* sp. orthoceraconic cephalopod asaphid trilobite, pygidium calymenid trilobite		
	Units 20 to 16 inclusive measured at station 347NB immediately below La Martre Falls.		
15	Dolomite, sandy, sparsely vuggy, pale greenish grey with light grey micro-mottling, massive, resistant, vertical cliff-former, weathers pale orange	5.5	84.8
	Sharp even upper contact; transitional with unit below. Vugs filled with white opaque and translucent coarsely crystalline calcite. Measured at station 348NB on west canyon wall 0.4 mile below lower end of La Martre Falls.		
14	Sandstone and shale interbedded; sandstone is variably dolomitic, pale brown, fine-grained, granular, in even thin beds up to 1.5 feet thick, cross-laminated, weathers pale brown; interbeds and partings of soft, dark olive green shale. Some sandstone beds contain shale chips; mud flow markings and sericite along some bedding planes	24.5	79.3
	Measured at station 348NB.		
13	Sandstone and shale thinly interbedded; sandstone, quartzose, ?dolomitic, fine-grained, granular, pale brown, very hard, beds up to 2 inches thick, weathers pale brown; shale interbeds up to 2 feet thick, highly fissile, dark green and dusky red	5.9	54.8
	Unit is evenly jointed, and an aquifer. Unit measured at stations 348NB and 352NB.		
12	Shale, soft, with harder silty laminae, dusky red and dark olive green; recessive	3.3	48.9
	Unit used as marker bed between stations 348NB and 352NB.		

Unit		Thickness (feet) Unit	From base
	LA MARTRE FALLS FORMATION—*Cont.*		
11	Interbedded, fissile, dark olive green shale; nodular shale; and one bed of soft, porous, pale olive green sandy quartzose shale 3 inches thick, 1.5 feet down from top of unit ..... Unit 11 considerably more recessive than unit 10 below. Measured at station 352NB.	4	45.6
10	Mudstone at top and bottom with soft shale between mottled olive green and dusky red, all weathering rusty orange	6	41.6
9	Mudstone, or shale, similar to unit 8 below but more fissile	4	35.6
8	Mudstone, nodular, dark olive green with irregular dusky red patches, fairly hard	2.3	31.6
7	Shale, dark olive green and dusky red, soft, fissile, weathering dark dusky red	2.3	29.3
6	Shale, dark olive green, soft, fissile, weathering medium olive green	3.6	27
5	Interbedded fissile shale, hard mudstone, silty shale, and laminae of fine-grained sandstone; shale, mudstone, and silty shale are dark olive green in colour. Sandstone is brown and weathers a rusty orange ..... A resistant, cliff-forming unit; transitional upper and lower contacts.	1.5	23.4
4	Shale, with silty laminae, dark olive green, fissile, weathers medium green; interbedded with some pale brown silty shale. Sericite along some bedding planes ..... Units 11 to 4 inclusive measured at station 352NB; unit 4 measured down to river level and base is not exposed.	11	21.9
3	Covered interval between sections at stations 352NB and 353NB	*c.* 5	10.9
2	Sandstone, sericitic, ?dolomitic, laminated pale and medium green, even bed, weathers dark brownish grey ..... Measured at station 353NB on the west bank of Rivière la Martre one mile below the Falls.	1.2	5.9
1	Sandstone, ?dolomitic, fine-grained, granular texture, medium green, massive, irregular shale partings and laminae spaced ½ to 2 inches apart, unit weathers medium olive green ..... Measured down to river level at station 353NB and base of unit not exposed. These are the lowest beds of the La Martre Falls Formation exposed in this vicinity. Thickness of La Martre Falls Formation exposed ....117.3 feet.	4.7	

Section 14. Station 317NB; section of La Martre Falls and Chedabucto Lake Formations measured at tip of peninsula about mid-way between Spruce and Redrock Points on the west shore of the North Arm of Great Slave Lake.

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

1	Dolomite, slightly sandy, fine-grained, granular, pale brown, resistant, massive, but with irregular fissility planes, lower 4 feet weathers a light pale orange	9 exposed	9

Unit		Thickness (feet) Unit	From base
	CHEDABUCTO LAKE FORMATION—*Cont.*		
	Poorly preserved fossils collected from top of unit include (sample 317NBa): streptelasmid coral *Catenipora* sp. *Liospira* sp.		
	Unit 1 caps the section at top of steep cliff overlooking the lake.		
	Exposed thickness of Chedabucto Lake Formation .....9 feet.		
	MIDDLE ORDOVICIAN AND ?OLDER		
	LA MARTRE FALLS FORMATION		
11	Dolomite, cryptograined, pale olive green, in thin even beds and weathering into thin layers $\frac{1}{16}$ to $\frac{1}{4}$ inch thick, weathers pale greenish grey	2.3	41.5
	Transitional lower contact; sharp even contact with unit above.		
10	Shale, silty laminae in top 2 feet, light olive green, weathering very pale greenish grey	6.5	39.2
9	Sandstone, quartzose, dark grey, medium-grained, weathering medium and dark grey	0.3	32.7
8	Shale, silty in upper 1 foot, dark green, soft, weathering medium green; silty layers at top weather pale orange	3	32.4
7	Sandstone and shale interbedded; beds of sandstone hard, quartzose, white, stained with orange red ochre. Interbeds of shale, similar to unit 6 below	0.6	29.4
6	Shale, similar to unit 4, with a few laminae of fine-grained, white, quartzose sandstone	4	28.8
5	Sandstone, quartzose, white, whitish grey, to pale greenish grey, friable, fine-grained, weathers pale greenish grey with irregular rusty orange iron staining	0.8	24.8
	More resistant than shale units above and below.		
4	Shale, medium to dark greenish black to black, very soft, highly fissile, alum yellow staining along some layers; contains some thin beds (up to 2 inches thick) of white, quartzose sandstone	10.5	24
3	Dolomite, sandy, dark brownish grey, even bed, weathers pale brownish grey	0.9	13.5
	Transitional lower contact, very sharp even upper contact.		
2	Gypsum, sandy, vaguely laminated dark and light grey, very soft, unit covered with a light orange and grey powdery encrustation; irregular veinlets of light orange weathering secondary gypsum	1.5	12.6
1	Covered interval down to lake level, presumed to contain soft shale	11.1	
	Thickness of La Martre Falls Formation represented....41.5 feet.		

Unit		Thickness (feet) Unit	From base

Section 15. Station 325NB; section measured at small unnamed peninsula about mid-way between Wrigley and Spruce Points on the west shore of the North Arm of Great Slave Lake.

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

1	Dolomite, in part sandy, and with closely spaced irregular argillaceous laminae, fine-grained, purplish red and in places a mottled purplish red and olive-green, massive, highly resistant, scarp-former; poorly preserved fossils comprising: gastropods, cephalopods, and *Rhynchotrema* sp. seen, but could not be extracted from tough matrix	*c.*9	*c.*9
	This unit caps the section at top of steep cliff bordering the lake where unit is undercut at contact with softer beds below. Thickness of Chedabucto Lake Formation exposed....*c.* 9 feet.		

MIDDLE ORDOVICIAN AND ?OLDER

LA MARTRE FALLS FORMATION

6	Dolomite, argillaceous, cryptograined, pale orange, thinly-bedded, recessive, weathering pale orange	1.6	30.6
	Transitional contact with unit above and sharp even contact with unit below.		
5	Dolomite, argillaceous in lower half, light grey, cryptograined, fairly hard in upper part, weathering to irregular, thin beds in lower part, weathers pale greenish grey	2.7	29
4	Covered interval; talus of soft olive green shale and fine-grained sandstone	13	26.3
3	Shale and sandstone, thinly interbedded; shale is soft, dark olive green, weathering rusty orange; sandstone, quartzose, white, weathering pale grey and brownish grey	3.8	13.3
2	Poorly exposed interval of olive green, soft, fissile shale	6.2	9.5
1	Covered interval down to lake level	3.3	
	Thickness of La Martre Falls Formation discontinuously exposed ..... 30.6 feet.		

Section 16. Composite section of the Chedabucto Lake Formation exposed at stations 73PI, 74PI, 53PI, 46PI, 52PI, 49PI, 75PI, 78PI, 77PI, 79PI, 80PI, 76PI, and 81PI, in the area west of Faber Lake. Covered intervals between exposures calculated on the assumption that the westerly dip is 10 feet per mile.

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

21	Covered interval to top of Chedabucto Lake Formation	*c.*5	278.5
	Overlying gypsum beds of Chinchaga Formation outcrop ½ mile west of station 73PI.		
20	Dolomite, fetid, light to medium grey, dense, bedding irregular, somewhat nodular, weathers light grey to light yellowish grey. Chert in form of nodules. Unit contains silicified stromatoporoids, similar to those in beds exposed at station 46PI (sample 73PI)....	*c.*4	273.5

Unit		Thickness (feet) Unit	From base
	CHEDABUCTO LAKE FORMATION—*Cont.*		
19	Dolomite, brecciated, nodular, mottled. Corals and stromatoporoids seen in talus	1	269.5
	Unit 19 poorly exposed 500 feet east of unit 20.		
	Units 20 and 19 are exposed as a broken pavement at station 73PI, on the east bank of Rivière Grandin 5.4 miles (air distance) upstream from the mouth.		
18	Covered interval between unit 19 at station 73PI and top of exposure at station 53PI	*c.*9	268.5
17	Dolomite, fetid, light medium-grey, aphanitic, irregular wavy bedding from ½ to 10 inches thick and having a brecciated appearance. Fossils comprise (sample $53PI_2$):	8	259.5
	Favosites sp. stromatoporoids		
	This fauna is similar to that collected at station 46PI.		
	Unit 17 appears to be in part equivalent to 15 feet of cherty fossiliferous dolomite outcropping at station 46PI, on the southwest bank of Rivière Grandin 14.4 miles (air distance) upstream from the mouth. Fossils include (sample 46PIc): *Streptelasma* sp. *Catenipora* sp. orthoceraconic cephalopod *Stromatocerium* sp. (sample 46PIb) *Palaeofavosites* sp. crinoid stems		
16	Dolomite, silty, cherty, fetid, dense, finely banded and cross-laminated, light grey, weathers yellowish grey. Chert present as flattened nodules up to 14 inches in diameter in the plane of bedding and less than 6 inches thick	7	251.5
	Units 17 and 16 outcrop in a 15-foot ledge at station 53PI, located 0.3 mile south of Rivière Grandin and about 14 miles upstream from the mouth of the river.		
15	Dolomite, strongly cherty, fetid, aphanitic, some intraformational brecciated layers, light medium grey, beds up to 3 inches thick, weathers light yellow	15	244.5
	Silicified fossils (sample 74PIa): *Palaeofavosites* sp.		
	Unit 15 outcrops at station 74PI and is probably roughly equivalent to the lower beds outcropping at station 46PI, where the following fossils were collected (sample 46PIa): *Bighornia* sp. *Streptelasma* sp. angulate *Streptelasma* *Catenipora* sp. A *Foerstephyllum* sp. "*Syringopora*" sp.		
14	Dolomite, fossiliferous (sample 52PIa).	32.5	229.5
	Frost-heaved block at station 52PI, on south bank of Rivière Grandin 13.8 miles (air distance) upstream from mouth.		
13	Covered interval between unit 14 and top of beds at station 49PI	7	227

Unit		Thickness (feet) Unit	From base
	CHEDABUCTO LAKE FORMATION—*Cont.*		
12	Dolomite, cherty, containing silicified fossils ..... *c.* 5 Frost-heaved blocks on small hill at station 49PI, 0.8 mile north of Rivière Grandin, and 15.2 miles north of the mouth of the river.		220
11	Covered interval between unit 12 at station 49PI and top of unit 10 at station 75PI ..... *c.* 16		215
10	Dolomite, fetid, vuggy, medium brownish grey, dense, massive, but with wavy irregular parting planes, weathers yellowish grey to light grey. Contains silicified fossils (sample 75PI): ..... *c.* 6 *Catenipora* sp. Outcrops as broken pavement at station 75PI, 12.8 miles on bearing 024T from mouth of Rivière Grandin. This unit is possibly equivalent to part of unit 9 at station 80PI.		199
9	Dolomite, vuggy in upper part, medium brownish grey, bedding 3 to 4 feet thick, nodular parting planes, weathers yellowish grey ..... 38 Exposed in a 38-foot scarp at station 80PI, 25.2 miles bearing 015T from mouth of Rivière Grandin.		193
8	Covered interval between base of exposure at station 80PI and top of beds at station 79PI ..... *c.* 29		155
7	Dolomite, fetid, dense, grey ..... 6 Exposed along shore of unnamed lake 28 miles bearing 021T from the mouth of Rivière Grandin at station 79PI.		126
6	Covered interval ..... *c.* 19		120
5	Dolomite, crinoidal, silty, dark grey, thickly-bedded from 2 to 3 feet thick, weathers to irregular almost nodular flaggy beds ½ to 2 inches thick, weathers pale yellowish grey. Fossiliferous (sample 77PIa): ..... 15 *Bighornia* sp. *Streptelasma* sp. *Calapoecia* sp. *Catenipora* sp. A *Palaeophyllum* sp. *Lepidocyclas* sp. *Rhynchotrema capax* *Caryocrinus* sp. *Cyclocystoides* sp. ophiurians, fragmentary crinoid stems Unit poorly exposed in frost-heaved ledges at station 77PI, 25.4 miles bearing 048T from mouth of Rivière Grandin.		101
4	Covered interval 10		86
3	Dolomite, silty, containing numerous large stromatoporoids (sample 77PIa) ..... 30 Units 5 and 3 outcrop at station 77PI, 25.4 miles bearing 048T from mouth of Rivière Grandin.		76
2	Covered interval from base of outcrop at station 77PI to top of beds at station 78PI. ..... *c.* 41		46

Unit		Thickness (feet) Unit	From base
	CHEDABUCTO LAKE FORMATION—*Cont.*		
1	Dolomite, fetid, dark grey, dense, in irregular, wavy, thin beds..... Outcrops at top of an escarpment at station 78PI, 30.4 miles bearing 041T from mouth of Rivière Grandin. Unit 1 is probably very close to the base of the Chedabucto Lake Formation. Approximate thickness of composite section of the Chedabucto Lake Formation .....280 feet.	?5	

Section 17. Station 358NB and 360NB; composite section of the Chedabucto Lake Formation exposed along face and top of an escarpment between 2.6 and 2.8 miles east southeast of La Martre Falls.

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

5	Covered interval to base of overlying formation; estimated ..... A southwesterly dip of 10 feet per mile is assumed.	?90	183.1
4	Dolomite, fine-grained, pale brown, hard, closely spaced separation planes and laminae of argillaceous dolomite, weathers pale orange ..... Poorly preserved fossils comprise (sample 360NBa): indet. coral crinoid ossicles. Unit poorly exposed at edge of muskeg at station 360NB, on top of a plateau.	1.5	93.1
3	Covered interval	*c.* 54	91.6
2	Dolomite, fine-grained, granular, pale brown, hard, massive, very resistant, weathers a dark grey to almost black, at other places a dark orange; sporadic nodules of chert more or less throughout; separation planes irregularly spaced 6 inches and more apart ..... Contains a poorly preserved coral fauna comprising (sample 358NBb): *Catenipora* sp. *Favistella* sp. undet. cup corals Fossils extremely difficult to extract from matrix. Unit exposed along cliff face at station 358NB.	*c.* 28 exposed	37.6
1	Dolomite, very fine-grained, pale brown, resistant, weathering into irregular thin beds between ½ to 2 inches thick, unit weathers pale orange ..... Silicified fossils collected from near top of unit comprise (sample 358NBa): Leptaena? sp. large rhynchonelloid brachiopod Sharp even contact with unit 2 above. This unit is at or very close to the base of the Chedabucto Lake Formation. Until 1 is exposed along east-facing escarpment at station 358NB. Total estimated thickness of Chedabucto Lake Formation ..... 183 feet.	9.6	

Unit		Thickness (feet) Unit	From base

Section 18. Station 364NB; section of Chedabucto Lake Formation exposed in escarpment 5 miles bearing 263T from the north end of James Lake.

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

3	Covered interval to base of overlying Chinchaga Formation	?80	155
2	Dolomite, fine-grained, granular, medium brown, massive, hard, very resistant, vertical scarp-former, weathers dark orange; small irregular light creamy grey chert nodules prominent in basal 12 feet. Stylolitic structures common in upper part of unit	62.5	75
1	Dolomite, fine-grained, granular, pale brown, massive, but less resistant than unit 2 above, irregular argillaceous beds up to 4 inches thick, unit weathers medium grey but in places is coated with a pale brown wash from above	12.5	

This unit is presumably very close to the base of the Chedabucto Lake Formation.

Total estimated thickness of the Chedabucto Lake Formation ..... 155 feet.

Section 19. Composite section of the Chedabucto Lake and Chinchaga Formations in the area west of Marian Lake. Exposures at stations 305NB, 306NB, 307NB, 366NB, and 336NB.

MIDDLE DEVONIAN

CHINCHAGA FORMATION

2	Limestone breccia, fragments up to 1.5 feet in diameter, light to dark grey, fine-grained, matrix of same material, vaguely bedded; weathers into small irregular fragments producing a hummocky terrain with from 3 to 4 feet of relief	5 exposed	19

Unit very poorly exposed capping plateau.

1	Covered interval littered with numerous thin slabs of light brown granule and pebble limestone breccia	*c.*14	

Units 2 and 1 measured at station 336NB 12.4 miles bearing 268T from Fort Rae.

These are the basal beds of the Middle Devonian Chinchaga Formation unconformably underlain by the Upper Ordovician Chedabucto Lake Formation.

Approximate thickness of Chinchaga Formation represented ..... 19 feet.

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

13	Dolomite, argillaceous in lower part, aphanitic, pale brown, thinly-bedded, minutely vuggy, weathers pale orange	3 exposed	170.1

This unit caps a small escarpment.

