

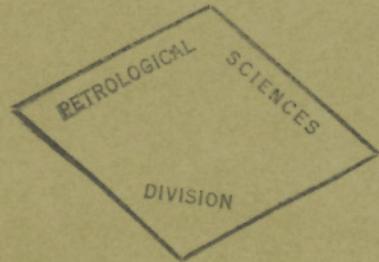
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DEPARTMENT OF MINES  
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PAPER 62-15



MIDDLE DEVONIAN AND OLDER PALAEOZOIC FORMATIONS  
OF SOUTHERN DISTRICT OF MACKENZIE  
AND ADJACENT AREAS

(Report, 3 figures, appendix)

Helen R. Belyea and A. W. Norris



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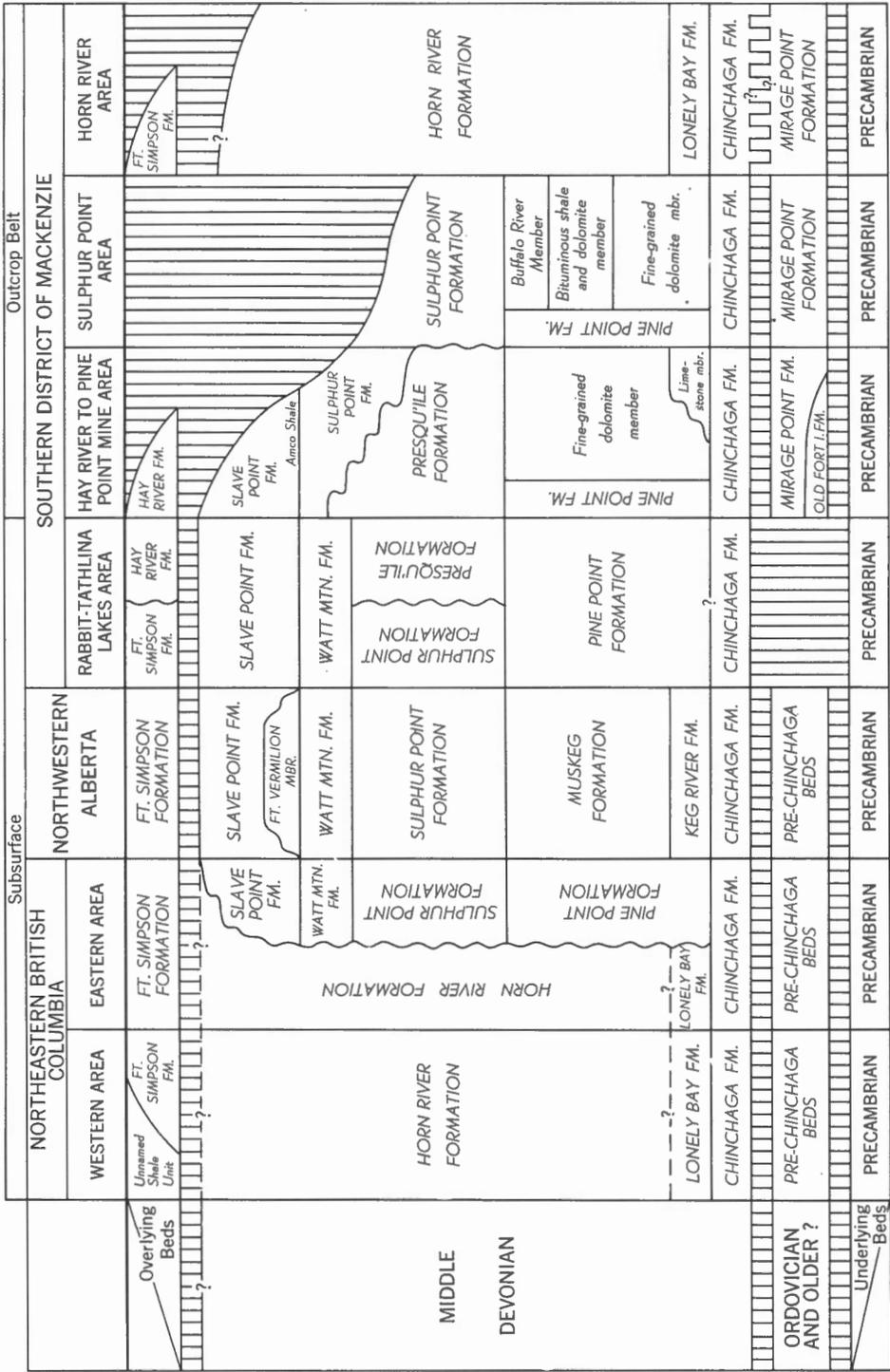
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GSC

Figure 1. Formational nomenclature.

# MIDDLE DEVONIAN AND OLDER PALAEOZOIC FORMATIONS OF SOUTHERN DISTRICT OF MACKENZIE AND ADJACENT AREAS

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## INTRODUCTION

This paper deals with the stratigraphy of Middle Devonian and older Palaeozoic rock units from the outcrop belt bordering the Precambrian Shield in southern District of Mackenzie, into the subsurface, to the Fort Nelson area in northeastern British Columbia (see Fig. 2). The outcrop successions have been described recently in detail (Norris, in press)<sup>1</sup>, based on work by members of Operation Mackenzie in 1957. The descriptions of the subsurface successions are by Helen R. Belyea.

Rocks of Ordovician and older(?) Palaeozoic age in the southern part of the outcrop belt and adjacent subsurface in southern District of Mackenzie have been mapped as the Old Fort Island and Mirage Point Formations. The basal Palaeozoic beds in northwestern Alberta and adjacent British Columbia are undated, and in this report are informally designated as pre-Chinchaga beds.

Middle Devonian rocks unconformably overlies the Ordovician in the outcrop belt, but the lack of fossil evidence makes age assignments less certain away from the belt.

In the area covered by this report the Middle Devonian succession is represented by three main facies types which intertongue: one type consists largely of carbonates, another of carbonates and evaporites, and the other comprises shales and some carbonates. The wells selected illustrate these more typical facies and some, but by no means all, of the intertonguing relationships (see Figs. 2 and 3). All of the rock units selected are those which are readily mappable at this time. Formational nomenclature used for the rock units and their relationships are indicated in a general way by Figure 1.

The writers are grateful for the cores, logs, and other data and assistance provided by The American Metal Company of Canada, the British Columbia Department of Mines and Petroleum Resources, the California Standard Company, The Consolidated Mining and Smelting Company of Canada Limited, Imperial Oil Limited, and the Windy Point Mining Company.

## ORDOVICIAN AND OLDER(?)

Ordovician and older(?) rocks outcrop in a narrow belt fringing the west shore of the North Arm of Great Slave Lake. North of

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<sup>1</sup>Names and/or dates in parentheses refer to publications listed in the References.

the lake these beds overlap the Precambrian Shield. In the area between the south end of the outcrop belt and the northern flank of the Tathlina 'high', rocks of Ordovician and older(?) age are represented by two formations—the Old Fort Island and the Mirage Point.

### Old Fort Island Formation

The oldest Palaeozoic rock unit outcropping in the Great Slave Lake area is a sandstone that unconformably overlies the Precambrian. The name "Old Fort Island Formation" has been proposed for this unit by Norris (in press), after the island on which it is best exposed. Old Fort Island is about midway up the west shore of the North Arm of Great Slave Lake. In the type area, exposures of this unit consist of thin- to thick-bedded, fine- to coarse-grained, varicoloured but mainly white, friable, quartzose sandstone, some beds of greenish grey and red siltstone, and occasional laminae and partings of green shale.

In the subsurface the unit is generally less than 20 feet thick, but a maximum of 110 feet has been penetrated in Northwest Windy Point No. 1 well (61° 19'N, 115° 52'W). The Old Fort Island Formation appears to be mainly confined to Precambrian depressions, and it thins to zero against Precambrian high areas.

The age of the Old Fort Island Formation is not known as it is unfossiliferous. However, it is limited above by the Mirage Point Formation in the south, and by the La Martre Falls Formation (Norris, in press) in the north; the latter contains Middle Ordovician fossils in its upper part. Below it lies the Precambrian. The Old Fort Island Formation is, therefore, dated as Middle Ordovician or older(?). An analogous sandstone—the La Loche Formation—overlying the Precambrian on upper Clearwater River in northwestern Saskatchewan and on Slave River in northeastern Alberta, is overlain by beds tentatively dated as Middle Devonian (Norris, 1962).

### Mirage Point Formation

The name "Mirage Point Formation" has been proposed by Norris (in press) for a variable sequence of red beds unconformably underlying the Middle Devonian Chinchaga Formation and transitionally overlying the basal Palaeozoic Old Fort Island sandstone, or, in places in the subsurface, overlying Precambrian rocks. Only the upper part of this unit is exposed along the south end of the western shore of the North Arm of Great Slave Lake. The formation is named after Mirage Point, near the southern end of the exposures.

In outcrops, the Mirage Point Formation is a thinly interbedded sequence of dusky-red, purplish and orange-red, variably argillaceous, sandy and gypsiferous dolomite, mudstone, green and red shale, gypsiferous shale, gypsum, and satinspar. Mud-cracks are present along some bedding surfaces, and irregular veinlets of secondary fibrous gypsum penetrate many beds of the exposed sequence.