12	Covered interval	2	167.1

Unit		Thickness (feet) Unit	From base
	CHEDABUCTO LAKE FORMATION—*Cont.*		
11	Dolomite, pale brown, aphanitic, minutely vuggy, evenly thin-bedded, resistant, weathers pale greenish grey and orange ..... Units 13 to 11 inclusive measured at station 336NB located 12.4 miles bearing 268T from Fort Rae.	1	165.1
10	Covered interval between base of beds at station 336NB and top of beds at station 366NB.	6.5	164.1
9	Dolomite, aphanitic, pale brown, massive, but with irregular closely spaced separation planes, pitted weathered surface, pale brown chert present as small blebs, unit weathers medium orange; considerably more resistant than unit 8 below. Poorly preserved fossils (sample 366NBa): ..... indet. gastropod orthoceraconic cephalopod Unit outcrops at top of main escarpment.	14.9	157.6
8	Dolomite, aphanitic, very pale creamy brown, with some dusky red mottling, massive, but with occasional separation planes, weathers a light creamy grey; unit considerably less resistant than unit above ..... Unit outcrops as a series of ledges along escarpment.	12.2	142.7
7	Dolomite, irregular argillaceous partings, very fine-grained, granular texture, creamy brown to whitish in upper part, small purplish red blebs throughout, massive, weathers light creamy brown ..... Outcrops at base of escarpment. Units 9, 8 and 7 outcrop along escarpment at station 366NB, 14.2 miles bearing 290T from Fort Rae.	13	130.5
6	Covered interval between basal beds of unit 7 at station 366NB to top of unit 5 at station 307NB.	?74	117.5
5	Dolomite, cherty, pale brown, aphanitic, evenly thick-bedded, weathers pale orange; pale grey chert nodules conspicuous in some beds ..... Arbitrary contact with unit below.	4	43.5
4	Dolomite, in places cherty, pale brown, very fine-grained, hard, thin to thick, evenly and irregularly bedded, weathers light orange. Poorly preserved fossils (sample 306NB1) ..... *Catenipora* sp. favositoid coral undet. cup coral undet. cephalopod Units 5 and 4 outcrop at stations 307NB, and 306NB, 10.4 miles northwest of Fort Rae.	9	39.5
3	Covered interval between base of exposure at station 306NB and top of exposure at station 305NB	3.5	30.5
2	Dolomite, cherty, similar to unit 4 above ..... Unit 2 outcrops at station 305NB 10.2 miles bearing 293T from Fort Rae.	12	27
1	Covered interval to base of Chedabucto Lake Formation ..... Total approximate thickness of the Chedabucto Lake Formation ..... 170 feet.	?15	

75427—9

Unit	Thickness (feet) Unit	From base

Section 20. Composite section of parts of the Chedabucto Lake and Chinchaga Formations on Rae Point. Sections at stations 370NB, 371NB, 372NB, and 374NB.

MIDDLE DEVONIAN

CHINCHAGA FORMATION

4	Limestone, aphanitic, pale brown, massive, highly irregularly fractured and weathering to small irregular fragments, weathers light brownish grey	10.5 exposed	53.2
	These are the youngest beds seen on Rae Point. Unit 4 measured at station 371NB.		
3	Covered interval littered with a shingle of thinly-bedded, fissile, laminated, aphanitic, light grey weathering limestone	29.7	42.7
	Interval measured at station 371NB.		
	About 6 feet of beds representing the lower part of this interval are exposed at station 372NB.		
2	Limestone, gypsiferous, pale brown, brecciated, massive, highly fractured, extremely vuggy, vugs from 1 to 4 inches in diameter many of which are lined with coarse translucent and milky white calcite crystals, unit weathers light brown	9	13
	Unit 2 measured at station 372NB; 6.5 feet of this unit exposed also at station 370NB where a covered interval of 6 feet separates it from the top of Chedabucto Lake Formation.		
1	Covered interval down to top of Chedabucto Lake Formation	4	
	Approximate thickness of Chinchaga Formation present on Rae Point ..... 53 feet.		

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

4	Covered interval down from top of main scarp at edge of Rae Point	*c.* 6	49
3	Dolomite, very pale brown, fine-grained, granular, in thin beds, weathering very pale brownish orange	2	43
	This may be a zone of weathering rather than a natural rock unit.		
2	Dolomite, pale brown (darker than unit above), fine-grained, granular, massive, vertical cliff-former, pitted cliff face, weathers pale orange brown; crinoid ossicles seen in talus blocks	24	41
	Gradational contact with unit below.		
1	Dolomite, slightly argillaceous, very pale brown, tiny speckles of purplish red seen in some chips, very fine-grained, granular, massive, separation planes spaced from 1 to 3 inches apart	17	
	Cliff face conspicuously pitted in this unit. Unit 1 more closely jointed than unit 2 above.		
	This unit is possibly close to the base of the Chedabucto Lake Formation.		
	Approximate thickness of Chedabucto Lake Formation....50 feet.		

Unit	Thickness (feet) Unit	From base

Section 21. Station 379NB; section of Chedabucto Lake Formation overlain by basal beds of Chinchaga Formation, located 9.2 miles bearing 237T from Fort Rae.

MIDDLE DEVONIAN

CHINCHAGA FORMATION

	?Limestone, medium to light grey weathering	*c.* 10	
	Basal beds of Chinchaga Formation seen from air, but not examined on ground. Contact with underlying beds of Chedabucto Lake Formation appears sharp and even. No gypsum appears to be present at the contact as observed at other nearby localities.		
	Approximate thickness of exposed basal beds of Chinchaga Formation ..... 10 feet.		

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

4	Dolomite, in part cherty, fine-grained, granular, thickly bedded, resistant, weathers pale orange; chert nodules pale to dark grey, weathering bone white. Silicified fauna comprising (sample 379 NBc)	19	36.2
	Streptelasma sp. *Catenipora* sp. *Foerstephyllum* sp. *Hebertella* sp. *Ceraurus* sp. *Cybeloides* sp. crinoid ossicles		
3	Covered interval	9	17.2
2	Dolomite, cherty, fine-grained, granular, porous, irregularly thin-bedded, weathers pale orange. Sparse poorly preserved silicified fossils which are difficult to extract from matrix (sample 379 NBa)	5.2	8.2
	?*Catenipora* sp. crinoid stems		
	Unit 2 exposed in a series of closely spaced ledges.		
1	Dolomite, pale brown, very fine-grained, granular texture, massive, weathers pale orange	3	
	Exposed at top edge of a low escarpment.		
	These beds appear to be near the base of the Chedabucto Lake Formation.		
	Total approximate thickness of Chedabucto Lake Formation ..... 36 feet.		

75427—9½

Unit		Thickness (feet) Unit	From base

Section 22. Type composite section of Chedabucto Lake formation discontinuously exposed at stations 69NC to 71NC inclusive on mesa and escarpment about 4 miles west of Whitebeach Point.

UPPER ORDOVICIAN

CHEDABUCTO LAKE FORMATION

17	Covered interval to base of overlying Chinchaga Formation; estimated thickness	?56	155.3
16	Dolomite, very pale orange to red, fine-grained, slightly vuggy, flaggy weathering in beds less than 2 inches thick Exposed in a low terrace at station 69NC, 3.6 miles southwest of Whitebeach Point.	5	99.3
15	Covered interval between base of exposed beds at station 69NC and top of plateau at station 71NC	7	94.3
14	Covered interval from top of mesa to highest beds exposed in escarpment at station 71NC. Flaggy pebbles near the top of this interval of very pale orange and greenish grey, fine-grained dolomite, somewhat similar to beds exposed at station 69NC	28	87.3
13	Dolomite, sandy, yellowish grey, fine-grained, to aphanitic; sand grains of clear rounded quartz Poorly exposed in a 6-foot terrace.	6	59.3
12	Covered interval	15	53.3
11	Dolomite, very pale orange to yellowish grey, fine-grained, weathering to wavy beds from 1 to 2 inches thick; contains blebs of hematite Unit exposed in a north-facing terrace. Sparsely fossiliferous (sample 71NCa): streptelasmid coral *Catenipora* sp. *Lophospira* sp.	2	38.3
10	Covered interval	3	36.3
9	Dolomite, similar to unit 11 Outcrops in two closely spaced terraces.	2.7	33.3
8	Covered interval	1	30.6
7	Dolomite, slightly calcareous, mottled light grey to light olive grey, fine-grained, in beds from 1 to 3 feet thick, weathers to wavy, flaggy plates	3.8	29.6
6	Covered interval; presumed to be shaly dolomite	0.5	25.8
5	Dolomite, similar to unit 7, but with scattered nodules and stringers of medium grey chert	8.8	25.3
4	Covered interval; presumed to be shaly dolomite	0.7	16.5
3	Dolomite, cherty, slightly calcareous, very pale orange, fine-grained, in beds from 1 to 2 feet thick; profuse blebs and stringers of light grey chert; poorly preserved silicified corals	2.5	15.8
2	Dolomite, very pale orange, fine-grained, massive, in places weathering to a mottled and pale orange and light brown; recessive to units above and below; contains a sparse silicified fauna angulate *Streptelasma* sp. crinoid ossicles	1.3	13.3

Unit		Thickness (feet) Unit	From base
	CHEDABUCTO LAKE FORMATION—*Cont.*		
1	Dolomite, argillaceous partings, contains scattered flecks of hematite, yellowish grey, fine-grained, in beds 1½ to 3 feet thick, flaggy weathering into slabs 1 to 4 inches thick. Unit strongly jointed.	12	
	This unit is very probably close to the base of the Chedabucto Lake Formation.		
	Approximate total thickness of Chedabucto Lake formation ..... 155 feet.		
	MIDDLE ORDOVICIAN AND ?OLDER		
	?LA MARTRE FALLS FORMATION		
1	Covered interval from base of unit above to base of scarp and 'flats' leading away to Great Slave Lake to the north	39	

Section 23. Composite section of the Mirage Point Formation compiled from scattered outcrops along the south end of the west shore of the North Arm of Great Slave Lake. Outcrops at stations 308NB, 312NB, 310NB, 309NB, 313NB, 267NB, 269NB, and 268NB.

	UPPER TO MIDDLE ORDOVICIAN AND ?OLDER		
	MIRAGE POINT FORMATION		
25	Covered interval to base of exposed gypsum of overlying Chinchaga Formation	12	183.1
24	Red gypsiferous talus along slope of east facing escarpment	4	171.1
	Basal gypsum beds of Chinchaga Formation and unit 24 outcrop at station 308NB, 3.6 miles bearing 251T from Baker Point.		
23	Covered interval; possibly gypsum and shale.	?35	167.1
22	Dolomite, ?argillaceous, finely granular texture, dusky red, in thin, irregular, lenticular beds up to 3 inches thick, weathering dusky orange red	1.3 exposed	132.1
	Unit 22 exposed at station 312NB, 2.8 miles bearing 251T from Alexander Point. Unit is presumed to represent a wedge or lentil of the Chedabucto Lake dolomite which becomes unrecognizable southward in the upper part of Mirage Point Formation. North of station 312NB the dolomite rapidly thickens to form a conspicuous rock unit.		
21	Covered interval	?46	130.8
20	Dolomite, slightly sandy, argillaceous partings between some beds, pale brownish red with speckles of olive green, weathers dusky red, in irregular thin-beds up to 6 inches thick	5	84.8
19	Dolomite, argillaceous, sandy, recessive in places	2	79.8
18	Dolomite, sandy, very pale greenish grey, weathering dusky red; resistant	4.5	77.8
	Transitional upper contact. Similar to unit 16 below.		

Unit		Thickness (feet) Unit	From base
	MIRAGE POINT FORMATION—*Cont.*		
17	Shale and satin spar (gypsum), thinly interbedded, shale is bright olive green, soft, putty-like when wet, weathers dusky red, beds up to 4 inches thick; gypsum is white, beds up to 1 inch thick .... 1 Sharp upper and lower contacts.	1	73.3
16	Dolomite, sandy, finely granular texture, very pale greenish grey, stained a pale dusky red, massive, resistant; containing numerous closely spaced laminae and beds of white satin spar	3.3	72.3
15	Argillaceous dolomite, gypsum, and shale, thinly interbedded, more argillaceous in upper 2.5 feet; beds between $\frac{1}{16}$ to $\frac{1}{2}$ inch thick. Satin spar, white, fibers perpendicular to bedding planes. Argillaceous dolomite, fine-grained, dusky red on both fresh and weathered surfaces. Shale, laminated, fissile, dusky red ..... Unit recessive, especially in upper part. Part of unit 20, units 19 to 16 inclusive, and part of unit 15 at station 309NB, on the northwest shore of Baker Bay, are possibly equivalent to the section exposed at station 310NB located on small peninsula 4 miles bearing 293T from Baker Point.	6.5	69
14	Gypsiferous dolomite and gypsum, in thin irregular beds. Dolomite is pale green, very fine-grained, hard. Gypsum is white, present as irregular 'stringers' throughout and in places cutting across the dolomite beds, in places fibers of satin spar oriented perpendicular to bedding planes ..... Unit stained a dusky red by wash from above. Units 20 to 14 inclusive outcrop at station 309NB on the northwest shore of Baker Bay.	7.5	62.5
13	Covered interval	?18.5	55
12	Dolomite, fine-grained, granular, pale purplish red and light olive green, in thin beds up to 1 inch thick, weathering purplish red. Mud cracks noted on one upper bedding surface ..... Unit 12 outcrops at several places along the shore just below lake level at station 313NB, on the north side of Alexander Point.	1	36.5
11	Mudstone, ?dolomitic, dusky orange red, both on fresh and weathered surfaces, fairly hard but in places weathering to small irregular fragments; vaguely and irregularly banded with harder layers possibly more ?dolomitic ..... Irregular upper and lower contacts. This is the uppermost bedrock unit of the section at station 267NB; a cliff section along the shore 1.6 miles northwest of Foam Point.	2.5	35.5
10	Dolomite, aphanitic, orange red with tiny green speckles, massive but in places weathering to irregular thin beds, weathers dark orange	1.5	33
9	Mudstone, gypsum, and dolomitic sandstone ..... A recessive unit.	0.7	31.5
8	Sandstone, dolomitic, very fine-grained, dusky orange red, weathering the same colour, in thin irregular beds, strongly factured; beds cut by numerous irregular 'stringers' of white gypsum	3.1	30.8
7	Gypsiferous shale and gypsum; shale is dusky orange red, flaky. Gypsum is white, fibrous, fibers perpendicular to bedding, present as laminae in the shale and as interbeds ..... This unit varies from 1 to 4 inches thick along cliff face.	0.3	27.7
6	Sandstone, dolomitic, argillaceous at top and bottom, dusky orange brown. Contains irregular stringers of secondary gypsum	3.2	27.4

Unit		Thickness (feet) Unit	From base
	MIRAGE POINT FORMATION—*Cont.*		
5	Dolomite, sandy, fine-grained, dusky orange brown, with tiny greenish grey speckles, weathers dusky orange red. Contains thin irregular beds between ¼ to 2 inches thick of white fibrous gypsum with fibers oriented perpendicular to bedding ..... Units 5 to 11 inclusive were measured at station 267NB.	2.2	24.2
4	Covered interval	?12	22
3	Dolomite, sandy, ferruginous, thinly and evenly bedded, fine-grained, light grey (wet); contains numerous small blebs of marcasite, which probably accounts for red colour when exposed to air ..... Present as a pavement along the shore just beneath lake level at station 269NB located 1.3 miles south of Foam Point.	?1	10
2	Covered interval	8	9
1	Dolomite, sandy, fine-grained, orange brown, thinly and evenly bedded between 3 to 4 inches thick, weathers bright orange brown ..... Beds outcrop as a pavement between 6 to 8 inches below lake level in a shallow bay at station 268NB about 1 mile south-southeast of Foam Point. Lower contact of formation not exposed and covered by Great Slave Lake. Approximate thickness of Mirage Point Formation exposed ..... 183 feet.	1	

Section 24. A thin section of beds near the base of the Chinchaga Formation exposed at top edge of a small mesa or outlier at station 368NB, 12 miles bearing 254T from Fort Rae.

MIDDLE DEVONIAN

CHINCHAGA FORMATION

1	Limestone, medium grey, fine-grained, granular, laminated, in irregular thin and medium beds, weathers light grey ..... Lower 6 feet well to poorly exposed; upper 2 feet merely a limestone rubble. Unit grades laterally to brecciated beds. Approximate thickness of Chinchaga Formation exposed....8 feet.	*c.*8	

Section 25. Section of basal beds of Chinchaga Formation and upper beds of Chedabucto Lake Formation; measured at station 365NB, 18.8 miles bearing 288T from Fort Rae.

MIDDLE DEVONIAN

CHINCHAGA FORMATION

3	Breccia, angular fragments of at least two types of dolomite and a limestone, dolomite fragments mainly a pale brownish grey, very fine-grained, granular; also a porous, petroliferous dolomite; and a laminated limestone ..... Upper surface of unit 3 highly irregular at top of a low escarpment.	2 exposed	5

Unit		Thickness (feet) Unit	From base
	CHINCHAGA FORMATION—*Cont.*		
2	Covered interval	2	3
1	Limestone, aphanitic, medium brown, in irregular and even thin beds, weathers a very light grey almost white *c.*1 Contact with unit below is sharp and even. Thickness of Chinchaga Formation represented ..... 5 feet.		
	UPPER ORDOVICIAN		
	CHEDABUCTO LAKE FORMATION		
1	Dolomite, very dark brownish grey, porous, smelling strongly of petroleum, massive, hard, resistant, weathers dark orange *c.*6 Unit 1 outcrops along a low scarp marked here and there by huge frost-heaved blocks. Thickness of Chedabucto Lake Formation exposed ..... 6 feet.		

Section 26. Composite section of the Chinchaga Formation discontinuously exposed across a belt from 10 to 25 miles west of the northern end of Marian Lake. Sections measured at stations 367NB, 337NB, 338NB, 382NB, and 338NBa. Covered intervals are calculated on the assumption that the westerly dip is 20 feet per mile.

	MIDDLE DEVONIAN		
	CHINCHAGA FORMATION		
16	Covered interval to top of Chinchaga Formation ..... ?28 Beds of the overlying Lonely Bay Formation are presumed to be present about 1.5 miles west of station 338NBa.		335.7
15	Gypsum, white ..... *c.* 5 Unit poorly exposed at station 338NBa on both the north and south banks of the Duport River, 26.6 miles bearing 255T from Fort Rae.		307.7
14	Covered interval ..... *c.* 36		302.7
13	Dolomite, laminated and brecciated, present as talus fragments along slope of scarp ..... ?4		266.7
12	Dolomite, slight petroliferous smell, medium brown, very fine grained, irregularly medium-bedded, weathers medium grey. Poorly exposed ..... 3 Units 13 and 12 measured at station 382NB at top edge of low scarp.		262.7
11	Covered interval ..... ?66.5		259.7
10	Limestone, aphanitic, laminated dark and light grey, in part brecciated, in irregular beds up to 3 feet thick, weathers dark grey but covered in part with a pale orange weathering wash; interbedded with limestone and shale; limestone is pale brown, finely granular texture, in irregular recessive beds between 2 to 6 inches thick, contains secondary, white, coarsely crystalline calcite. Shale is dark grey, present as partings and beds up to 2 inches thick 7		193.2
9	Covered interval ..... *c.* 20		186.2

Unit		Thickness (feet) Unit	From base
	CHINCHAGA FORMATION—*Cont.*		
8	Gypsum, mottled white and dark grey, no bedding evident in poor exposure, weathers light grey to white, outcrop in places coated with a pale brown argillaceous wash from above ..... Nearby this unit is highly contorted; and a karst topography is produced in it. Scarp along which unit 8 is exposed is in places deeply indented.	12	166.2
7	Gypsum ..... Unit 7 present at the foot of and beyond base of escarpment. Lake and slough bottoms contain a mixture of evaporites and soil. Units 10, 9, 8, and 7 measured at station 338NB, 18.2 miles bearing 263T from Fort Rae.	15	154.2
6	Covered interval between base of exposure at station 338NB and top of exposure at station 337NB	*c.*43	139.2
5	Gypsum, white and light grey, massive ..... Very poor exposure. Unit 5 measured at station 337NB, 16 miles bearing 266T from Fort Rae.	*c.*16	96.2
4	Covered interval between base of exposure at station 337NB and top of exposure at station 367NB	50.5	80.2
3	Limestone (possibly sandy), wavy laminated, fine-grained, granular texture, porous, vuggy in even and irregular beds between 4 to 18 inches thick, weathers brownish grey ..... Unit 3 caps plateau and is in part brecciated.	*c.*3	29.7
2	Covered interval	25	26.7
1	Limestone, aphanitic, very light grey almost white, extremely vuggy particularly in upper 4 inches of unit, weathers white ..... Vugs presumably formed by solution of evaporites in the limestone. Units 3, 2, and 1 measured at station 367NB, 13 miles bearing 252T from Fort Rae. Unit 1 is thought to be at or very near the base of the Chinchaga Formation. Approximate thickness of the Chinchaga Formation.....336 feet.	1.7	

Section 27. Composite section of the Chinchaga Formation and basal beds of the Lonely Bay Formation discontinuously exposed in the area west-southwest of Rae Point. Sections measured at stations 375NB, 344NB, 343NB, 340NB, and 341NB.

MIDDLE DEVONIAN

LONELY BAY FORMATION

4	Limestone, dark brown, aphanitic, massive, brittle, breaks with conchoidal fracture, weathers medium grey ..... Unit forms a vertical cliff at top edge of the higher of two closely spaced escarpments. Uppermost beds contain numerous macerated and recrystallized organic fragments (sample 341NBa): ?stromatoporoids undet. cup coral undet. brachiopod fragments	14	63

Unit		Thickness (feet) Unit	From base
	LONELY BAY FORMATION—*Cont.*		
3	Covered interval	*c.*7	49
2	Limestone, aphanitic, dark brown, in thick even beds, weathers dark grey Units 4, 3, and 2 measured in the upper of two closely spaced escarpments at station 341NB.	2	42
1	Covered interval Thickness of Lonely Bay Formation represented ..... 63 feet.	?40	
	CHINCHAGA FORMATION		
21	Dolomite, light brown, fine-grained, granular in thin even beds, weathers dark grey Unit 21 measured on the lower of two closely spaced escarpments. Units 4 to 1 of Lonely Bay Formation and unit 21 of Chinchaga Formation measured at station 341NB bearing 262T from Pointe du Lac.	1.5	269.1
20	Dolomite, and calcareous dolomite, faintly laminated light to medium brown, thinly-bedded from 1 to 4 inches thick, weathers light grey; some beds brecciated Unit 20 is very poorly exposed near the top edge of a low escarpment. Unit 20 may be in part equivalent to unit 21 at station 341NB.	2.7	267.6
19	Limestone, light grey, fine-grained, minutely vuggy, in part replaced by milky white finely crystalline calcite, some beds faintly laminated, beds between 1 and 5 inches thick, weathers pale grey. Several beds in upper 2 feet brecciated	4	264.9
18	Covered interval	1.5	260.9
17	Limestone, pale grey, fine-grained, granular, in even beds between 1.5 to 4 inches thick, weathers medium to light grey	1.5	259.4
16	Gypsum, white Unit 16 discontinuously exposed along cliff face of an escarpment down to level of a playa lake. Units 20 to 16 measured at station 340NB, on an escarpment 24.8 miles bearing 267T from Pointe du Lac.	12	257.9
15	Covered interval between base of beds of unit 16 at station 340NB to top of beds at station 343NB	?50	245.9
14	Limestone breccia, coarse angular fragments up to 2½ feet in diameter, some fragments slightly fetid, fine-grained to aphanitic, massive to vaguely bedded, weathers light to medium grey. Vague outlines of brachiopods and poorly preserved traces of dendritic corals noted about middle of unit (sample 343NB2) Unit 14 outcrops along an irregular escarpment and as erosional stacks along front of escarpment.	48	195.9
13	Covered interval	12	147.9
12	Gypsum, laminated and banded white and medium grey also mottled the same colours, laminae more conspicuous towards base, weathers into a light grey powdery, putty-like material Unit 12 is exposed in a sink-hole near base of the escarpment. Units 14, 13, and 12 were measured at station 343NB, 17.8 miles bearing 264T from Pointe du Lac.	13	135.9

Unit		Thickness (feet) Unit	From base
	CHINCHAGA FORMATION—*Cont.*		
11	Covered interval between base of exposure at station 343NB to top of exposure at station 344NB	50	122.9
10	Gypsum, white	*c.* 15	72.9
	Unit 10 exposed at base of a low escarpment.		
9	Covered interval between base of exposure of unit 10 to top of beds exposed at station 375NB	?3	57.9
8	Covered to top edge of escarpment	14	54.9
	Small sink-holes from 5 to 7 feet deep are present just back from the top edge of the escarpment. These holes are littered with fragments of dolomitic limestones or limy dolomite (very weak acid reaction), pale brown, fine-grained, granular, some are laminated, some minutely vuggy, most fragments weather a very pale brownish grey to almost white. There is, presumably, about 6 feet of these beds within the upper part of the covered interval overlying gypsum.		
7	Gypsum and/or anhydrite, white, highly fractured, light brown and black laminae, weathers white to light grey	2.9	40.9
6	Covered interval	16.5	38
	Poor evaporite exposure within this interval 50 to 100 feet north of spot where interval was measured.		
5	Gypsum and/or anhydrite, brecciated, massive, white and light grey, weathering same	10	21.5
4	Covered interval	4	11.5
3	Gypsum, similar to unit 1	3	7.5
2	Covered interval	2	4.5
	Limestone and gypsum talus in this interval.		
1	Gypsum, soft, punky, porous, white and light grey, massive, weathers light grey	2.5	
	Unit 1 is poorly exposed at base of escarpment. This unit is presumably at or very near the base of the Chinchaga Formation.		
	Total approximate thickness of the Chinchaga Formation .....270 feet.		

Section 28. Composite section of part of the Lonely Bay Formation, the Chinchaga Formation, and upper part of Chedabucto Lake Formation, discontinuously exposed west-southwest of Spruce Point. Sections measured at stations 333NB, 330NB, 321NB, 377NB, 335NB, 322NB.

MIDDLE DEVONIAN

LONELY BAY FORMATION

4	Limestone, aphanitic, light grey, box-like structures formed by solution of evaporites	1	65
	Unit 4 presumed from talus along top of escarpment.		
3	Covered interval	13	64

Unit		Thickness (feet) Unit	From base
	LONELY BAY FORMATION—*Cont.*		
2	Limestone, dark to medium brown, fine-grained in irregular medium beds, strongly fractured, weathers light grey	6	51
	Poorly preserved fossils collected in place (sample 330NBa): ?*Aulopora* sp. ?*Emanuella* sp.		
	Fossils collected from talus include (sample 330NBb): *Alveolites* sp. G *Spinatrypa* sp. undet. macerated brachiopod fragments. crinoid ossicles.		
1	Covered interval to base of Lonely Bay Formation	45	
	Thickness of Lonely Bay Formation represented ..... 65 feet.		
	CHINCHAGA FORMATION		
20	Gypsum, white, powdery, mixed with soil, weathers light grey	10	309.5
	Unit 20 exposed along bottom and bank of playa lake and in small sink-holes along bottom of escarpment.		
	Units 4 to 1 of Lonely Bay Formation and unit 20 of Chinchaga Formation measured at station 330NB, 20 miles west of Baker Point.		
	Evaporite beds of about the same stratigraphic position as unit 20 are exposed at station 333NB, 22 miles west northwest of Redrock Point.		
19	Covered interval between base of escarpment at station 330NB and top of exposure at station 331NB	?21.5	299.5
18	Gypsum, mixed with lake sediments	1	278
	Unit 18 exposed on playa lake bottom at station 331NB, 16 miles west of McIver Point.		
17	Covered interval between base of exposure at station 331NB to top of exposure at 335NB	?85	277
	This interval is presumed to consist mainly of evaporites, suggested by typical evaporitic terrain separating the two localities.		
16	Limestone, mottled white and pale brown, very coarse grained, bioclastic, massive, weathers light brownish grey. A layer of very numerous *Cladopora* sp. within unit (sample 335NBa)	5	192
15	Dolomite, mottled medium and dark brown, fine-grained, granular, in a thick even bed, very resistant, weathers pale brownish grey	*c.*3	187
	The contact between units 16 and 15 is sharp and fairly irregular; it possibly marks a minor unconformity.		
14	Breccia, coarse angular fragments of dolomite up to 1½ feet in diameter, medium brown, aphanitic, some are minutely vuggy; all cemented by coarsely granular porous limestone containing coarse crystals of secondary white calcite	6.5	184
	Units 16, 15, and 14 at station 335NB appear to be nearly equivalent to a sequence of beds described below at station 377NB, 5 miles west of Old Fort Island.		

Unit		Thickness (feet) Unit	From base
	CHINCHAGA FORMATION—*Cont.*		
	Breccia, small angular fragments of limestone, medium brown, massive, unit extremely porous, cemented by coarsely crystalline white calcite, unit weathers pale brown. Desiccation cracks noted in some fragments in upper part of unit	4.5	
	Breccia, dolomite fragments up to 1 foot in diameter, dark brown, aphanitic, massive to thickly bedded, weathers medium to light grey	9.5	
13	Covered interval	35	177.5
12	Limestone, gypsiferous and in part brecciated pale to medium brown, fine-grained, in thin to medium beds, weathers very light grey Unit is exposed at top edge of a small escarpment. Units 16 to 12 inclusive were measured at station 335NB.	4.5	142.5
11	Covered interval between base of exposure at station 335NB and top of beds exposed at station 323NB	?22	138
10	Gypsum, white and light grey, in thin irregular beds, weathers light grey. Only 2 feet well exposed along face of escarpment. Poor exposures of gypsum in small sink holes along top of escarpment Unit 10 measured at station 323NB.	?15	116
9	Covered interval between base of exposure at station 323NB and top of exposure at station 321NB	?32	101
8	Dolomite, dusky orange, in flaggy rubble containing crinoid ossicles (sample 321NB3) Fragments present on slope 11 feet from top of the upper of three closely spaced escarpments.	?1	69
7	Covered interval from base of unit 8 to top of second escarpment	8.5	68
6	Covered interval from top of second escarpment to top of exposure	19.5	59.5
5	Limestone, ?gypsiferous, dark brown, fine-grained, porous, minutely vuggy, outcrop coated with a calcareous sinter-like material weathering light yellowish grey	*c*.1	40
4	Dolomite, gypsiferous, pale brown, fine-grained, in thin irregular beds from 1 to 3 inches thick, weathers light grey	*c*.3.5	39
3	Gypsum, banded white and light to a dark grey, in beds of variable thickness; basal 2 feet lighter coloured and thicker bedded	9.5	35.5
2	Covered interval to top of first escarpment at station 321NB	20	26
1	Covered interval from top of first escarpment to top of exposure at station 321NB Total approximate thickness of Chinchaga Formation....310 feet.	6	
	UPPER ORDOVICIAN		
	CHEDABUCTO LAKE FORMATION		
1	Dolomite, pale reddish brown to brownish grey, fine-grained, granular, minutely vuggy, weathers pale orange; pale green argillaceous partings separating some beds Unit poorly exposed 6 feet down from top of escarpment at station 321NB. Exposed thickness of the Chedabucto Lake Formation....2 feet.	2	2

Unit	Thickness (feet) Unit	From base

Section 29. Composite section of the Chinchaga Formation measured at stations 308NB and 311NB. These are the most southern exposures of the Chinchaga Formation on the north side of Great Slave Lake.

MIDDLE DEVONIAN

CHINCHAGA FORMATION

4	Covered interval to base of overlying Lonely Bay Member of the Pine Point Formation ..... Gypsum at or very near the top of the Chinchaga Formation can be seen along the northwest shore of Long Island during periods of low lake level, but was covered by water when the island was traversed by the writer.	?235	279
3	Gypsum and shale ..... Unit 3 is poorly exposed at top edge of an east facing escarpment.	3	44
2	Covered interval	40	41
1	Gypsum mixed with clay on playa lake bottom at base of east facing escarpment ..... Units 3, 2, and 1 measured at station 311NB, 1.6 miles bearing 237T from McIver Point. At station 308NB, located 3.6 miles bearing 251T from Baker Point, 7 feet of banded white and medium grey gypsum beds are exposed which are probably in part equivalent to unit 1 at station 311NB. At station 308NB the gypsum is separated by a covered interval of 12 feet from red beds of the Mirage Point Formation. Approximate total thickness of the Chinchaga Formation ..... 280 feet.	?1	

Section 30. Composite section of the Little Buffalo Formation, and the Chinchaga Formation including the Hay Camp Member near its base. Discontinuously exposed between Little Buffalo River Falls area and Bell Rock on Slave River, at stations 185NB, 186NB, 188NB, 176NB to 181NB inclusive, 193NB, 30BI, 29BI, and 35BI.

MIDDLE DEVONIAN

LITTLE BUFFALO FORMATION

'Limestone and Dolomite' Member

7	Covered interval to top of Little Buffalo Formation and contact with evaporites of the Nyarling Formation	?20	57.2
6	Dolomite, ?gypsiferous, medium to dark brown, fine- to coarse-grained, irregularly thin- to medium-bedded, weathers light brownish grey; resistant. Crinoid ossicles numerous in some beds. Poorly preserved cup coral and *Atrypa* sp. (medium costate) collected from unit (sample 185NBa) ..... Nine feet of this unit is exposed at station 185NB on east bank and near right angle bend in river 0.4 mile above main falls. The beds at this point project out into river forming low cascades. On the opposite side of the river at station 186NB,	*c.*15	37.2

Unit		Thickness (feet) Unit	From base
	LITTLE BUFFALO FORMATION—*Cont.*		
	0.3 mile above the main falls, about 15 feet of unit 6 is exposed but was not examined. A small falls in the river with a four-foot drop is formed in the lower part of this unit opposite the outcrop.		
5	Covered interval	?2	22.2
4	Limestone, medium brown, aphanitic, rubbly thin-bedded between 1 to 6 inches thick, separated by argillaceous limestone and shale partings, unit weathers light brownish grey. Richly fossiliferous.	*c.* 8	20.2
	Fossils collected loose (sample 187NBb): undet. gastropod *Mastigospira* sp. undet. pelecypod (coarsely costate) cf. *Michelinoceras* sp. *Atrypa* sp. cf. *A. arctica* Warren *Emanuella meristoides* (Meek) crinoid ossicles		
	Fossils collected loose (sample 187NBb): undet. gastropod *Mastigospira* sp. undet. pelecypod cf. *Michelinoceras* sp. *Atrypa* sp. cf. *A. arctica* Warren *Atrypa* sp. cf. *A. perfimbriata* Crickmay cf. *Emanuella* sp. crinoid ossicles *Dechenella* sp.		
3	Dolomite, medium to dark brown, medium-grained, granular, evenly medium-bedded, between 6 to 8 inches thick, weathers medium orange brown; recessive	2.9	12.2
2	Limestone, medium brown, cryptograined, irregularly thin-bedded averaging about 4 inches thick, weathers light brownish grey; more resistant than unit above	3.3	9.3
	Units 4 to 2 inclusive are exposed at station 187NB, located on the east bank of the river 0.1 mile above the main falls. A small cascade (middle falls) is present in river opposite this outcrop.		
1	Limestone, crinoidal, medium to dark brown, medium-grained to aphanitic, coarser-grained towards base, rubbly-bedded about 3 to 4 inches thick, separated by argillaceous partings, weathers brownish grey	6	
	Fossiliferous (sample 188NBa): *Atrypa* sp. cf. *A. arctica* Warren ?*Gypidula* sp.		
	This is the highest unit of the section immediately downstream from the main or lower falls on Little Buffalo River (station 188NB) where the drop is about 60 feet. The upper part of this unit may be equivalent to the lower part of unit 2 exposed at the middle falls (station 187NB).		
	Approximate total thickness of 'Limestone and Dolomite' Member. ..... 57 feet.		
	'Dolomite' Member		
7	Dolomite, dark to medium brown, fine- to medium-grained, massive, resistant, very irregular parting planes, weathers medium brownish grey	20	56.2