The well closest to the outcrop belt of the Mirage Point Formation is the Northwest Windy Point No. 1, located some 58 miles southwest of Gypsum Point. There, the Mirage Point Formation

consists (Cameron, 1922, p. 16) of a sequence of red beds comprising shale, gypsum, anhydrite, and salt, lying between depths of 1,045 and 1,640 feet.

In the Cominco G-1 and G-4 wells in the Pine Point area, the Mirage Point Formation is considerably thinner (188.6 and 293.8 feet thick respectively), presumably because the wells penetrate 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. Southward, the Mirage Point Formation thins to zero where it abuts the Tathlina 'high'.

The age of the Mirage Point Formation in the outcrop belt is presumed to range from Middle Ordovician or older, to Upper Ordovician. This age assignment is based on field evidence that the Mirage Point Formation occupies the stratigraphic position of three rock units to the north (Norris, in press). Middle and Upper Ordovician fossils respectively, have been collected from the upper two rock units to the north; the upper of these units pinches out in the vicinity of Alexander Point within the top 50 feet or so of the Mirage Point Formation.

West of the outcrop belt it is possible that some of the upper red beds included in the Mirage Point Formation—for example the salt in the Imperial Triad Davidson Creek P-2 well (see Fig. 2)—may actually be part of the Devonian Chinchaga Formation.

#### Pre-Chinchaga Beds

South of the Tathlina 'high', beds overlying the Precambrian consist of red beds that include sandstone, anhydrite, siltstone, and shale. These were grouped together by Law (1955a, b) as "Redbeds of doubtful age". Over parts of the District of Mackenzie they may be basal Devonian. In northern Alberta they may be Devonian and older. They are correlative, at least in part, with the Lower Elk Point of Alberta, but may include pre-Devonian beds in the Great Slave Lake area. The "red bed" unit is mappable under the Chinchaga in northeastern British Columbia, but its relationship to rocks of known age has not yet been determined.

#### MIDDLE DEVONIAN

#### Chinchaga Formation

The Chinchaga Formation was named by Law (1955a, b), for the anhydrite, dolomitic and sandy anhydrite, and sandstone that overlie the red bed unit. From a thickness of 205 feet in the type well (California Standard Steen River 2-22), it thins to zero over the Devonian Peace River landmass. Over the Tathlina 'high', it is thin or absent, but thickens northeastward to between 300 and 400 feet, and northwestward to more than 250 feet.

From the type section westward into northeastern British Columbia the Chinchaga Formation is divisible into two members. In the type section the lower member consists mainly of sandy anhydrite, dolomite and sandstone, but grades to anhydrite and dolomite westwards—for example, in the Pan American et al. A-1 Snake River c-28-D and Gulf States Kotcho Lake d-39-J (4) wells (Fig. 4). The anhydrite in (Gulf States) Evie Lake No. 1 well (b-90-G/94-J-14) between 7,290 and 7,530 feet may be pre-Chinchaga.

The upper member retains its characteristics as an anhydritic dolomite with interbedded anhydrite and shale into north-eastern British Columbia. A silty to sandy anhydrite and sandstone lentil is taken as the base of the member. Farther west it becomes fine-grained, very finely crystalline, yellow-brown dolomite, in part argillaceous and anhydritic, with some intercrystalline porosity (see Gulf States Kotcho Lake d-39-J (4) and Pan American et al. A-1 Snake River c-28-D wells, Fig. 2). A similar dolomite occurs at the base of the Devonian in wells in the southern part of the District of Mackenzie (see Appendix: Briggs Foetus Lake No. 1 and Rabbit Lake No. 1 wells).

The Chinchaga Formation rests disconformably on the red beds and grades upwards into the Keg River Formation. Locally, some of the upper part of the Chinchaga may be the time equivalent of beds which are included with the Keg River Formation in other areas.

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. Immediately south of Great Slave Lake the Chinchaga Formation is overlain by a number of different facies of the Pine Point Formation; north and northwest of the lake it is overlain by the Lonely Bay Formation.

In outcrops the Chinchaga Formation is generally sparsely fossiliferous because of the evaporitic character of most of the unit. However, in the Great Slave Lake region, fossils have been collected from carbonate rocks at a number of scattered localities and horizons. These include stromatoporoids, Cladopora-like organisms, (?)Spinatrypa sp. cf. (?)S. andersonensis (Warren), cf. Spinatrypa dysmorphostota Crickmay, and others. The Chinchaga Formation is overlain throughout most of the area by fossiliferous beds of Middle Devonian (Givetian) age. The Chinchaga Formation is dated as Middle Devonian, and the presence of cf. Spinatrypa dysmorphostota Crickmay from near the middle of the formation suggests that it may be in part of lower Middle Devonian (Eifelian) age. In the lower Mackenzie Basin this form occurs well below Stringocephalus sp.