Unit		Thickness (feet) Unit	From base
	LITTLE BUFFALO FORMATION—*Cont.*		
6	Dolomite, medium brown, coarsely vuggy, massive, weathers pale brown	*c.*16	36.2
5	Dolomite, pale brown, aphanitic, resistant. Inaccessible under falls.	4	20.2
4	Dolomite, laminated medium and dark brown, aphanitic, massive, resistant, weathers medium and dark brown (wet)	4	16.2
3	Dolomite, pale brown, faintly laminated, even resistant bed, weathers very light brown. Sharp even contacts	1.5	12.2
2	Dolomite, pale brown, dark grey to black carbonaceous laminae, aphanitic, conchoidally fracturing, massive, weathers pale brown.	5.5	10.7
1	Limestone, carbonaceous, banded dark grey to black, some of lighter layers brecciated Sharp even contact with evaporites below. Thickness of 'Dolomite' Member .....56.2 feet. Total approximate thickness of the Little Buffalo Formation ..... 115 feet.	5.2	
	CHINCHAGA FORMATION		
15	Gypsum, laminated white, dark grey to black, evenly bedded averaging about 1 inch thick This is the lowest unit exposed at the base of the main falls (station 188NB) on Little Buffalo River. Stratigraphically lower beds are exposed downstream from this point. The section below is composite and was compiled from a number of measured sections between 0.9 to 1.6 miles (air distance) below the lower (main) falls where the canyon walls are about 80 feet high and composed of gypsum.	*c.*3	430.5
14	Covered interval	?2	427.5
13	Gypsum, white, with light to dark grey laminae and coarser banding, massive looking from a distance, scarp-forming in Little Buffalo River canyon Arbitrary transitional lower contact.	15	425.5
12	Gypsum, white, banded, light brown and light grey, weathering to thin fissile beds between ‡ inch and 2 inches thick. Dark impure layers more resistant Unit 12 is slightly less resistant than unit 13 above. Arbitrary transitional lower contact. Units 13 and 12 were measured at station 177NB, 2.3 miles (air distance) below the main falls.	25	410.5
11	Gypsum, light whitish grey with dark brownish grey argillaceous laminae, beds from 2 to 7 inches thick; some layers brecciated; irregular inclusions of green, brittle, hackly fracturing shale Unit 11 was measured at station 180NB, 2.8 miles (air distance) below the main falls.	*c.*40	385.5
10	Covered interval between base of exposure at station 180NB and top of exposure at station 193NB	?90	345.5
9	Dolomite, pale brown, fine-grained; sparse poorly preserved recrystallized fossils (sample 193NBa) ?*Spinatrypa* sp. undet. organisms crinoid ossicles Unit present as large angular frost-heaved blocks along the top of lower escarpment west of Fort Smith.	*c.*3	255.5

Unit		Thickness (feet) Unit	From base
	CHINCHAGA FORMATION—*Cont.*		
8	Covered interval; presumed to consist of evaporites	36.5	252.5
7	Gypsum, laminated white and light brown	2	216
6	Covered interval	6	214
5	Gypsum, white, with light to dark brown laminae, thinly bedded, weathers a very light creamy brown or whitish grey powder and small chip-like fragments	8 exposed	208
	Unit 5 exposed near the base of a steep cliff of lower escarpment.		
	Units 9 to 5 inclusive measured at station 193NB, on north-facing escarpment 15.4 miles bearing 271T from Bell Rock.		
	These units appear to be roughly equivalent to the composite sequence exposed at stations 30BI and 29BI on escarpment 10.4 miles bearing 272T from Bell Rock.		
4	Covered interval between base of exposure at station 193NB and top of exposure at Bell Rock	?148	200
	Hay Camp Member		
3	Limestone breccia, massive, coarsely angular fragments of pale brown, aphanitic limestone; dark grey laminated limestone which is itself brecciated; and light buff brown, fine-grained dolomite; scattered throughout are curved layers of dark brown, fine-grained, laminated limestone; all in a matrix of the same material. Some of the blocks are slickensided. White coarsely crystalline calcite fills some fractures and vugs. A poorly preserved *Emanuella* sp. cf. *E. meristoides* (Meek) collected from one limestone fragment (sample 35BI)	35	52
	The above breccia is exposed in the eastern part of the section at Bell Rock and is in vertical fault contact with units 3a and 2 described below exposed to the west.		
3a	Limestone interbedded with shale; limestone, pale brown, very fine grained, beds mainly between 4 and 6 inches thick but with occasional bed up to 12 inches thick, in part vuggy with some vugs lined with coarsely crystalline calcite; shale is brown to greyish brown, very soft, contains some limestone nodules	20	— —
	Basal unit of Hay Camp Member and in part equivalent to the brecciated limestone of unit 3.		
	Total approximate thickness of the Hay Camp Member. 35 feet.		
2	Gypsum, white, interbedded with greenish grey shale which is most abundant in lower 5 feet of section; some of the gypsum occurs as veinlets and is clearly of secondary origin	12 exposed	17
	Units 3 and 2 exposed on the west side of the exposure at Bell Rock (station 35BI).		
1	Covered interval to base of Chinchaga Formation	?5	
	The Fitzgerald dolomite member may not be present in the area because Precambrian crystalline rocks outcrop a short distance eastward.		
	Total approximate thickness of the Chinchaga Formation 430 feet.		

75427—10

Unit		Thickness (feet) Unit	From base

Section 31. Composite type section of the Nyarling Formation from discontinuous exposures near the southern border of the Great Slave Lake region at stations 37DD to 41DD inclusive.

Covered intervals are calculated on the basis of a presumed southwest dip of 13 feet per mile.

MIDDLE DEVONIAN

NYARLING FORMATION

20	Covered interval to base of Slave Point Formation	?140	418.5
19	Gypsum	*c.* 10	278.5
	Blocks of gypsum loosened by bull-dozer along winter road at station 41DD, 51.6 miles bearing 280T from Bell Rock.		
18	Covered interval	10.5	268.5
17	Gypsum, laminated, interbedded with massive to rubbly-bedded gypsum	13	258
	Exposure in sink-hole at station 40DD, 50.8 miles bearing 280T from Bell Rock.		
16	Covered interval	?1	245
15	Gypsum, white	8	244
	Exposed along a bull-dozed winter road connecting Salt River and Hay River Settlement at station 39DD, 50 miles bearing 280T from Bell Rock.		
14	Covered interval	?78	236
13	Gypsum, grey to white, crystalline	1.3	158
12	Limestone, brown, fine-grained to dense, hard, in beds from 1 to 2 inches thick	1	156.7
11	Gypsum, white, crystalline in poorly developed beds about 1 inch thick, breaks into small fragments	2	155.7
10	Gypsum, massive, white to grey banding evident on weathered surface	4	153.7
9	Gypsum, brecciated, fragments between ¼ to 1 inch in diameter	0.2	149.7
8	Limestone, gypsiferous, leached	0.2	149.5
7	Limestone, as below in 2 inch beds	0.6	149.3
6	Limestone, as below, fissile, splits into ⅛ inch laminae	0.2	148.7
5	Limestone, brown, laminated, with dark brown carbonaceous streaks, fine-grained to aphanitic, splits into ¼ to ½ inch plates	3	148.5
4	Limestone, brown, evenly laminated, massive, fairly hard, weathers light brown	1	145.5
	Units 13 to 14 inclusive exposed as ledges along the edge of a playa lake at station 38DD, 46.6 miles bearing 282T from Bell Rock.		
3	Covered interval	?42	144.5
2	Gypsum, mixed with clay	2.5	102.5
	Playa lake near escarpment at station 37DD, 46 miles bearing 282T from Bell Rock.		
1	Covered interval to base of Nyarling Formation and top of Little Buffalo Formation	?100	
	Approximate total thickness of Nyarling Formation 420 feet.		

Unit		Thickness (feet) Unit	From base

Section 32. Section of part of the Lonely Bay Formation exposed in a sink-hole lake located at station 383NB, 42.7 miles bearing 264T from Fort Rae.

MIDDLE DEVONIAN

LONELY BAY FORMATION

4	Covered interval to top of Lonely Bay Formation	?48	192.2
3	Limestone, medium brown, fine-grained to aphanitic, breaks with a conchoidal fracture, irregularly bedded from 1 to 3 inches thick, contains a few crinoid ossicles; interbedded with limestone, nodular, medium brown, fine-grained, some beds brecciated with angular fragments up to 4 inches in diameter in matrix of vaguely banded argillaceous limestone, beds average 12 inches thick	9.2	144.2
	Unit slightly fetid, and sparsely fossiliferous (sample 383NBa). *Atrypa* sp. (med. costate shell fragments) Unit 3 exposed down to lake level at northeast edge of sink-hole lake.		
2	Limestone, fetid, dark to medium brown, medium- to fine-grained, massive, resistant, vertical scarp-former, irregular argillaceous partings; a 10-inch brecciated layer 3 feet from top. Sparsely fossiliferous (sample 383NBb)	*c*.10	135
	calcareous sponge cf. *Euomphalus* sp. *Atrypa* sp. *Spinatrypa* sp. cf. *S. lata* (Warren) crinoid ossicles		
	Unit 2 exposed down to water level at southwest edge of sink-hole lake.		
1	Covered interval to top of Chinchaga Formation; thickness estimated	*c*.125	
	Total estimated thickness of the Lonely Bay Formation 190 feet.		

Section 33. Part of Lonely Bay Formation exposed in an outlier at station 342NB, 21.4 miles bearing 264T from Pointe du Lac.

MIDDLE DEVONIAN

LONELY BAY FORMATION

3	Covered interval to top of formation	?57	120
2	Limestone, dark brown, aphanitic, brittle, massive, resistant, in places separation planes evident and spaced from 1½ to 6 inches apart, weathers dark grey; stylolitic in upper 5 feet	42	63
	Poorly preserved stromatoporoids collected loose at top of unit 2 (sample 42NBa). Unit 2 outcrops in a series of ledges some of which are 25 to 35 feet high on the northeast face of escarpment of outlier.		
1	Covered interval to base of Lonely Bay Formation	?21	
	Total estimated thickness of Lonely Bay Formation 120 feet.		

75427—10½

Unit		Thickness (feet) Unit	From base

Section 34. Composite section of Lonely Bay and Chinchaga Formations exposed at stations 331NB, 330NB, 53NC to 51NC inclusive.

MIDDLE DEVONIAN

LONELY BAY FORMATION

4	Covered interval to top of formation	?50	123
3	Limestone, bioclastic, slightly argillaceous, medium light grey, fine-grained to aphanitic, in thin wavy beds up to 4 inches thick, weathering very light orange brown	32	73
	Fossiliferous (sample 53NCa): stromatoporoids *Alveolites* sp. G *Aulopora* sp. *Syringopora* sp. D undet. cup coral ?*Tentaculites* sp. ?*Emanuella* sp. undet. brachiopod fragments crinoid ossicles		
	Unit 3 measured at station 53NC, along a terraced escarpment 24 miles west of McIver Point.		
	Beds equivalent to the lower part of unit 3 outcrop also at station 52NC, 27 miles west of Alexander Point. They consist of:		
3 in part	Limestone, light olive grey to medium grey, fine-grained, in thin wavy beds from 1 to 4 inches thick, containing numerous indeterminable organic fragments (sample 52NC1)	4	— —
	Unit exposed along a terrace 4 feet high.		
	Beds presumably equivalent to the upper part of unit 3 outcrop at station 51NC, 30 miles west of Redrock Point. They consist of:		
3 in part	Limestone, slightly dolomitic, medium grey, aphanitic, in beds from 6 to 12 inches thick; separated by irregular bitumen partings	2	— —
	Unit outcrops at the top of an escarpment along the south side of a lake.		
2	Covered interval from base of exposure at station 53NC to top of exposure at station 331NB	?30	41
1	Limestone, in part slightly argillaceous, pale brown, in even thin beds averaging 1½ inches thick, weathers pale brown and light grey	*c.* 11	
	Unit 1 is exposed at top edge of escarpment. Contact with unit below is sharp and even.		
	Total approximate thickness of the Lonely Bay Formation 123 feet.		

CHINCHAGA FORMATION

9	Limestone, in part gypsiferous, laminated dark and pale grey, aphanitic to medium granular texture, in thick irregular beds to massive; in part brecciated and vuggy, vugs lined with coarsely crystalline white calcite, unit weathers pale brownish grey	*c.* 7	23.1

Unit		Thickness (feet) Unit	From base
	CHINCHAGA FORMATION—*Cont.*		
8	Gypsum and limestone, thinly interbedded; lower 1.2 feet mainly laminated white and grey gypsum and pale brown limestone; remaining upper part mainly limestone with partings of gypsum.... A fairly hard unit.	2.9	16.1
7	Dolomite, calcareous, medium to dark brown, aphanitic, in thick, irregular beds, weathers dark brownish grey	2.6	13.2
6	Gypsum, white, in places laminated pale brown and white, vuggy, hard, unit pinches and swells along strike, weathers whitish grey..	1.2	10.6
5	Argillaceous limestone and gypsiferous shale; limestone is laminated, dark grey to dark brown, aphanitic, fissile, in beds up to 4 inches thick; forms the main constituent in the lower and upper parts of unit; gypsiferous shale is fissile, thinly bedded ..... Unit 5 is slightly harder than unit 4 below.	1.8	9.4
4	Limestone interbedded with gypsum, brecciated, vuggy, vugs up to 3 inches in diameter; limestone beds are dark grey, laminated, aphanitic; gypsum is mainly white; unit weathers light to dark grey; slightly recessive	1.3	7.6
3	Limestone, wavy laminated pale and dark brown, fine grained to aphanitic, weathers pale brownish grey; resistant	0.5	6.3
2	Gypsum, white, even bed, stained a bright green in places, sharp even contacts with units above and below	0.4	5.8
1	Limestone, irregular laminae pale to medium brownish grey, medium- to fine-grained, granular, beds between 1 to 10 inches thick, beds weather medium grey; a 6-inch bed 1 foot from base of fissile, laminated, silty limestone ..... Unit 1 of Lonely Bay Formation and units 9 to 1 inclusive of Chinchaga Formation outcrop at station 331NB, 16 miles west of McIver Point. Total thickness of upper beds of Chinchaga Formation exposed ..... 23 feet.	5.4	

Section 35. Section of Lonely Bay Member of the Pine Point Formation exposed in a large sink-hole at station 275NB bearing 268T from Gypsum Point.

MIDDLE DEVONIAN

LONELY BAY MEMBER OF THE PINE POINT FORMATION

3	Covered interval to top of Lonely Bay Member	?30	120
2	Limestone, medium brown, fine-grained, evenly thick-bedded to massive, from 1½ to 5 feet thick, weathers light to medium grey .... Fossils collected in place (sample 375NBb): *Spinatrypa* sp. Fossils collected loose (sample 275NBa): cf. *Paracyclas* sp. *Atrypa* sp. cf. *A. arctica* Warren *Spinatrypa* sp. cf. *S. lata* (Warren) crinoid ossicles Unit 2 measured down to water level in sink-hole.	*c.* 23	90
1	Covered interval to base of Lonely Bay Member ..... Total approximate thickness of the Lonely Bay Member ..... 120 feet.	?67	

Unit		Thickness (feet) Unit	From base

Section 36. Section of the Lonely Bay Member of the Pine Point Formation exposed at station 273NB, 2.2 miles northwest of Long Island.

MIDDLE DEVONIAN

LONELY BAY MEMBER OF THE PINE POINT FORMATION

11	Covered interval to top of member	?75	118.8
10	Limestone, pale brown, fine-grained, rubbly bedded; poorly exposed in a ridge back from top of escarpment. Fossils collected from talus (sample 273NBc): *Atrypa* sp. cf. *A. arctica* Warren crinoid ossicles	*c.* 3	43.8
9	Limestone, pale brown, fine-grained, rubbly-bedded, weathers light grey. A few fragmentary brachiopods Poorly exposed.	*c.* 3	40.8
8	Covered interval	15	37.8
7	Limestone, top 3 feet slightly argillaceous, medium brown, fine-grained, massive in places, but elsewhere weathering to medium and thin lenticular beds, weathers light brownish grey; sparse fossils (sample 273NBb) undet. gastropods *Atrypa* sp. cf. *A. arctica* Warren *Emanuella* sp. cf. *E. meristoides* (Meek) Top 3 feet recessive weathering.	6.5	22.8
6	Limestone, argillaceous in lower 3 inches, medium brown, hard, irregular bedding surfaces, weathers medium brownish grey; argillaceous bed fossiliferous	0.7	16.3
5	Limestone, argillaceous partings, medium brown, aphanitic, rubbly thin-bedded, weathers medium brownish grey; contains abundant *Emanuella* sp.	2.2	15.6
4	Limestone, pale brown, aphanitic, hard, massive, weathers medium brownish grey. Richly fossiliferous, especially in top 4 inches (sample 273NBa) undet. gastropod undet. cephalopod *Productella* sp. *Emanuella meristoides* (Meek) *Atrypa* sp. cf. *A. arctica* Warren	2.3	13.4
3	Limestone, argillaceous partings at top, medium brown, irregular thin bed, weathers light brown	0.6	11.1
2	Limestone, medium brown, aphanitic, hard, conchoidally fracturing, even bed, weathers brownish grey	0.5 exposed	10.5
1	Covered interval to base of member	?10	

Total approximate thickness of the Lonely Bay Member ..... 120 feet.

Unit		Thickness (feet) Unit	From base

Section 37. Section of the Lonely Bay Member of the Pine Point Formation exposed at station 274NB, 6 miles west-northwest of Long Island.

MIDDLE DEVONIAN

LONELY BAY MEMBER OF THE PINE POINT FORMATION

12	Covered interval to top of member	?90	124.2
11	Limestone, argillaceous, medium brown, rubbly thin-bedded, weathers very light grey. Fossiliferous (sample 274NBf) *Productella* sp. *Atrypa* sp. cf. *A. arctica* Warren Fossils collected loose (sample 274NBe): undet. gastropod *Productella* sp. *Emanuella meristoides* (Meek) Unit 11 poorly exposed in a rubbly ridge back from top edge of escarpment.	*c.* 2	34.2
10	Covered interval, littered with fragments of rubbly weathering limestone	2.3	32.2
9	Limestone, pale brown, aphanitic, rubbly thin-bedded from ½ to 1 inch thick, weathers light grey. Fossiliferous (sample 274NBd) undet. planispiral gastropod undet. pelecypod *Michelinoceras* sp. *Productella* sp. ?*Emanuella* sp.	0.6	29.9
8	Covered interval	7.8	29.3
7	Limestone, slightly argillaceous in upper 2.5 feet, light brown, fine-grained, lower 4 feet massive, bedded towards top, weathers light grey *Atrypa* sp. fragments present in upper 3 feet.	6.5	21.5
6	Similar to unit 4 below	1	15
5	Limestone, medium brown, aphanitic, hard, even bed, weathers medium to dark brownish grey. Fossiliferous (sample 274NBc) undet. gastropod *Michelinoceras* sp. *Emanuella meristoides* (Meek) Unit 5 is similar to unit 3 below.	0.4	14
4	Limestone, argillaceous partings, medium brown, aphanitic, rubbly thin-bedded, weathers dark rusty brown. Fossiliferous (sample 274NBb): undet. gastropod ?*Emanuella meristoides* (Meek)	0.6	13.6
3	Limestone, medium brown, even thick bed, resistant, weathers medium brown (sample 274NBa) undet. spirally coiled gastropod ?*Productella* sp. *Emanuella meristoides* (Meek)	1.3	13.0
2	Limestone, poorly exposed and similar to unit 4	2.7	11.7
1	Covered interval to base of member Approximate total thickness of Lonely Bay Member.....125 feet.	?9	

Unit		Thickness (feet) Unit	From base

Section 38. Section of Lonely Bay Member of the Pine Point Formation exposed at stations 272NB and 198NB both located near Lonely Bay.

MIDDLE DEVONIAN

LONELY BAY MEMBER OF THE PINE POINT FORMATION

8	Covered interval to top of member	?90	121.6
7	Limestone, argillaceous, medium brown, rubbly thin-bedded, separated by shale partings, aphanitic, weathers light grey. Fossiliferous (sample 272NBc) ..... undet. gastropods *Emanuella meristoides* (Meek) large crinoid ossicles	2	31.6
6	Limestone, pale brown, in thick even bed but in places weathering to irregular lenticular beds up to 4 inches thick, weathers light grey; a fairly resistant unit. Fossiliferous (sample 272NBb): ..... undet. planispiral gastropods *Emanuella meristoides* (Meek) crinoid ossicles	2.5	29.6
5	Limestone, slightly dolomitic, medium brown, aphanitic, very hard, conchoidally fracturing, pale brown argillaceous partings between thin (average is 2 inches) irregular beds, in places rubbly, weathers medium to light grey and pale brown. Fossiliferous (sample 272NBa): ..... undet. gastropod cf. *Euomphalus* sp. *Productella* sp. (poorly preserved) *Atrypa* sp. cf. *A. arctica* Warren	2.9	27.1
4	Limestone, slightly dolomitic, light greyish brown, fine-grained, in thick even beds, faintly laminated, stylolitic, weathers medium grey; a very resistant unit; sharp even contact with unit above .. Units 7 to 4 inclusive were measured at station 272NB, 5 miles west of Long Island.	4.2	24.2
3	Covered interval from base of exposure at station 272NB to top of exposure at station 198NB	?3	20
2	Limestone, medium brown, aphanitic, hard, brittle, in thin to medium beds, weathering very light grey; oil staining along fractures. Poorly preserved fossils collected in place (sample 198NBa): 1 *Atrypa* sp. cf. *A. arctica* Warren Fossils collected from loose blocks include (sample 148NBb): *Productella* sp. *Atrypa* sp. cf. *A. arctica* Warren *Emanuella meristoides* (Meek) undet. trilobite cephalon fragment Unit present as a pavement 8 inches and more under water for about 150 feet along shore at station 198NB, on peninsula on east side of Lonely Bay.	1	17
1	Covered interval to base of member	?16	

Total approximate thickness of the Lonely Bay Member ..... 120 feet.

Unit		Thickness (feet) Unit	From base

Section 39. Composite section of Limestone Member of the Pine Point Formation outcropping in the Fort Resolution area. Sections measured at stations 99NB, 98NB and 103NB.

MIDDLE DEVONIAN

LIMESTONE MEMBER OF THE PINE POINT FORMATION

9	Covered interval to top of Limestone Member and contact with Fine-grained Dolomite Member of the Pine Point Formation	?20	111.5
8	Limestone, medium brown, fine-grained to aphanitic, fairly evenly thin-bedded, weathers whitish grey. Contains a few *Tentaculites* sp., and numerous *Atrypa* sp. cf. *A. arctica* Warren (sample 103NBa).	*c.*3	91.5
	Unit 8 is exposed as a pavement immediately north of the wharf at Fort Resolution (station 103NB); also along some of the roads within the settlement.		
7	Covered interval.	?50	88.5
6	Limestone, medium brown, aphanitic, thinly-bedded up to 4 inches thick, interbedded with brownish grey shale from 1 to 2 inches thick; resistant, cliff-forming.	2	38.5
	Unit 6 caps the bedrock section in the quarry at station 98NB.		
5	Limestone, medium brown, fine-grained, hard even bed, weathers whitish grey; contains finely macerated fossil fragments including *Atrypa* sp. cf. *A. arctica* Warren (sample 98NBe)	1.7	36.5
4	Limestone interbedded with shale; limestone is medium brown, hard, aphanitic, irregularly thin-bedded, weathers light grey; shale is brownish grey, beds from ½ inch to 4 inches thick, contains small limestone nodules. Shale diminishes upwards in unit to mere partings at the top. Contact with unit below is sharp and separated from it by a 4 inch shale bed.	2.2	34.8
	Few fossils (sample 98NBd): *Atrypa* sp. cf. *A. arctica* Warren *Atrypa* sp. (medium costate)		
3	Limestone, medium brownish grey, medium evenly bedded between 6 and 30 inches thick; separated by shale and shaly limestone partings and beds up to 3 inches thick. Bottom 1.5 feet of unit is thinner bedded and consists of alternating limestone, shaly limestone and shale in beds 2 to 6 inches thick	9.6 exposed	32.6
	Sparsely fossiliferous (sample 98NBa): stromatoporoid *Tentaculites* sp. *Emanuella* sp. crinoid ossicles		
	Units 6 to 3 measured at station 98NB at the south end of rock quarry 0.6 mile north of Fort Resolution.		
	Unit 3 appears to correlate with the upper beds of section at station 99NB near the north end of the rock quarry.		

Unit		Thickness (feet) Unit	From base
	LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*		
2	Limestone, medium brown, hard, aphanitic, conchoidally fracturing, evenly thick-bedded, weathers a light creamy brown. Poorly preserved macerated fossil fragments (sample 99NBa) ..... *Atrypa* sp. cf. *A. perfimbriata* Crickmay *Emanuella* sp. Unit 2 is exposed at station 99NB at the north end of rock quarry 0.8 mile north of Fort Resolution.	*c.*13	23
1	Covered interval to top of presumed evaporites of the Chinchaga Formation.	?10	
	Total approximate thickness of the Limestone Member of the Pine Point Formation .....110 feet.		

Section 40. Composite section of Fine-grained Dolomite Member of the Pine Point Formation discontinuously exposed on Mission Island, Loutit Island, northeast, middle, and southwest Burnt Islands, and Beaulieu Island, at stations 102NB, 101NB, 88NB, 89NB, 17BI, 16BI, 18BI, 19BI, and 25BI.

All of these outcrops are on the north flank of the coarsely recrystallized belt. No attempt is made to estimate thicknesses of covered intervals because of the uncertainty of the structure within covered intervals.

MIDDLE DEVONIAN

FINE-GRAINED DOLOMITE MEMBER OF THE PINE POINT FORMATION

21	Covered interval to top of member.	?
20	Dolomite, medium brown, fine-grained, sugary textured, extremely vuggy, vugs generally lined with calcite, very slight petroliferous odour ..... Unit outcrops as a pavement at one point on the south shore of Beaulieu Island at station 25BI. There are numerous large frost-heaved angular blocks along the shore in this vicinity.	*c.*3
19	Covered interval between units at stations 25BI and 19BI	?
18	Dolomite, greyish brown, fine-grained, resistant, irregular upper bedding surface, weathers brownish grey; moulds of brachiopods filled with black sticky bitumen. ..... Few fossils collected (sample 19BIa): ?*Gypidula* sp. *Emanuella* sp. cf. *E. meristoides* (Meek) *Hadrorhynchia sandersoni* (Warren) Unit outcrops along water's edge at station 19BI on the west shore of the southwest island of the Burnt Islands group.	*c.*1
17	Covered interval	?
16	Dolomite, pale brown, fine-grained, granular, thin veins and vugs filled with white calcite, where veins are numerous, rock has appearance of a breccia, unit weathers very light brown; very slight petroliferous smell ..... Unit exposed at station 18BI, on southwest island of Burnt Islands group.	*c.*2

Unit		Thickness (feet) Unit	From base
	FINE-GRAINED DOLOMITE MEMBER OF THE PINE POINT FORMATION—*Cont.*		
15	Covered interval	?	
14	Dolomite, pale to medium brown, fine-grained, scattered vugs filled with coarsely crystalline white calcite, weathers dark grey; rare traces of fossils	?3	
	Unit present as large loose blocks at station 16BI and 17BI at the southwest tip and near middle of north shore of middle island of the Burnt Islands group. Most of this island snow-covered when traversed on May 19, 1957. *Stringocephalus* sp. and other fossils collected from beds at this locality by Cameron (1922a, p. 22).		
13	Covered interval	?	
12	Dolomite, light brown, fine-grained, granular, vuggy, presumably thickly bedded to massive; slight petroliferous smell; a few indeterminable fossils and marcasite noted in some blocks	?3	
	Present as loose angular blocks on beach at station 89NB on the east shore of most northern of the Burnt Islands group.		
11	Covered interval	?	
10	Dolomite, light brown, fine-grained, granular, in thin irregular beds from 1 to 4 inches thick	*c.*1	
	Pavement exposure 6 inches below lake level at station 88NB on the northwest end of Loutit Island. Some loose dolomite blocks along beach have a strong petroliferous smell and some are slightly vuggy.		
9	Covered interval	?	
8	Dolomite, medium brown, fine- to medium-grained, irregularly thick-bedded to massive, lenticular interbeds up to 2 inches thick of coarse-grained, crinoidal dolomite. A few poorly preserved fossil moulds	*c.*3	
	Spinatrypa sp. Unit present as large angular blocks at station 97NBa at the northwest end of Round Island. Most of the north shore of island snow covered when traversed (May 20, 1957).		
7	Covered interval	?	
6	Dolomite, fine- to medium-grained, irregularly thin-bedded averaging 4 inches thick, weathers light brownish grey; sparse vugs some of which are lined with coarsely crystalline calcite	0.3	
	Unit exposed as a pavement along water's edge at station 98NBa on south shore on Round Island.		
5	Covered interval	?	
4	Dolomite, medium-brown, coarsely vuggy, fine- to medium-grained, weathers medium grey; stromatoporoids seen in one loose block (sample 101NB1); some vugs lined with coarsely crystalline calcite.	*c.*1	
	Unit present as a pavement 6 inches below lake level and as angular blocks along beach near mid-point of the south shore of Mission Island (station 101NB).		
3	Covered interval	?	

Unit		Thickness (feet) Unit	From base
	FINE-GRAINED DOLOMITE MEMBER OF THE PINE POINT FORMATION—*Cont.*		
2	Dolomite, light brown, fine-grained, in irregular beds from 4 to 6 inches thick, weathers brownish grey. ..... Very large recrystallized brachiopods present, some of which are determinable as medium costate atrypids and some of which are highly suggestive of stringocephalids (sample 102NBa). Unit 2 is exposed along beach for a distance of 60 feet on the south shore of Mission Island at station 102NB, east of station 101NB.	*c*.4	
1	Covered interval to base of member	?	

Section 41. Composite section of Bituminous Shale and Limestone Member of Pine Point Formation discontinuously exposed on Green and McKay Islands 2 miles off shore from Pine Point at stations 20BI, 22BI, 21BI, 23BI, and 24BI.

MIDDLE DEVONIAN

BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION

13	Limestone, dark brown, fine-grained, irregularly thin-bedded, interbedded with very thin layers of dark grey to black shale; petroliferous odour. Ratio of limestone to shale: 80% to 20% ..... Unit 13 outcrops 250 feet southwest of the main middle exposure at station 20BI.	*c*.1	198.5
12	Covered interval	?10	197.5
11	Limestone interbedded with shale; limestone is very dark brown to brownish black, fine-grained, with irregular inclusions of coarse- to medium-grained limestone, weathers medium grey; shale is bituminous, calcareous, very dark brown, weathers 'slate' grey. Limestone is nodular and surrounded by shale, beds vary between ½ to 6 inches thick. Limestone to shale ratio: 60% to 40% ..... Fossils from shale (sample 20BIc): *Tentaculites* sp. Fossils from limestone (sample 20BId): *Styliolina* sp. *Emanuella meristoides* (Meek) Largest and middle outcrop at station 20BI exposed in an area 150 feet by 20 feet.	2	187.5
10	Covered interval	?25	185.5
9	Limestone, richly fossiliferous, medium brown, fine-grained, evenly interbedded with shale, beds up to 6 inches thick. Limestone to shale ratio: 85% to 15% ..... Fossils from limestone (sample 20BIa): *Emanuella* sp. cf. *E. meristoides* (Meek) *?Warrenella* sp. *Hadrorhynchia sandersoni* (Warren)	2	160.5

Unit		Thickness (feet) Unit	From base
	BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*		
	Fossils collected from shale (sample 20BIb): *Tentaculites* sp. cf. *Lingula* sp.—fragment *Chonetes aurora* Hall *Emanuella meristoides* (Meek) cf. *Hadrorhynchia sandersoni* (Warren) *Leiorhynchus* sp. *Dechenella* sp. Unit 9 is exposed just below and above water level 500 feet northeast of middle outcrop at station 20BI. Units 13, 11, and 9 are discontinuously exposed for a distance of about 1,000 feet along the northwest side of Green Island at station 20BI.		
8	Covered interval	?18	158.5
7	Limestone, medium brown, very fine-grained, irregular thick-bedded, lower half of unit has a strong petroliferous odour; upper half of unit richly fossiliferous (sample 24BIa) *Emanuella meristoides* (Meek) *Leiorhynchus* sp. *Hadrorhynchia sandersoni* (Warren) Unit 7 is exposed on the north shore of McKay Island about 0.4 mile from the east tip.	2	140.5
6	Covered interval	?48	138.5
5	Limestone; at station 23BI under water near tip of peninsula on mid-north shore of McKay Island	?0.5	90.5
4	Covered interval	?80	90
3	Limestone with shaly laminae, petroliferous, dark brown, fine-grained, thinly interbedded (up to 1 inch thick) with dark bituminous calcareous shale; both fairly fissile and richly fossiliferous (sample 21BIa): *Lingula minuta* Meek *Productella* sp. *Emanuella meristoides* (Meek) ?*Warrenella* sp. *Leiorhynchus awokanak* McLaren Unit 3 exposed at station 21BI on the north shore of McKay Island about 0.4 mile from the west tip.	*c.*3	10
2	Covered interval	?5	7
1	Limestone, petroliferous, dark brown, interbedded with shale; upper half of unit richly fossiliferous (sample 22BIa): *Devonoproductus* sp. D (=*Productus*? of Meek, 1867) *Emanuella meristoides* (Meek) *Warrenella kirki* (Merriam) *Leiorhynchus awokanak* McLaren Unit 1 exposed on the north shore and near the west tip of McKay Island near the axis and west flank of an anticline.	*c.*2	

Unit	Thickness (feet) Unit	From base

Section 42. Composite section of Bituminous Shale and Limestone Member of the Pine Point Formation discontinuously exposed from Dawson Landing wharf eastward along the south shore of Great Slave Lake for a distance of 0.7 mile at stations 64NB to 69NB inclusive. All of this sequence is on the east flank of a synclinal fold.

MIDDLE DEVONIAN

BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION

13	Limestone, petroliferous, slightly dolomitic, medium to dark brown, very fine grained, thinly bedded, fissile, closely and irregularly jointed, weathers medium brownish grey. Richly fossiliferous (sample 64NBa):	0.5 exposed	90.9
	Emanuella meristoides (Meek) ?*Leiorhynchus* sp. A Merriman Unit 13 outcrops as a pavement immediately east of Dawson Landing wharf.		
12	Covered interval	?13	90.4
11	Limestone, crinoidal, dark to medium brown, upper bedding surface highly irregular, weathers dark greyish brown (sample 65NBa1):	0.5 exposed	77.4
	Atrypa sp. cf. *A. arctica* Warren		
10	Covered interval	?14	76.9
9	Limestone, medium brown, irregular bed, aphanitic, hard, brittle, weathers medium brownish grey; fossiliferous (sample 66NBa): ?productellid *Schizophoria mcfarlanei* (Meek) *Cyrtina* sp. cf. *C. panda* Meek *Emanuella meristoides* (Meek) *Hadrorhynchia sandersoni* (Warren) crinoid ossicles	0.5	62.9
8	Limestone, dark brown, aphanitic, weathering dark brownish grey. Fossiliferous (sample 66NBb): ?*Lingula* sp. *Productella* sp. *Emanuella meristoides* (Meek) crinoid ossicles	0.3	62.4
7	Limestone, dark brown, irregular bedding, aphanitic, strongly fractured, weathers whitish grey. Richly fossiliferous (sample 66NBe): *Productella* sp. *Emanuella meristoides* (Meek) *Dechenella* sp. crinoid ossicles Fossils collected loose (sample 66NBd): undet. orthocone nautiloid *Emanuella meristoides* (Meek) productellid Units 9, 8, and 7 measured at station 66NB, 0.2 mile east of Dawson Landing wharf.	0.3	62.1
6	Covered interval	?21	61.8

Unit		Thickness (feet) Unit	From base
	BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*		
5	Limestone, dark brown, fine-grained, irregular bedding, closely and irregularly jointed. Richly fossiliferous (sample 67NBa): ..... *Productella* sp. cf. *P.* sp. O *Emanuella meristoides* (Meek) *Dechenella* sp. crinoid ossicles Unit 5 exposed in a small area (8 ft. by 4 ft.) of pavement along shore at station 67NB, 0.4 mile east of Dawson Landing wharf.	*c.*1	40.8
4	Covered interval	?31	39.8
3	Limestone, medium brown, fairly evenly bedded, closely and evenly jointed, weathers dark brownish grey; fossiliferous (sample 68NBa missing)	0.3 exposed	8.8
2	Covered interval	8	8.5
1	Limestone, dark brown, fine-grained, very irregular bedded, closely and irregularly jointed, weathers dark brownish grey	0.5 exposed	
	Richly fossiliferous (sample 69NBa): cephalopod *Productella* sp. cf. *P.* sp. O *Schizophoria* sp. *Emanuella meristoides* (Meek) *Leiorhynchus* sp. *Dechenella* sp. ?ostracod crinoid ossicles Unit 1 is exposed in a small area of pavement along shore just above lake level at station 69NB, 0.7 mile east of Dawson Landing wharf. Fine-grained dolomite is exposed about 1 mile east of the station.		