#### Keg River Formation

The Keg River Formation as defined by Law (1955a, b) is mappable as a separate unit only where it is underlain by the Chinchaga Formation and overlain by the Muskeg Formation; that is, in an area in northern Alberta, north of the Peace River arch, and in the southernmost part of the District of Mackenzie. It is about 200 to 250 feet thick.

The Keg River is divisible into two members. The lower member consists of yellow-brown dolomitic limestone, varying to dolomite in places. The limestone is commonly fine grained, tightly cemented with calcite, and contains pelletoid layers and, locally, stromatoporoid beds. Where it consists of dolomite it is buff to light brown and commonly has euhedral dolomite crystals, giving good intercrystalline porosity.

The upper member is commonly dolomitic, medium to coarsely crystalline, and porous, with good vuggy porosity. In places it consists largely of stromatoporoids, visible even where dolomitized.

Eastward, the Keg River Formation passes into the dark brown limestones of the lower part of the Pine Point Formation (see Fig. 3). West of the type section it is difficult to separate it from the overlying Muskeg Formation and the two become one lithologic unit.

### Muskeg Formation

The Muskeg Formation as defined by Law (1955a, b), extends from the Peace River Devonian landmass northward into the southern part of the District of Mackenzie (see Law, 1955b, Fig. 10). In western Alberta and northeastern British Columbia it grades from zero along the north side of the Peace River landmass at about Township 90 to a maximum of about 800 feet in the centre of the basin, and thins northward to zero over the Tathlina 'high'. Law has defined the Muskeg as consisting of brown microcrystalline, cryptocrystalline dolomite and grey to light brown anhydrite. To the southeast it grades into the "First Salt" of Alberta and Saskatchewan.

Law included at the top of his Muskeg Formation a member consisting of breccias, dolomite and limestone, between depths of 4,513 and 4,619 feet in the type section in California Standard's Steen River No. 2-22 well. This member is here excluded from the Muskeg Formation and considered to be equivalent to the Sulphur Point Formation. The boundaries of the Muskeg as so revised, are 4,619 to 5,210 feet in the type section. The Muskeg, as redefined, comprises a threefold repetition of anhydrite and dolomite in northern Alberta. The lowest cycle is predominantly dolomite whereas the overlying cycles become progressively more anhydritic. Northward over the Tathlina 'high' the Muskeg Formation thins by loss of the highest beds. The uppermost dolomite is present in Imperial Bistcho Lake No. 1 well, but is missing in the Shell Kakisa River No. 1 well. Probably only the lowermost part of the Muskeg Formation is present in Shell Alexandra No. 2 well, and this formation is completely missing in Briggs Rabbit Lake No. 1 well.

### 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. In his table of formations in a later publication, Cameron (1922, p. 13) described the Pine Point as: "Soft, grey, shaly limestones" with a thickness of 595 feet in the Northwest Windy Point No. 1 well,

unconformably overlying the Fitzgerald dolomites (Chinchaga Formation), dated as Silurian, and conformably overlain by the Presqu'ile dolomites. The Pine Point Formation is perhaps the most variable unit of the Middle Devonian succession in the Great Slave Lake outcrop area, 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 has been redefined by Norris (in press), as the rocks occupying the stratigraphic interval between the top of the evaporites of the Chinchaga Formation and the base of the coarse dolomites 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, informally designated as members, which grade or intertongue into 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 except the Buffalo River Member are well represented in outcrops.

The Limestone member from the central and eastern parts of the Cominco Concession to the Fort Resolution area forms the basal beds of the Pine Point Formation where it is overlain by the fine-grained Dolomite member. The Limestone member is in part exposed in the vicinity of Fort Resolution where it is estimated to be about 110 feet thick. In outcrops it 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. It is close to 83 feet thick in the Cominco Test G-1 well.

Fossils collected from exposures of the Limestone member include stromatoporoids, Tentaculites sp., Atrypa sp. cf. A. arctica Warren, Atrypa sp. (medium costate), and Emanuella sp. These fossils are not particularly diagnostic for precise correlation but do indicate a Middle Devonian age.

The Fine-grained Dolomite member is defined in the Cominco Test G-1 well on the south side of Great Slave Lake. In this well it comprises 460 feet of the total 540-foot thickness of the Pine Point Formation. There, it overlies the Limestone member of the Pine Point Formation and is overlain by dolomite of the Presqu'ile Formation. North and northwestwards, the upper part of the Fine-grained Dolomite member presumably interfingers with the Bituminous Shale and Limestone member and Buffalo River Member of the Pine Point Formation. Parts of the Fine-grained Dolomite member outcrop along the south shore of Great Slave Lake from just east of Dawson Landing wharf, eastward to the mouth of Little Buffalo River. The Fine-grained Dolomite member is also present on Mission, Round, and Loutit Islands, the three islands of the Burnt Islands group, Beaulieu Island, and probably underlies Moose, Deer, Birch, and Paulette Islands, where its presence is indicated by loose blocks. Lithologically, this member consists of brown, fine-grained, granular in part, vuggy and petroliferous dolomite; sandy-textured earthy dolomite; fine-grained dolomite; and minor coarse-grained crinoidal dolomite.