Section 43. Composite section of Bituminous Shale and Limestone Member of the Pine Point Formation discontinuously exposed along the south shore of Great Slave Lake between Pine Point and Dawson Landing wharf, at stations 63NB to 57NB inclusive, on east limb of anticlinal fold.

MIDDLE DEVONIAN

BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION

8	Limestone, medium brown, fine-grained, irregular thick bed, weathers medium brownish grey. A coquina of fragmentary fossils (sample 63NBa): ..... *Tentaculites* sp. *Chonetes aurora* Hall *Devonoproductus* sp. D(=*Productus*? of Meek, 1867) *Emanuella meristoides* (Meek) *Leiorhynchus awokanak* McLaren Exposed along shore just above lake level at station 63NB, 1.4 mile west-northwest of Dawson Landing wharf. Part of this unit appears to be exposed also near tip of peninsula at station 62NB, 1.5 miles west-northwest of Dawson Landing wharf.	*c.*1	

Unit	Thickness (feet) Unit	From base

BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*

7 Covered interval ..... ?

6 Shale, bituminous, calcareous, petroliferous, dark grey to black, soft, weathering light grey; containing nodules of medium brown, fine-grained, fairly hard limestone, weathering a very light whitish grey. Richly fossiliferous (sample 61NBa): ..... ?2

Thamnopora sp. E
leptoinophyllid genus E
Tentaculites sp.
Chonetes aurora Hall
Emanuella meristoides (Meek)
Spinatrypa sp.
Leiorhynchus sp.
Dechenella sp.

Present as huge blocks littering the shore at station 61NB, 1.6 miles west northwest of Dawson Landing wharf.

5 Limestone, dark brown, aphanitic, thickly bedded, hard; with thin, fissile, dark bituminous calcareous shale partings; fairly numerous cup and colonial corals and a few brachiopods present in some beds (sample 60NBa lost). ..... 6 exposed

Present along shore at station 60NB, 1.9 miles west-northwest of Dawson Landing wharf.

4 Covered interval ..... ?

3 Shale, richly fossiliferous, strongly calcareous, bituminous, dark brown to black, fissile, laminated; containing hard nodules of dark brown, fine-grained limestone; a 6-inch coquina bed near top of discontinuously exposed sequence; fossils rare in nodular limestone (sample 59NBa): *c.*7.5

Tentaculites sp.
undet. pelecypod
undet. cephalopod
Chonetes aurora Hall
Devonoproductus sp. E

Present along shore at station 59NB, 2 miles west-northwest of Dawson Landing wharf. Beds of similar lithology (1.3 feet exposed) outcrop along the shore at station 58NB, 0.2 mile west-northwest of station 59NB.

2 Covered interval ..... ?

1 Shale, calcareous, bituminous, laminated dark grey to black, weathers very light grey; interbedded with limestone, dark brownish grey, aphanitic to fine-grained, hard, weathering medium to dark brown; beds from 2 to 8 inches thick. Lower two-thirds more evenly bedded than upper third ..... 5 exposed

Fossils from upper 1 foot (sample 57NBc):

Tentaculites sp.
Chonetes aurora Hall
Emanuella meristoides (Meek)
?*Atrypa* sp.
cf. *Hadrorhynchia sandersoni* (Warren)

Unit	Thickness (feet) Unit	From base

BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*

Fossils collected 2 feet from top (sample 57NBb):

Tentaculites sp.
?*Productella* sp.
Emanuella meristoides (Meek)
Warrenella sp. cf. *W. franklini* (Meek)
Leiorhynchus awokanak McLaren
Leiorhynchus castanea (Meek)
?*Proetus* sp.
crinoid ossicles

Beds gently folded and exposed for about 200 feet along shore at station 57NB, 2.5 miles west-northwest of Dawson Landing wharf. These beds are probably in part equivalent to beds at stations 58NB and 59NB.

Section 44. Composite section of Bituminous Shale and Limestone Member of the Pine Point Formation discontinuously and poorly exposed along the south shore of Great Slave Lake in the vicinity of Pine Point, at stations 95NB, 94NB, 93NB, 56NB, 92NB, 55NB, 91NB, 90NB, 52NB, and 53NB.

All of these beds are on the south flank of an anticlinal fold. No attempt is made to estimate thicknesses of covered intervals because of the paucity of outcrops. Descriptions below are in what is thought to be the correct stratigraphic sequence but there is possibly some duplication of strata.

MIDDLE DEVONIAN

BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION

17	Shale, bituminous, calcareous, dark grey to black, interbedded with harder, medium brown, fine-grained limestone. *Emanuella* sp. extremely abundant	?3	
	Present as large loose blocks along shore at station 95NB, 2.4 miles southwest of Pine Point.		
16	Covered interval	?11	
15	Shale, bituminous, calcareous, petroliferous smell, dark brown, evenly interbedded with limestone, fossiliferous, medium brown, aphanitic, brittle; beds average 6 to 8 inches thick (sample 94NBa):	?3	
	Tentaculites sp. — *Chonetes aurora* Hall productellid rugose productellid *Devonoproductus* sp. D (=*Productus*? sp. of Meek, 1867) *Emanuella meristoides* (Meek) *Leiorhynchus awokanak* McLaren *Cyrtina* sp. *Dechenella* sp.		
	Present as large blocks on small peninsula separating two shallow bays at station 94NB, 1.3 miles southwest of Pine Point.		
14	Covered interval	?2.5	

75427—11

Unit	Thickness (feet) Unit	From base

BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*

13 Interbedded limestone and calcareous, bituminous shale; similar to station 92NB; richly fossiliferous (sample 93NBa):

Styliolina sp.
Chonetes aurora Hall
Emanuella meristoides (Meek)
?*Hadrorhynchia sandersoni* (Warren)
crinoid ossicles

Large blocks along shore at head of shallow bay at station 93NB, 1.1 miles southwest of Pine Point.

12 Covered interval. ..... ?1

11 Limestone, nodular, interbedded with highly calcareous, fissile, bituminous shale. Nodules are 2 to 4 inches thick, up to 8 inches long, medium brown, fine-grained, granular, not as fossiliferous as shale beds; unit weathers light whitish grey. Fossils comprise (sample 56NBa): ..... 2 exposed

sponge spicules
Cladopora sp.
Thamnopora sp. F (=*Favosites polymorpha* Goldfuss of Meek)
metriophyllid coral
Atrypa sp. cf. *A. arctica* Warren
undet. ostracod
undet. trilobite pygidium
crinoid ossicles

Unit exposed at station 56NB, in bay 0.5 mile south-southeast of Pine Point.

10 Covered interval ..... ?

9 Limestone, nodular and irregular bedded, dark brown, fine-grained, interbedded with dark, platy, fissile, calcareous shale containing numerous *Tentaculites* sp. Fossils collected from limestone comprise (sample 55NBa):

Atrypa sp.
Emanuella sp.

Large blocks along shore at station 55NB, in bay 0.5 mile southeast of Pine Point.

Large blocks along shore at station 92NB, 0.9 mile southwest of Pine Point, possibly representing nearly the same horizon as at station 55NB. Fossils collected at station 92NB comprise (sample 92NBa):

Styliolina sp.
Lingula sp.
Chonetes aurora Hall
?*Emanuella meristoides* (Meek)

8 Covered interval ..... ?

Unit	Thickness (feet) Unit	From base

BITUMINOUS SHALE AND LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*

7 Limestone, nodular, and irregular bedded, dark brown, fine-grained, interbedded with black, fissile, calcareous bituminous shale; beds up to 7 inches thick. Fossils comprise (sample 91NBa):

Tentaculites sp.
Lingula sp.

Large blocks along shore at station 91NB, 0.5 mile southwest of Pine Point.

6 Covered interval ..... ?

5 Limestone, dark brown, fine-grained, granular, in part nodular and evenly interbedded with shale, calcareous, black; beds between 1½ to 3 inches thick (sample 90NBa):

Tentaculites sp.

Large blocks along shore at station 90NB, 0.4 mile southwest of Pine Point.

4 Covered interval ..... ?6

3 Limestone, petroliferous, argillaceous, slightly nodular, dark grey to black, weathering pale brown, interbedded with shale, bituminous, calcareous, fissile, laminated, weathering very light grey. Beds vary between 1½ to 7 inches thick (sample 52NBa): *c.* 3

Styliolina sp.
Tentaculites sp.
undet. inarticulate brachiopods.

Unit outcrops at station 52NB, 0.3 mile southwest of Pine Point.

2 Covered interval ..... ?

1 Lithology similar to beds exposed at station 52NB ..... *c.* 1

Fossils collected in place (sample 53NBa):

Styliolina sp.
Tentaculites sp.
Emanuella meristoides (Meek)
Leiorhynchus awokanak McLaren

Fossils collected from loose blocks (sample 53NBb):

Tentaculites sp.
Chonetes sp.
Devonoproductus sp. D (*Productus*? sp. of Meek 1867)
Productella sp.
?*Schizophoria* sp. (fragment)
Nervostrophia sp. I
Atrypa sp. (unusually large, med. costate)
Spinatrypa sp. cf. *S. andersonensis* (Warren)
Warrenella sp. cf. *W. franklini* (Meek)
Cyrtina sp. cf. *C. panda* Meek
Dechenella sp.
crinoid ossicles

Beds exposed at station 53NB near tip of Pine Point.

75427—11½

Unit	Thickness (feet) Unit	From base

Section 45. Composite section of Brown Limestone Member of the Pine Point Formation discontinuously exposed in a series of low escarpments southwest of Dawson Landing wharf measured at stations 13BI, 12BI, 14BI, 11BI, 9BI, 8BI, 7BI, and 6BI.

MIDDLE DEVONIAN

BROWN LIMESTONE MEMBER OF THE PINE POINT FORMATION

17	Covered interval to top of member	?10	160.5
16	Limestone, crinoidal, medium to dark brown, fine-grained, weathers to thin platy beds between ½ to 1 inch thick. Numerous brachiopods (sample 13BIa):	11 exposed	150.5
	Devonoproductus sp. D (=*Productus*? of Meek 1867) ?*Productus* of Meek 1867 *Warrenella* sp. cf. *W. franklini* (Meek) *Leiorhynchus* sp. cf. *L. castanea* (Meek) crinoid ossicles		
	Lower 4½ feet of unit thinner-bedded and more intensely weathered. Unit is exposed along the upper edge of a flat-topped escarpment at an elevation of about 770 feet above mean sea level at station 13BI, 1.7 miles bearing 202T from Dawson Landing wharf.		
15	Covered interval	?8.5	139.5
14	Limestone, dark brown, fine-grained, laminated, petroliferous odour, thin platy bedding; richly fossiliferous (sample 12BIa):	0.5	131
	?*Styliolina* sp. *Chonetes aurora* Hall *Devonoproductus* sp. D (=*Productus*? of Meek 1867) *Atrypa* sp. cf. *A. perfimbriata* Crickmay *Leiorhynchus* sp. crinoid ossicles *Dechenella* sp.		
	Angular frost-heaved fragments along a flat-topped ridge at station 12BI, 1.6 miles bearing 201T from Dawson Landing wharf.		
13	Covered interval	?9	130.5
12	Limestone, dark brown, platy	?0.5	121.5
	Bull-dozed fragments at junction of two roads, one road parallel to shore of lake and the other leading to the Pine Point townsite; at station 10BI, 1.5 miles bearing 205T from Dawson Landing wharf.		
11	Covered interval	?4	121

Unit		Thickness (feet) Unit	From base
	BROWN LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*		
10	Limestone, dark brown, fine-grained, thin flaggy bedding up to ½ inch thick Sparsely fossiliferous (sample 14BIa): cf. *Atrypa perfimbriata* Crickmay ?*Leiorhynchus* sp. crinoid ossicles Poorly exposed at station 14BI, 1.7 miles bearing 205T from Dawson Landing wharf.	?0.5	117
9	Covered interval	?13.5	116.5
8	Limestone, medium to dark brown, very fine- to fine-grained, thinly bedded, weathers very light brown. Richly fossiliferous (sample 11BIa): *Productella* sp. *Devonoproductus* sp. D (=*Productus*? of Meek 1867) *Cyrtina* sp. *Warrenella* sp. cf. *W. franklini* (Meek) *Atrypa* sp. cf. *A. perfimbriata* Crickmay *Leiorhynchus* sp. cf. *L. castanea* (Meek) *Leiorhynchus* sp. *Dechenella* sp. crinoid ossicles Outcrop about 2 by 10 feet in area on road at station 11BI, 1.4 miles bearing 209T from Dawson Landing wharf.	?0.7	103
7	Limestone, dark brown, fine-grained, laminated, petroliferous odour. Fragments along road loosened by bull-dozer at station 8BI, 1.4 miles bearing 203T from Dawson Landing wharf.	?0.5	102.3
6	Covered interval	?4	101.8
5	Limestone, slightly argillaceous, fine-grained, finely laminated, thinly bedded. Loose blocks at junction of old and new roads at station 8BI, 1.2 miles bearing 204T from Dawson Landing wharf.	?0.5	97.8
4	Covered interval	*c.*0.5	97.3
3	Dolomite, medium brown, medium- to coarse-grained, weathers dark grey; vuggy; undeterminable recrystallized and dolomitized organic remains Frost-heaved fragments on top of a low escarpment (elevation 656 feet a.s.l.) at station 7BI, 0.9 mile bearing 199T from Dawson Landing wharf.	?0.8	96.8
2	Limestone, slightly argillaceous, very dark brown, thinly interbedded with harder beds containing *Thamnopora* sp., unit weathers pale brown; petroliferous odour Argillaceous beds contain (sample 6BIa): *Emanuella meristoides* (Meek) *Leiorhynchus awokanak* McLaren Outcrop along road exposed by bull-dozer at station 6BI (elevation 656 feet a.s.l.), 1.1 miles bearing 206T from Dawson Landing wharf.	*c.*1	96
1	Covered interval to beds exposed at Dawson Landing wharf	*c.*95	

Unit	Thickness (feet) Unit	From base

Section 46. Composite section of Upper Limestone Member of the Pine Point Formation discontinuously exposed along the northwest shore of Great Slave Lake in the vicinity of Caribou and Jones Bays and immediately east of Prairie Lake, at stations 201NB, 36NC, 37NC, 202NB, 38NC, 39NC, 40NC, 41NC, 277NB, 276NB, 54NC, 43NC, 42NC, and 57NC.

MIDDLE DEVONIAN

UPPER LIMESTONE MEMBER OF THE PINE POINT FORMATION

29	Limestone, bioclastic, light olive grey, medium-grained, in wavy beds from 1 to 4 inches thick, contains numerous corals and stromatoporoids (sample 57NC1)	5.6	214.7
	Coenites sp. C		
	Unit 28 is overlain by coarsely crystalline, massive, vuggy dolomite of the Presqu'ile Formation 300 feet to the north of station 57NC.		
28	Limestone, bioclastic, yellowish grey, in wavy beds from 1 to 6 inches thick, rubbly weathering (sample 57NC2)	5.2	209.1
	Coenites sp. C		
27	Limestone, bioclastic, light olive grey, lower 2.5 feet massive, remaining upper part thinly bedded from 1 to 6 inches thick, with thin interbeds of calcareous shale. In part richly fossiliferous (sample 57NCa):	5.6	203.9
	Coenites sp. C *Grypophyllum gracile* Wedekind *Schizophoria* sp. *Atrypa* sp. R *Spinatrypa* sp. cf. *S. lata* (Warren)		
26	Limestone, bioclastic, light olive grey, fine-grained, in beds from 1 to 6 inches thick; irregularly interbedded with strongly calcareous shale containing numerous coral fragments (sample 57NBb):	4.1	198.3
	Coenites sp. C *Grypophyllum gracile* Wedekind *Schizophoria* sp. *Atrypa* sp. R *Atrypa* sp. cf. *A.* sp. R (sample 54NC4) *Spinatrypa* sp. cf. *S. lata* (Warren)		
	Base of unit 26 is 3.5 feet above lake level at station 57NC on the north shore and 0.3 mile west of the east tip of small bay on the east side of Prairie Lake.		
25	Covered interval	?120	194.2
24	Limestone, slightly dolomitic, light grey, aphanitic, wavy bedding from 1 inch to 2 inches thick, with occasional partings of strongly calcareous mudstone and interbeds of coarsely crystalline crinoidal limestone	3.2	74.2
	Unit 23 exposed on a small scarp near tip of small peninsula at station 42NC near the west end of the south shore of Jones Bay. An additional 3 feet of beds can be seen under water.		
23	Covered interval	?6	71