Fossils in the Fine-grained Dolomite member 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, probably about 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 (1922, p. 22), from the middle island of the Burnt Islands group. These occurrences, along with evidence presented elsewhere, suggest that Stringocephalus ranges throughout most of the Fine-grained Dolomite member as well as into the overlying beds of the Presqu'ile and Sulphur Point Formations.

Beds of the Bituminous Shale and Limestone member of the Pine Point Formation are discontinuously exposed along the south shore of Great Slave Lake between a point 0.7 mile east of Isle du Mort to a point 0.7 mile east-southeast of Dawson Landing wharf. They are exposed also on Green and McKay Islands about 2 miles out from the mainland. This is the type area and shows the typical facies of Cameron's Pine Point Formation.

Two main types of lithology are present in the area. One type, outcropping in the vicinity of Pine Point and on Green and McKay Islands, consists of dark, richly fossiliferous, strongly calcareous bituminous shale, thinly interbedded with medium to dark brown, fine-grained to aphanitic, in part nodular limestone. The other type, outcropping along the shore immediately east of Dawson Landing wharf, consists of medium to dark brown, irregularly thin-bedded, very fine grained, in part petroliferous limestone.

Close to the outcrop area this member has been penetrated by the Cominco Test G-4 well located immediately southeast of Sulphur Point, and by shallow diamond-drill holes 5.5 miles southwest of Pine Point. In the Cominco Test G-4 well, the member is represented by the sequence (114.5 feet thick) between the 358- and 472.5-foot depths that overlies the Fine-grained Dolomite member and is overlain by the Buffalo River Member.

Rocks of the Bituminous Shale and Limestone member are by far the most richly fossiliferous of any that outcrop in the Great Slave Lake region. It was from beds of this member that some of the early explorers passing through the Great Slave Lake area collected many fossils, some of which were described and illustrated by Meek (1867). Other workers who have collected, listed, or described and illustrated some of the fauna of this member include: Kindle (1916, p. 248), Camsell (1915, p. 56), Cameron (1922, pp. 14, 20), Warren (1944, pp. 127-128), and Warren and Stelck (1956, pl. IV). Many of the fossils in this member appear to be facies-controlled, as they are absent or sparsely represented in contemporaneous beds of different facies outcropping elsewhere in the area. Some of these facies-controlled forms include: Styliolina sp., Centroceras sp., Lingula minuta Meek, Nervostrophia sp. I, Devonoproductus sp. D (= Productus? of Meek), Devonoproductus sp. E, Chonetes aurora Hall, 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. Some of these include: Emanuella meristoides (Meek), Warrenella sp. cf. W. franklini (Meek), Leiorhynchus awokanac McLaren, and Hadrorhynchia sandersoni (Warren). It is concluded that the fauna of the Bituminous Shale and Limestone member is broadly contemporaneous with beds containing Stringocephalus

elsewhere in the area and is therefore dated as Middle Devonian (Givetian) age.

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. 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, based 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 the Bituminous Shale and Limestone member of the Pine Point Formation (below). The Buffalo River shale appears to wedge out southward and it is not known how far north the shale extends beneath the western part of Great Slave Lake. The Buffalo River shale is here considered as 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 here designated as the type section of the member. The Buffalo River Member 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.

The Pine Point Formation in the subsurface, southwest of Great Slave Lake in the District of Mackenzie, consists of thinly bedded, dark brown, fine-grained limestones, interbedded with dark brown to black shales. It contains a prolific fauna of brachiopods and corals. This limestone varies to dolomite, particularly in the Tathlina Lake area. The dolomite masses are generally less than 100 feet thick and consist of brown, fine- to medium-crystalline dolomite with an euhedral development of dolomite crystals and good inter-crystalline porosity. They seem to form irregular masses in the bedded carbonates.

Rocks here assigned to the Pine Point Formation in a relatively small area in northeastern British Columbia and in the northwestern corner of Alberta, are lithologically similar to those in the immediate vicinity of Great Slave Lake. In this area the Pine Point Formation reaches a maximum thickness of about 800 feet. It consists of a variable sequence of limestone, dolomitic limestone, and dolomite with occasional tongues of shale. A typical section is illustrated by Gulf States Kotcho Lake d-39-J well (Fig. 2). Shale tongues are known to occur near the Clarke Lake field and in Pan Am A-1 Kimea Lake well, but the individual limestone, dolomite and shale members cannot yet be mapped because of paucity of holes. The Pine Point Formation is equivalent to the Keg River and Muskeg (restricted) Formations of northern Alberta. It rests on the Chinchaga and is overlain by the Sulphur Point.

### Lonely Bay Formation

The name "Lonely Bay Formation" was proposed by Norris (in press) for a resistant carbonate unit conformably overlying the evaporitic Chinchaga Formation and overlain by shale and limestone of the Horn River Formation on the northwest side of Great Slave Lake. From the immediate vicinity of the lake to an arbitrary point 12 miles north of Lonely Bay, this unit was referred to as the Lonely Bay Member of the Pine Point Formation. The outcrop belt of this unit, between Lonely Bay and the headwaters of Duport River, is between 4 and 10 miles wide, trends roughly northwest, and is characterized by relatively high, flat ground.

In outcrops the lower part of the formation consists of massive, dark brown, in part stylolitic limestone; thin- to medium-bedded, light grey, fine-grained to aphanitic limestone; medium-bedded, grey, aphanitic, slightly dolomitic limestone; and thin-bedded, pale brown, argillaceous limestone. Younger beds consist of massive, dark to medium brown, fine-grained limestone, overlain by irregularly thin-bedded, medium brown, fine-grained limestone interbedded with nodular limestone.

The total thickness of the Lonely Bay Formation is estimated to be about 120 feet at the southern end of its outcrop belt; to the northwest it probably thickens to about 280 feet, on the basis of the width of the belt it is presumed to occupy. In the Imperial Triad Davidson Creek P-2 and Briggs N.E. Rabbit Lake No. 1 wells, it is 167 and 165 feet thick respectively (see Fig. 3).

Both the Lonely Bay Member of the Pine Point Formation and the Lonely Bay Formation mark the earliest appearance of relatively abundant Middle Devonian fossils on the northwest side of Great Slave Lake. Corals and stromatoporoids predominate in the northern part, and brachiopods are relatively abundant in the southern part of the outcrop belt. 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 area, northeastern British Columbia. The brachiopod fauna includes Productella sp., Atrypa sp. cf. A. arctica Warren, Spinatrypa sp. cf. S. lata (Warren), and Emanuella meristoides (Meek). With the possible exception of Productella sp., most of these fossils range higher and also lower in the Middle Devonian succession of the Great Slave Lake area, and thus are of little help in precise correlation. Of some significance is the apparent absence of Stringocephalus in beds of the Lonely Bay Formation and Member. On the basis of the fauna, and field relations to other rock units, the Lonely Bay Formation (and Member, to the south) are tentatively assigned a Middle Devonian, possibly lower Givetian age.

In wells drilled in northeastern British Columbia a limestone unit about 280 feet thick has the same stratigraphic position as the Lonely Bay Formation. It overlies the evaporitic Chinchaga Formation and is overlain by a thick shale sequence. It is most probably the Lonely Bay Formation, and although continuity through southern District of Mackenzie has not yet been fully demonstrated, tentative use of the term "Lonely Bay" seems appropriate in this area.

### Sulphur Point Formation

The name "Sulphur Point Formation" was proposed by Norris (in press) for the sequence of limestones and in places interbedded limestones and dolomites that overlies various facies of the Pine Point Formation and is overlain by limestones of the Slave Point Formation in the Great Slave Lake region. 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.

The sequence designated as map-unit 13 by Douglas (1959b, p. 42) in the Cominco Test G-4 well was selected as the type section of the formation (see Fig. 3). 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.

Beds of the Sulphur Point Formation outcrop on both the northwest and south sides of Great Slave Lake. The thickest sequence is exposed along the northwest shore of the lake from 1.5 miles northwest of the tip of Windy Point to immediately north of Burnt Point. There, the sequence consists of stromatoporoidal limestone, argillaceous limestone, thinly bedded aphanitic limestone, and minor nodular dolomitic limestone and clastic limestone. Drill-holes by the Windy Point Mining Company (Malcolm, 1956) here indicate thicknesses of between 135 and 160 feet for the Sulphur Point Formation.

About 7.5 feet of Sulphur Point beds are exposed in the vicinity of Presqu'ile Point. There they consist of richly fossiliferous limestone and argillaceous limestone that possibly correlate with beds about 35 feet above the base of the Sulphur Point Formation in the Cominco Test G-4 well.

A thin, presumably younger sequence, about 7.5 feet thick, exposed in the vicinity of Sulphur Point, consists of brown stylolitic limestone, slightly sandy and carbonaceous limestone, oolitic limestone, and argillaceous limestone.

The Sulphur Point Formation is mappable in the subsurface as a distinct lithologic unit from the Great Slave Lake area to northeastern British Columbia. It can also be distinguished from the overlying and underlying formations by electric-log and gamma-ray-neutron-log characteristics. It is thinnest over the Tathlina 'high' (25 feet or less) and thickens to about 300 feet in the Kotcho Lake area in northeastern British Columbia.