Unit		Thickness (feet) Unit	From base
	UPPER LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*		
22	?Limestone, thinly bedded ..... Unit 21 present under water at station 43NC on the south shore of Jones Bay, 1.1 miles west-southwest of Jones Point.	*c.* 1	65
21	Covered interval	?1	64
20	Limestone, argillaceous, medium light grey, aphanitic, wavy bedding from 1 to 6 inches thick; numerous crinoid fragments (sample 54NCa); strongly jointed ..... Unit 20 exposed just above lake level along shore at station 54NC south of Jones Point.	*c.* 1	63
19	Covered interval	?6	62
18	Limestone, pale brown, aphanitic, platy, thinly bedded, fissile, weathers to laminae of light grey and light yellowish grey ..... Oscillation ripple and fucoidal markings noted on loose slabs along beach. Unit 18 exposed just above lake level at station 276NB along shore 0.6 mile southwest of René Point.	*c.* 1	56
17	Covered interval	?6.5	55
16	Limestone, ?dolomitic, light grey, fine-grained, thinly bedded and nodular, mainly less than 2 inches thick; occasional thin interbeds of coarse-grained bioclastic limestone; thinly interbedded with mudstone, strongly calcareous, yellowish grey. Limestone to mudstone ratio: 70% to 30%. ..... Sparsely fossiliferous (samples 277NBa and 41NCa): *Emanuella meristoides* (Meek) crinoid ossicles—2 forms Unit 16 exposed as a pavement and also in a low escarpment just back from shore immediately north of René Point st stations 277NB and 41NC. The upper part of these beds possibly overlie beds exposed at station 276NB.	*c.* 11	48.5
15	Covered interval	?2	37.5
14	Limestone, thinly bedded ..... Unit 14 exposed as a pavement along shore at station 40NC; not examined.	*c.* 1	35.5
13	Covered interval	?2	34.5
12	Limestone, ?dolomitic, medium grey, fine-grained, thinly bedded, less than 1 inch thick; well-jointed; scattered crinoid ossicles and shell fragments present in loose slabs along beach. ..... Unit 12 present just above lake level 50 feet off shore at station 39NC. Fossils collected loose (sample 39NCa): undet. sponge worm borings undet. planispiral gastropods ?*Emanuella meristoides* (Meek) crinoid ossicles	1	32.5
11	Covered interval	?11	31.5
10	?Limestone; outcrops as a pavement along shore at station 38NC on north shore of Caribou Bay, 3 miles southwest of John Point. Not examined	*c.* 1	20.5
9	Covered interval	?2	19.5

Unit		Thickness (feet) Unit	From base
	UPPER LIMESTONE MEMBER OF THE PINE POINT FORMATION—*Cont.*		
8	Limestone, pale brown, aphanitic, evenly thin-bedded, weathers light grey.	*c.* 1	17.5
	Fossils collected from talus (sample 202NBa): *Emanuella meristoides* (Meek) *Hadrorhynchia sandersoni* (Warren) Unit 8 is exposed as a pavement for about 200 feet at station 202NB on the north shore of Caribou Bay, 2.7 miles southwest of John Point.		
7	Covered interval	?2.5	16.5
6	Limestone, ?dolomitic, same lithology as at station 36NC.	*c.* 1	14
	Unit 6 exposed as a pavement just above water level at station 37NC on north shore of Caribou Bay, 2.5 miles southwest of John Point.		
5	Covered interval	?4	13
4	Limestone, ?dolomitic, light grey, fine-grained, in thin beds less than 1 inch thick; strongly jointed.	*c.* 1	9
	Unit 4 exposed as a pavement at station 36NC along the north shore of Caribou Bay, 2 miles southwest of John Point.		
3	Covered interval	?2	8
2	Limestone, pale brown, aphanitic, brittle, in irregular beds from 2 to 4 inches thick, weathers light to medium grey; strongly jointed.	*c.* 1	6
	Fossils collected in place (sample 201NBa): cf. *Bellerophon* sp. *Emanuella meristoides* (Meek) *Leiorhynchus castanea* (Meek) Fossils collected loose (sample 201NBb): *Emanuella meristoides* (Meek) *Leiorhynchus* sp.		
1	Covered interval to top of Horn River Tongue of the Pine Point Formation	?*c.* 5	
	Approximate thickness of Upper Limestone Member ....215 feet.		

Section 47. Composite section of the Presqu'ile Formation discontinuously exposed 9 miles southeast of Presqu'ile Point at station 4NB and 2NB.

MIDDLE DEVONIAN

PRESQU'ILE FORMATION

6	Covered interval to top of formation	?15	132.5
5	Dolomite, mottled light to medium grey with patches of purplish grey, very coarsely crystalline, evenly thick-bedded to massive, minutely vuggy, vugs lined with light yellowish rhombs of dolomite, outcrop weathers white to very light grey	*c.* 5	117.5
	Area of outcrop is about 150 feet by 200 feet (station 4NB), about 9 miles southeast of Presqu'ile Point.		
4	Dolomite, light creamy brown, with medium grey mottling, coarsely crystalline, thickly bedded, weathers dark grey; irregular masses of galena, and sphalerite scattered throughout but most abundant within a layer from 1 to 3 inches thick, 1 foot from top of unit.	3	112.5
3	Dolomite, mottled dark and medium brown, coarsely crystalline, weathers dark grey and rusty brown, highly mineralized with galena and some sphalerite, especially in lower 3 feet of unit where it is more recessive than above; upper 2 feet slightly vuggy.	5	109.5

Unit		Thickness (feet) Unit	From base
	PRESQU'ILE FORMATION—*Cont.*		
2	Dolomite, mottled light yellowish brown, milky white, and medium grey, very coarsely crystalline, resistant, numerous small disconnected vugs; unit stained a dark rusty brown. Considerable galena, both crystalline and specular, and sphalerite disseminated throughout unit.	*c.* 4.5	104.5
	Only upper 2.8 feet well exposed, lower part covered by water at bottom of sink-hole. Units 4, 3 and 2 measured at stations 2NB. Coarsely crystalline dolomite presumed to be roughly equivalent to the above unit is exposed at stations 7NB and 41NB.		
1	Covered interval to base of Presqu'ile Formation.	?100	
	Approximate total thickness of the Presqu'ile Formation ..... 130 feet.		

Section 48. Section of Presqu'ile Formation exposed on the south faces of a succession of three closely spaced escarpments at station 257NB about 1 mile north of the middle of the north shore of Sulphur Bay.

MIDDLE DEVONIAN

PRESQU'ILE FORMATION

13	Dolomite, white to very pale brown, medium- to coarse-grained, numerous small irregular vugs, massive, weathers very light grey with a pale orange tinge; highly irregular upper surface.	4 exposed	110.8
	Unit 13 caps the sequence at top edge of upper escarpment. Top of unit is eroded.		
12	Dolomite, pale to medium brown, fine- to medium-grained, granular, sparsely vuggy, thickly bedded to massive, weathers pale orange brown.	11.5	106.8
	Vugs suggestive of brachiopod moulds.		
11	Covered by dolomite rubble.	3	95.3
10	Dolomite, pale brown, very fine grained, granular, coarsely vuggy, rubbly thin bedded, weathers medium to dark brownish grey.	4.5	92.3
9	Dolomite, pale to medium brown, fine-grained, granular, irregular bedding between 4 to 6 inches thick, weathers medium to dark brownish grey; numerous thin veins of white dolomite.	10	87.8
8	Dolomite, mottled pale and medium brown, very fine to fine-grained, granular, irregularly thin bedded, weathers medium to dark brownish grey.	8	77.8
	Large vugs in upper 3 feet of unit which are strongly suggestive of moulds of stringocephalids.		
7	Dolomite, pale brown, very fine-grained, granular, highly irregular beds up to 4 inches thick, weathers medium grey. Milky white dolomite filling small veins and some vugs.	5	69.8
6	Dolomite, mottled pale to dark brown and white, mainly fine-grained, granular, massive, weathers medium brownish grey. Irregular masses of coarser-grained, darker brown dolomite.	6	64.8
5	Dolomite, light to medium brown, medium-grained, granular, in part vuggy, irregular and lenticular beds up to 10 inches thick, weathers pale orange brown to medium brown; vugs lined with white coarsely crystalline dolomite.	11	58.8
	A vertical scarp-former.		

Unit		Thickness (feet) Unit	From base
	PRESQU'ILE FORMATION—*Cont.*		
4	Covered interval	9.2	47.8
3	Dolomite, similar to unit 2 below but more fractured; poorly exposed; poorly preserved *Atrypa* sp. (sample 257NB).	5.9	38.6
2	Dolomite, medium brown, fine-grained, granular, in even thick beds, weathers pale orange brown, a few large vugs up to 3 inches in diameter lined with coarsely crystalline white calcite. Covered interval to base of escarpment about 3 feet.	7.7	32.7
1	Covered interval to base of Presqu'ile Formation. Approximate total thickness of the Presqu'ile Formation 110 feet.	?25	

Section 49. Composite section of the lower part of the Hay River Formation (formerly assigned to the Slave Point Formation) unconformably overlying the west flank and feather edge of the Presqu'ile Formation; exposed at stations 265NB and 264NB, 1.6 miles north northwest of the north shore of Sulphur Bay.

UPPER DEVONIAN

HAY RIVER FORMATION

6	Limestone, argillaceous, medium grey, in thin irregular beds separated by shaly partings up to 2 inches thick, unit weathers light grey. Richly fossiliferous (sample 265NBb): *Atrypa* sp. cf. *A. clarkei* Warren *Spinatrypa* sp. cf. *S. albertensis* (Warren) crinoid ossicles Fossils collected from loose fragments lying on unit 6 (sample 265NBc): undet. cup corals (recrystallized) *Lingula* sp. cf. *L. spatulata* Vanuxem *Atrypa* sp. cf. *A. independensis* Webster *Spinatrypa* sp. Unit 6 forms the top of a westward dipping slope on west flank of coarsely recrystallized dolomite.	1.7	10.6
5	Covered interval	*c.* 1	8.9
4	Dolomite, brown, medium-grained, hard, very evenly bedded up to 8 inches thick, weathers pale orange; large irregular vugs.	2	7.9
3	Limestone, argillaceous, medium to dark grey, in thin rubbly beds, weathers light grey; recessive; richly fossiliferous (sample 265NBa): *Cladopora* sp. (fine form) undet. planispiral gastropod *Schizophoria* sp. ?*Cyrtina* sp. *Atrypa* sp. ?*Spinatrypa* sp. *Ladogioides pax* McLaren ?*Leiorhynchus* sp. crinoid ossicles	2	5.9

Unit		Thickness (feet) Unit	From base
	HAY RIVER FORMATION—*Cont.*		
2	Dolomite, ?bioclastic, crinoidal, pale to medium brown, medium- to coarse-grained, evenly bedded between 2 to 8 inches thick, weathers pale orange brown (sample 265NB1).	1.9	3.9
	Poorly preserved *Cladopora* sp.		
	Units 6 to 2 inclusive measured at stations 265NB immediately west of the west edge of the coarsely crystalline dolomite.		
1	Covered interval	?2	
	Thickness of Hay River Formation represented. .....10.6 feet.		
	MIDDLE DEVONIAN		
	PRESQU'ILE FORMATION		
2	Dolomite, pale brown, medium to coarsely crystalline texture, vuggy to cavernous, massive, resistant, weathers very light orange brown and almost creamy white in places; pitted and fluted weathered surface. Jointed on a large scale. Unit produces a knobby highland terrain.	*c.* 87	102
	Unit exposed at station 264NB located about 1.6 miles north-northwest of Sulphur Bay.		
1	Covered interval to base of coarsely crystalline dolomite.	?15	
	Approximate total thickness of the coarsely crystalline dolomite. .....102 feet.		

Section 50. Composite section of the Presqu'ile Formation overlying argillaceous limestone of the Pine Point Formation, discontinuously exposed at stations 250NB and 251NB, 1.2 miles north of the northeast end of Sulphur Bay.

	MIDDLE DEVONIAN		
	PRESQU'ILE FORMATION		
11	Dolomite, dark brown to almost black, fine-grained, in thick even beds, weathers pale orange brown. Numerous *Cladopora* sp. in upper bed (sample 251NB)	4 exposed	56.7
10	Covered interval	8	52.7
9	Limestone, pale brown, aphanitic, in irregular beds between 1 to 2 inches thick separated by argillaceous partings, weathers whitish grey; unit outcrops as a low rubbly scarp. Numerous poorly preserved fossils (sample 250NBe)	3.5	44.7
	stromatoporoid ?*Cladopora* sp. *Atrypa* sp. *Atrypa* sp. cf. *A. perfimbriata* Crickmay		
8	Covered interval	6.5	41.2

Unit		Thickness (feet) Unit	From base
	PRESQU'ILE FORMATION—*Cont.*		
7	Dolomite, medium brown, vuggy, fine- to medium-grained, massive, weathers pale brownish grey to light orange brown; pitted and fluted weathered surface ..... 2.5 34.7 Numerous very poorly preserved recrystallized fossils (sample 250NBd): ?*Cladopora* sp. *Atrypa* sp. ?*Stringocephalus* sp. (moulds)		
6	Covered interval	4	32.2
5a	Dolomite, medium brown, fine- to medium-grained, vuggy, weathers pale brownish grey to light orange brown	2	
—	Covered interval to base of escarpment ..... Units 11 to 5a are on the southwest side of a fault striking 127T. The sequence exposed on the north side of the fault is described below:	4	
5	Dolomite, medium to light brown, fine- to medium-grained, vuggy, some vugs filled with milky white calcite, massive, weathers pale orange brown. Numerous poorly preserved *Cladopora* sp. (sample 250NBc) ..... This unit may be in part equivalent to unit 5a on the southwest side of the fault.	4.5	28.2
4	Covered interval	7.4	23.7
3	Dolomite, medium to light brown, in irregular beds from 1 inch to 4 inches thick, numerous vugs formed mainly by removal of *Cladopora* sp., indeterminable brachiopods and crinoid ossicles also present (sample 250NB2). Unit poorly exposed	*c.* 5	16.3
2	Covered interval	11	11.3
1	Dolomite, medium brown, fine-grained, even bed, weathers pale orange brown ..... Thickness of Presqu'ile Formation discontinuously exposed ..... 57 feet.	0.3	
	UPPER LIMESTONE MEMBER OF THE PINE POINT FORMATION		
4	Covered interval	6.5	12
3	Limestone, argillaceous, pale brown, fine-grained, weathers whitish grey. Only upper 6 inches well exposed (sample 250NBb) ..... *Cladopora* sp.—numerous undet. gastropod *Atrypa* sp. cf. *A. perfimbriata* Crickmay	2	5.5
2	Limestone, medium brown, in irregular beds from 1 to 2 inches thick separated by argillaceous limestone and shale partings, weathers whitish grey. Fossiliferous (sample 250NBa) ..... cf. *Cladopora* sp. undet. planispiral gastropod cf. *Megalodon* sp. *Atrypa* sp. cf. *A. perfimbriata* Crickmay *Spinatrypa* sp. cf. *S. lata* (Warren)	1.5	3.5
1	Covered interval to base of escarpment ..... Thickness of Upper Limestone Member of the Pine Point Formation discontinuously exposed ..... 12 feet.	2	

Unit		Thickness (feet) Unit	From base

Section 51. Composite section of Sulphur Point Formation discontinuously exposed along the northwest shore of Great Slave Lake between 1.5 miles northwest of the Windy Point survey monument to 2.8 miles south of the same point. Sections measured at stations 220NB to 244NB inclusive and 47NC. Parts of the section given below may be repeated because of covered intervals and gentle flexures.

MIDDLE DEVONIAN

SULPHUR POINT FORMATION

33	Covered interval to base of Slave Point Formation	?	
32	Limestone, bioclastic, argillaceous, pale yellowish brown, thinly bedded up to 1 inch thick. Sparsely fossiliferous (sample 47 NCa)	?1	148.7
	stromatoporoids ?*Cladopora* sp. Loose fragments presumably close to bedrock forming a ridge on uplands (station 47NC) 1.4 miles bearing 195T from Windy Point survey monument.		
31	Covered interval	?5	147.7
30	Limestone, dark grey, irregularly thin bedded, fine-grained, granular, weathers pale brown	2 exposed	142.7
	Very numerous *Amphipora ramosa* (Phillips) (sample 241NBe), *Emanuella meristoides* (Meek)—collected loose (sample 241NBd) Unit 29 more resistant than beds below. Transitional lower contact.		
29	Limestone, argillaceous, light brown, fine-grained to aphanitic, massive, closely jointed, and highly fractured, weathers very pale brownish grey. Fossiliferous (sample 241NBc)	4	140.7
	stromatoporoid digitate stromatoporoid *Grypophyllum gracile* Wedekind Transitional contacts.		
28	Limestone, argillaceous and silty, light brown, in irregular thin beds, weathers very light grey. Fossiliferous (sample 241NBb):	3	136.7
	Grypophyllum gracile Wedekind *Cladopora* sp. — numerous *Atrypa* sp. cf. *A. perfimbriata* Crickmay ?*Leiorhynchus* sp.		
27	Limestone, light brown, fine-grained, irregularly thick bedded to massive, weathers very light grey (sample 241NBa):	9.5	133.7
	stromatoporoid digitate stromatoporoid undet. spirally coiled gastropod *Atrypa* sp. cf. *A. perfimbriata* Crickmay *Emanuella* sp. F		

Unit		Thickness (feet) Unit	From base
	SULPHUR POINT FORMATION—*Cont.*		
26	Limestone, petroliferous, possibly sandy, light brown, fine- to medium-grained, beds average 8 inches thick, weathers medium to dark brownish grey. Sparsely fossiliferous (sample 241NBf): ..... *Emanuella* sp. F Units 30 to 26 inclusive are exposed at stations 241NB, 243NB, and 239NB.	*c.* 2	124.2
25	Covered interval	?30	122.2
24	Limestone, petroliferous, especially along bedding planes, medium to dark brown, aphanitic, evenly bedded between 2 to 4 inches thick, weathers whitish to medium grey. ..... Parts of unit 24 exposed at stations 238NB, 237NB, and 236NB.	*c.* 2.5	92.2
23	Covered interval	6	89.7
22	Limestone, medium brown, aphanitic, brittle, evenly thin bedded, closely jointed and fractured, weathering medium brownish grey. Sparsely fossiliferous (sample 235NBa): ..... ?*Emanuella* sp. Unit 22 exposed just above and below lake level at station 235NB.	*c.* 1	83.7
21	Covered interval	?15.7	82.7
20	Limestone, stromatoporoidal, with irregular thin argillaceous layers, medium to dark brown, fine-grained, thickly bedded to massive, weathers light grey (sample 232NBa). ..... Fossils comprise: stromatoporoids ?*Cladopora* sp. Numerous huge blocks fifty feet out from shore at station 232NB that may have been derived from escarpment to the north but this is probably unlikely.	?3	67
19	Limestone, medium brown, aphanitic, brittle, evenly thin bedded, closely jointed and fractured, weathers whitish grey (sample 233NBa): ..... *Cladopora* sp. — numerous ?*Emanuella* sp. Unit 19 exposed at and just below lake level at station 233NB.	*c.* 1	64
18	Limestone, dolomitic, nodular, light brownish grey, fine-grained, evenly thin bedded between 2 to 4 inches thick, nodules concentrically laminated of medium to dark brown colour, and up to 3 inches in diameter, sphalerite and fossils in some nodules; unit weathers whitish grey ..... undet. gastropods Unit 18 occurs just below water level along lake shore at station 230NB.	*c.* 1	63
17	Covered interval	?10	62
16	Limestone, light brown, fine-grained, evenly thin bedded, weathers whitish grey. ..... A pavement below water level along shore at station 229NB.	?1	52