It consists of limestone with abundant stromatoporoids and corals, that in places form a solid reef-like mass. The matrix of the limestone is fine grained and is composed largely of organic debris. In the Tathlina area it consists almost entirely of a very fine grained clotted limestone (see Appendix for wells in this area). It passes to the south, for example in the California Standard Steen River 2-22 well, to limestone, argillaceous dolomite and anhydrite with some interbeds of bright green waxy shale and siltstone. Farther south and southeast it is a thin, brown, argillaceous anhydritic dolomite and becomes no

longer recognizable as the Sulphur Point Formation; there, it is simply a dolomite tongue between the First and Second Red Beds of Member 1 of the Elk Point Group as described by Crickmay (1954).

The Sulphur Point is presumed to rest disconformably on the lower part of the Muskeg Formation in the southern part of the District of Mackenzie where the upper part of the Muskeg Formation is missing. It may be conformable with that formation to the southwest in British Columbia and to the east in the Great Slave Lake area. It grades upwards to the Watt Mountain Formation. The upper part of the carbonate is commonly brecciated and infilled with bright green waxy shale; in places boulders of carbonate are present in the shale. No sharp contact can be drawn between the carbonate and the green waxy shale.

Important fossils from outcrops of the Sulphur Point Formation are Stringocephalus sp. and Hypothyridina cameroni Warren. Other relatively abundant forms include stromatoporoids, Leptoinophyllid genus E, Thamnopora sp. F (=Favosites polymorpha Goldfuss of Meek), Spinatrypa sp. cf. S. lata (Warren), Emanuella meristoides (Meek), and others. The presence of Stringocephalus sp. indicates a Middle Devonian (Givetian) age.

#### Presqu'ile Formation

Cameron (1918, pp. 25-26), proposed the name "Presqu'ile dolomites" for strata exposed at Presqu'ile Point and on Burnt Islands east of Pine Point on the south side of Great Slave Lake. On the northwest shore he included the dolomite strata exposed in the vicinity of Windy Point and on the shores of Sulphur Bay. At that 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 coarsely crystalline porous and cavernous dolomite."

Later, Cameron (1922, 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."

It is now evident 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: (1) coarsely recrystallized dolomite, (2) limestone and dolomitic limestone, and (3) fine-grained 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 around the southwest end of Great Slave Lake. Facies type 2, typified by strata at Presqu'ile Point, is not easily differentiated from 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. To include this 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. Excluding it from the Presqu'ile restricts the Presqu'ile to the upper part only of the stratigraphic interval between the top of the Chinchaga Formation and the base of the Slave Point Formation. The latter choice, although not completely satisfactory, was adopted by Douglas (1959b) and Norris (in press) in order to retain some legacy of Cameron's scheme of classification.

The Presqu'ile Formation, as now restricted, applies mainly to a light-coloured, coarsely recrystallized, variably vuggy, massive dolomite, which is generally presumed to have replaced reefal limestone. In the Great Slave Lake area it overlies various facies of the Pine Point Formation and is overlain by the Sulphur Point or Slave Point Formations. The coarsely recrystallized dolomite on some flanks grades to and interfingers with undolomitized reefal and associated limestone facies which are excluded from the Presqu'ile Formation and named the Sulphur Point Formation.

The Presqu'ile Formation outcrops on both the south and northwest sides of Great Slave Lake. To date it has been penetrated only in a few places outside the Great Slave Lake area, e.g. in California Standard Shekelie River 9-26-120-11W6 well.

In the subsurface the Presqu'ile Formation 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 (see Douglas, 1959b, p. 49).

#### Watt Mountain Formation

The Watt Mountain Formation is here modified slightly from the unit described by Law (1955a, b), to exclude beds that recent drilling has shown to be equivalent to the Sulphur Point Formation (see Fig. 2). As so defined, it consists of the waxy green shales, breccias and limestones between 4,455 and 4,488 feet in the type section (the California Standard Steen River 2-22 well). In other areas it consists entirely of shale, and, locally, thin siltstone and sandstone beds are present. The contact with the overlying Slave Point Formation is sharp, whereas the lower contact is gradational to the Sulphur Point Formation. In places, the Watt Mountain seems to be the equivalent of at least the upper part of the Sulphur Point Formation; elsewhere it cannot be separated from the Sulphur Point, which may have green waxy shales interbedded with it. Eastward it is correlative with the First Red Beds (McGehee, 1949) of the Elk Point area. It does not include the underlying argillaceous dolomite and Second Red Beds which were assigned to the Watt Mountain Formation by Law (1955b, Fig. 2).

#### 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 in outcrops along the south side of Great Slave Lake from

Presqu'ile Point to High Point, on Buffalo River, on the northwest side of the lake at Slave Point, and along the shore between House<sup>1</sup> 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 (1922, pp. 13-15, 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 crests of hills north of Sulphur Bay on the northwest side of the lake. His revised estimate of the formation's thickness was 200 feet.