Unit		Thickness (feet) Unit	From base
	SULPHUR POINT FORMATION—*Cont.*		
15	Covered interval	?4	51
14	Limestone, light brown, faintly laminated, aphanitic, hard, very evenly thick-bedded, weathers whitish grey. Fossils collected loose comprise (sample 228NBa).	?3	47
	calcareous algal 'buns' ?*Emanuella* sp. Present just above and below water level along shore of lake.		
13	Covered interval	?11	44
12	Limestone, laminated light brown to light brownish grey, thickly-bedded, weathers whitish grey.	?1.5	33
	Present as large blocks along shore at station 227NB.		
11	Limestone, light brownish grey, fine-grained, evenly thin bedded averaging 1½ inches thick, weathers whitish grey. *Cladopora* sp. noted in loose fragments (sample 227NB).	0.5	31.5
	Pavement exposure at water's edge at station 227NB.		
10	Covered interval	?10	31
9	Limestone, pale brownish grey, aphanitic, irregularly to evenly thin bedded, weathers whitish grey	*c.* 1	21
	Discontinuously exposed as a pavement along lake shore between stations 226NB to 224NB. Large undet. planispiral gastropods collected loose at station 225NB (sample 225NBa).		
8	Covered interval	?2	20
7	Dolomite, medium to dark brown, fine-grained, thin bedded, weathers whitish grey	*c.* 1	18
	Pavement exposure just above and below lake level at station 223NB.		
6	Covered interval	?2	17
5	Limestone, ?dolomitic, petroliferous, medium to dark brown, fine-grained, thickly bedded to massive, weathers white to creamy white. A few *Amphipora* sp. (sample 222NBa).	*c.* 3	15
	Present as huge blocks along shore at station 222NB.		
4	Covered interval	?2	12
3	Limestone, medium brown with irregular patches of milky white dolomite, beds from 1 to 2 inches thick, weathers almost white	*c.* 1	10
	Unit 3 discontinuously exposed as a pavement just beneath lake level in vicinity of station 221NB.		
2	Covered interval	?8	9
1	Limestone, thinly bedded	*c.* 1	
	Present just beneath lake level at station 220NB on shoreline 1.5 miles northwest of Windy Point survey monument. Coarsely recrystallized dolomite is exposed northwest of this point.		
	Approximate total thickness of discontinuously exposed section of Sulphur Point Formation. ....150 feet.		

Unit		Thickness (feet) Unit	From base

Section 52. Composite section of Sulphur Point Formation discontinuously exposed in the Presqu'ile Point area at stations 96NB and 97NB.

MIDDLE DEVONIAN

SULPHUR POINT FORMATION

5	Covered interval to base of overlying Slave Point Formation.	?	
4	Limestone, light brown, fine-grained, in irregular thin beds, unit covered with a dark brownish grey clay wash.	*c.* 1	42.5
	Richly fossiliferous (sample 96NBa):		
	Stromatoporella sp.		
	leptoinophyllid genus E		
	Thamnopora sp. F (=*Favosites polymorpha* Goldfuss of Meek)		
	Spinatrypa sp. cf. *S. lata* (Warren)		
	?*Emanuella* sp.		
	Unit 4 exposed as a pavement about 6 inches above lake level at station 96NB in bay immediately east of Presqu'ile Point.		
3	Covered interval	?4	41.5
2	Limestone, light brown, fine-grained, in irregular thin beds, weathering medium brown to brownish grey; interbedded with dark brown, fine-grained, fossiliferous, argillaceous limestone, weathering very light grey. Beds between 1 to 4 inches thick. Fossils comprise (sample 97NBa).	2.5 exposed	37.5
	stromatoporoids—numerous		
	Stromatoporella sp.		
	Aulopora sp.		
	leptoinophyllid genus E		
	Thamnopora sp. F (=*Favosites polymorpha* Goldfuss of Meek)		
	Spinatrypa sp. cf. *S. lata* (Warren)		
	?*Warrenella* sp. cf. ?*W. franklini* (Meek)		
	Beds of unit 2 are exposed along lake shore for a distance of about 150 yards at station 97NB.		
1	Covered interval to top of shale of Buffalo River Member	?35	

Section 53. Section of part of the Horn River Formation exposed at station 29PI on southwest bank of Horn River 8.8 miles (river distance) above the mouth of Ferguson Creek.

MIDDLE DEVONIAN

HORN RIVER FORMATION

4	Covered interval to top of formation	?50	260
3	Limestone, medium grey, aphanitic, fetid odour, in nodular and irregular beds up to 2 feet thick, weathers light grey. Richly fossiliferous:	10	210

Unit		Thickness (feet) Unit	From base
	HORN RIVER FORMATION—*Cont.*		
	Fossils collected in place (sample 29PIb): ?*Buchiola* sp. *Productella* sp. *Atrypa* sp. cf. *A. arctica* Warren *Spinatrypa* sp. cf. *S. andersonensis* (Warren) ?*Hadrorhynchia sandersoni* (Warren) undet. brachiopods crinoid ossicles		
	Fossils collected loose (samples 29PIa1 and 29PIa): undet. sponge cf. *Ontaria* sp. *Schizophoria* sp. *Productella* sp. *Atrypa* sp. cf. *A. arctica* Warren *Spinatrypa* sp. cf. *S. lata* (Warren) cf. *Leiorhynchus castanea* (Meek) *Dechenella* (*Dechenella*) sp. undet. organic fragments		
	Unit 3 outcrops as broken ledges along top of river bank sharply overlying shale and presumed to be regionally a synclinal remnant.		
2	Shale, non-calcareous, dark grey, fissile, containing limy concretions, weathers dark rusty brown; in places outcrop coated with sulphurous encrustation.	30	200
	No fossils seen.		
1	Covered interval to base of formation.	?170	
	Approximate total thickness of Horn River Formation. 260 feet.		

Section 54. Composite section of the Slave Point and Sulphur Point Formations on the south side of Great Slave Lake discontinuously exposed up Buffalo River and along the shore from east of Breynat Point to Sulphur Point at stations 121NB to 119NB inclusive, 105NB to 111NB inclusive, 114NB, and 116NB to 118NB inclusive.

	MIDDLE DEVONIAN		
	SLAVE POINT FORMATION		
15	Limestone, sandy, dark grey to black, medium-grained, in irregular beds between 1½ and 4 inches thick, weathers medium grey. A 6-inch bed of flat pebble limestone conglomerate at base; fragments derived from underlying unit.	2 exposed	147.3
14	Limestone, clastic, coarse-grained, fragments cemented by clear calcite, in thin irregular beds, weathering pale greyish brown.	1.5	145.3
	Units 15 and 14 exposed at station 121NB just above river level on the west bank of Buffalo River 11 miles upstream from mouth.		
13	Covered interval	?15	143.8

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Unit		Thickness (feet) Unit	From base
	SLAVE POINT FORMATION—*Cont.*		
12	Limestone, light brown, aphanitic; interbedded with limestone, light greyish brown, fine-grained, granular, with black carbonaceous streaks; beds between 4 to 8 inches thick. Strongly jointed. .... 2.3 *Atrypa* sp. collected loose from near top of unit (sample 120NBb).	2.3	128.8
11	Limestone, light brown, fine-grained, massive to thickly bedded, strongly fractured; sparsely fossiliferous (sample 120NBa). ..... stromatoporoids *Cladopora* sp. Units 12 and 11 exposed at station 120NB on the east bank of Buffalo River immediately below 'Upper' Mellor Rapids 9 miles (air distance) upstream from mouth.	4	126.5
10	Covered interval	?30	122.5
9	Limestone, sandy, petroliferous, massive, fine-grained, granular, weathers dark brownish grey; contains well-rounded fragments of quartz. Sparsely fossiliferous (sample 119NBa): ..... stromatoporoids *Atrypa* sp. (med. costate) crinoid ossicles Unit 9 exposed on west bank of Buffalo River at station 119NB immediately below 'Lower' Mellor Rapids 5.6 miles (air distance) upstream from mouth of river.	3	92.5
8	Covered interval	?55	89.5
7	Limestone, medium brown, fine-grained, in irregular thin beds from 1 to 2 inches thick ..... Unit 7 present as loose fragments along shore at station 105NB, on west side of small bay 2 miles east of west tip of Breynat Point.	?1	34.5
6	Covered interval	?2.5	33.5
5	Limestone, in part dolomitic, slightly vuggy, greyish brown, fine- to medium-grained, granular, in irregular beds from 1 to 4 inches thick containing shiny black specks of bituminous material; in places laminae of coarser-grained, darker brown limestone; also thin interbeds of light grey, aphanitic, in part brecciated limestone. A slight smell of petroleum. A few indeterminable fragmentary brachiopods (sample 106NB) ..... Pavement exposure along shore just above and below lake level at station 106NB on east side of small bay 2.2 miles east of the west tip of Breynat Point.	*c.* 1.5	31
4	Covered interval	?2	29.5
3	Limestone, light brown, fine-grained, weathering light greyish brown; thinly interbedded with dolomite, greyish brown, medium-grained, granular, containing black specks of carbonaceous material; beds average 1 to 2 inches thick. Fragmentary fossils in limestone beds (sample 107NBa) ..... undet. pelecypods *Emanuella* sp. F Pavement exposure just below lake level at station 107NB on small peninsula 2.5 miles east of the west tip of Breynat Point.	*c.* 1.5	27.5
2	Covered interval to top of Amco marker bed	?15	26
1	?Amco marker bed (not exposed) ..... Approximate thickness of Slave Point Formation.....147 feet.	?11	

Unit		Thickness (feet) Unit	From base
	SULPHUR POINT FORMATION		
9	Covered interval from base of Amco marker bed	?35	122.5
8	Limestone, medium grey, fine-grained, in even thin beds between 1 to 6 inches thick; alternating with argillaceous limestone, brownish grey, fissile, beds up to 3 inches thick, weathering a darker grey than the limestone Unit forms a 3½ foot escarpment 20 feet back from the water's edge at station 118NB.	3.3	87.5
7	Covered interval	0.5	84.2
6	Limestone, medium to dark brown, aphanitic, in part coarsely vuggy, irregular bedded, weathers pale brown	0.7	83.7
5	Limestone, oolitic, light bluish grey, ooliths dark grey, unit weathers dark brownish grey	0.5	83
4	Limestone, light greenish grey, black carbonaceous smears along bedding planes, argillaceous towards top, unit weathers light greenish grey	0.4	82.5
3	Limestone, slightly sandy, light grey, fine-grained, carbonaceous smears along bedding planes Units 8 to 3 inclusive measured at station 118NB at the east end of Sulphur Point.	0.1	82.1
2	Limestone, pale brown to brownish grey, aphanitic, even beds between 3 to 8 inches thick, brittle, weathers light brownish grey; some stylolitic structures Two feet of this unit is exposed at station 117NB; equivalent or slightly higher beds exposed at stations 114NB to 116NB inclusive; all located near the east end of Sulphur Point.	4	82
1	Covered interval to top of exposure at station 96NB on Presqu'ile Point Approximate total thickness of Sulphur Point Formation ..... 120 feet.	?78	

Section 55. Section of part of the Slave Point Formation exposed in a sink-hole at station 9DD, 24 miles bearing 175T from Presqu'ile Point.

MIDDLE DEVONIAN

SLAVE POINT FORMATION

10	Covered interval to top of formation	?	
9	Limestone, brown, fine-grained, massive, weathers light brown; contains brown bituminous streaks; jointed, with some joint planes coated with calcite. Shaly parting at base. Sparsely fossiliferous (sample 9DDa): *Atrypa* sp. (medium costate) *Emanuella* sp. F crinoid ossicles	5	57.5
8	Limestone, as above, rare limonite stained vugs; weathering to beds ¼ to ½ inch thick. Sparsely fossiliferous (sample 9DDb): *Atrypa* sp. (medium costate) *Emanuella* sp. crinoid ossicles	12	52.5

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Unit		Thickness (feet) Unit	From base
	SLAVE POINT FORMATION—*Cont.*		
7	Limestone, brecciated, angular and sub-rounded fragments between ¼ and 1 inch in diameter, of aphanitic light brown limestone and dark brown limestone; fossils comprise (sample 9DDc): ..... stromatoporoid *Atrypa* sp. (medium costate) ?*Emanuella* sp. Unit 7 seems to grade along strike to less brecciated beds.	6	40.5
6	Covered interval	2	34.5
5	Limestone, brown, fine-grained, fissile, weathering to beds 4 to 8 inches thick (sample 9DD3)	23	32.5
4	Limestone, as above, shaly to platy; fossiliferous (sample 9DDd): *Atrypa* sp. cf. *A. arctica* Warren *Emanuella* sp. F	4	9.5
3	Shale	1	5.5
2	Limestone, brown, aphanitic, massive (sample 9DD4).	3.5	4.5
1	Shale, dark brown, soft, highly fissile. ..... Base of exposure in sink-hole.	1	1
—	Covered interval to top of Nyarling Formation	?	

Section 56. Section of part of the Slave Point Formation exposed in a sink-hole at station 33NC, 52.6 miles bearing 242T from Pte. Ennuyeuse.

MIDDLE DEVONIAN

SLAVE POINT FORMATION

8	Covered interval to top of formation.	?	
7	Limestone, argillaceous, greyish yellow, medium-grained, massive, flaggy weathering.	3.5	67.4
6	Limestone, argillaceous, yellowish grey, aphanitic, in beds from ¼ to 1 inch thick.	1.3	63.9
5	Limestone, similar to unit 7.	2.6	62.6
4	Limestone, argillaceous, laminae, very pale orange, fine-grained to aphanitic, in beds from 1 inch to 4 inches thick.	7.9	60
3	Limestone, argillaceous, bioclastic, yellowish grey, beds from 2 to 3 feet thick; lower 1.7 feet more argillaceous than beds above.	6.7	52.1
2	Limestone, argillaceous, bioclastic, light olive grey, fine-grained, beds from 1 to 3 feet thick; base not exposed in sink-hole.	5.4	45.4
1	Covered interval to base of formation and top of evaporites of Nyarling Formation.	?40	

Unit		Thickness (feet) Unit	From base

Section 57. Composite section of part of the Slave Point Formation discontinuously exposed at stations 32NC and 31NC, 71 and 73 miles west of Bell Rock on Slave River on line of section 14.

MIDDLE DEVONIAN

SLAVE POINT FORMATION

5	Covered interval to top of formation.	?	
4	Gypsum, white, in beds ¼ inch to 4 inches thick; interbedded with an equal amount of mudstone, light olive grey to greenish grey, rubbly weathering; and nodules of medium to dark grey chert.	8.5	71.5
	Exposed near road connecting Salt River and Hay River Settlement, at station 31NC, 73 miles bearing 282T from Bell Rock.		
3	Covered interval	39	63
2	Limestone, gypsiferous, argillaceous, yellowish grey, fine-grained, in beds from 1 to 3 feet thick, flaggy weathering; gypsum present as translucent laminae.	14	24
	Sparsely fossiliferous (sample 32NCa): *Emanuella* sp. C		
	Unit 2 outcrops at station 32NC on northeast edge of circular-shaped lake near road connecting Salt River and Hay River Settlement, 71 miles bearing 281T from Bell Rock.		
1	Covered interval to base of formation.	?10	
	Thickness of Slave Point Formation represented. .....71.5 feet.		

Section 58. Section of Horn Plateau Formation beds exposed round the periphery of circular hill at station 384NB; located about 2.5 miles west of the west side of Fawn Lake and near the east flank of Horn Plateau.

MIDDLE DEVONIAN

HORN PLATEAU FORMATION

3	Limestone, reefoid, pale brown, fine- to very coarse-grained, bioclastic, weathers light to medium grey, contains numerous large fossil fragments; lower 5 feet weathers to thin irregular beds; upper part more resistant and massive, coarse limestone fragments are loosely cemented in a matrix of finer material.	21	36
	Fossils collected from top of unit 150 feet in from south edge of outcrop (sample 384NBe): *Atelophyllum* sp. B *Spongophyllum* sp. cf. *S. planotabulatum* (Yoh) *Atrypa* sp. T crinoid ossicles		
	Fossils collected from top of an erosional stack near top of unit (sample 384NBd): *Atelophyllum* sp. B *Spongophyllum* sp. cf. *S. planotabulatum* (Yoh) *Atrypa* sp. T		

Unit		Thickness (feet) Unit	From base
	HORN PLATEAU FORMATION—*Cont.*		
	Fossils collected from near base of unit (sample 384NBc): *Disphyllum* sp. *D.* cf. *D. dyeri* Cranswick and Fritz leptoinophyllid genus E *Thamnopora* sp. undet. pentamerid ?*Schizophoria* sp. *Atrypa* sp. S *Atrypa* sp. T *Spinatrypa* sp. B		
2	Covered interval	*c.* 10	15
1	Limestone, bioclastic, light to medium brown, coarse-grained, massive, weathers to irregular layers from 1 to 3 inches thick; richly fossiliferous (sample 384NBa):	*c.* 5	
	Heliophyllum (*Keriophyllum*?) sp. A *Productella* sp. U *Leptaena* sp. *Schuchertella* sp. *Athyris* sp. cf. *Emanuella* sp. *Ambocoelia* sp. cf. *A. umbonata* (Conrad) *Atrypa* sp. *Spinatrypa* sp. B cf. *Adolfia* sp. *Hypothyridina cameroni* Warren crinoid ossicles		
	Fossils collected from talus presumably derived from unit 1 (sample 384NBb): "*Cystiphylloides*" sp. (=*Lythophyllum* of authors) *Favosites* sp. C *Athyris* sp. cf. *Centronella* sp.		

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