Campbell (1950, pp. 89-92) described the Slave Point Formation 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. To the east, the basal 86 feet or so contains an intercalation of lithologies characteristic of both the Slave Point and Presqu'ile Formations.

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 as consisting (in descending sequence) of: an upper unit (24 feet thick) of finely granular, buff-coloured limestones containing stromatoporoids; a middle unit (80 feet thick) composed mainly of finely fragmental limestone containing minor argillaceous and carbonaceous material; and 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. Difficulty arises when one attempts to trace Slave Point strata 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 was (Norris, in press) arbitrarily selected as the base of the Amco marker bed. Near the mouth of Buffalo River this bed is within limestone between 30 and 45 feet above the top of coarse dolomite of the Presqu'ile Formation. 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 Presqu'ile coarse dolomite or the Watt Mountain shale, if present. 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 merely a guess, but it probably intersects the shoreline between Breynat and Sulphur Points. 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

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<sup>1</sup>The name "House Point" is not in general use; it probably corresponds to Jones Point.

Buffalo River are above the Amco marker, and belong to the Slave Point Formation.

Scattered exposures of the Slave Point Formation occur between Gypsum Cliffs on Peace River and Slave Point on the northwest shore of Great Slave Lake.

The thickness of the Slave Point Formation immediately west of the lower part of Buffalo River is close to 200 feet.

The Slave Point Formation as used here, west of the type region, is that mapped by Law (1955 a, b) in the subsurface of north-western Alberta. He divided it into two members: the lower, Fort Vermilion; and the upper, unnamed. The Fort Vermilion member in northern Alberta consists of dolomite, limestone and anhydrite. This facies is not present in the southern part of the District of Mackenzie or in British Columbia. There, the whole section consists of grey to brown, very fine grained limestone, commonly lithographic, slightly argillaceous, with interbedded dark brown to grey shale. A few zones contain Amphipora, and locally, stromatoporoids. In places it grades to dolomitic limestone and dolomite. The upper member consists of a variable sequence of brown, fine-grained limestones, calcilutite and coarser limestones, calcarenites, and stromatoporoid-rich zones commonly containing Amphipora, especially in the upper 10 to 50 feet. Locally, it consists almost entirely of stromatoporoids. It is commonly light brown to yellowish brown, and contains scattered dolomite rhombs. Chert is present in some areas.

The contact between the Slave Point and the underlying green shale of the Watt Mountain Formation is generally abrupt, being conspicuous in cores. It is sharply overlain by the Upper Devonian, a variable shale sequence. In places the overlying beds are black shales; elsewhere they consist of brown, fine-grained limestones, containing brachiopod and crinoid fragments. In other places the overlying beds are greenish grey shales.

The most diagnostic fossils of the Slave Point Formation appear to be Emanuella sp. C and Emanuella sp. F (Norris, in press). The former appears to be absent in older Devonian strata. The latter, Emanuella sp. F, is present also in strata assigned to the Sulphur Point Formation. Hypothyridina sp. has been collected from near the top of the Slave Point Formation in the Frobisher Hay River No. 5B well (60°42'N, 115°52'W), and appears to be distinct from Hypothyridina cameroni Warren present in Sulphur Point beds in the outcrop area. The stromatoporoids which are relatively abundant in some beds may on close study prove useful for differentiating the Slave Point from older and younger strata.

The Slave Point Formation as here restricted is tentatively considered to be of Middle Devonian (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 9.5 miles (air distance)

above the mouth of Ferguson Creek. At four localities between 5.4 to 6 miles (air distance) above the mouth of the creek, limestone beds overlie the shale which Whittaker (1922, pp. 51-52) referred to as the Pine Point Formation. A thin sequence of limestone beds is also exposed along Clive River some 26 miles southwest of Clive Lake. All of the above beds were assigned (Norris, in press) to the Horn River Formation. This formation was redefined to apply to a unit consisting largely of dark shales variably interbedded with limestones, which overlies limestones of the Lonely Bay Formation, and is overlain by green shales of the Fort Simpson or Hay River Formation, or locally near Horn Plateau by reefoid limestone (Map-unit 15 of Douglas and Norris, 1960; to be named by Norris, in press). The latter formation is of local development and is not covered in this report.

In outcrops the shales are dark grey, mainly non-calcareous, soft, fissile, rubbly bedded and well jointed. The limestones exposed on Horn River are irregularly medium to thick bedded, medium grey, and in part nodular. Those exposed on Clive River are olive-grey to brownish grey, aphanitic to fine grained, and rubbly bedded.

In the subsurface the contact between the shales of the Horn River and Fort Simpson Formations is placed arbitrarily at strong gamma-ray 'kick' which generally corresponds to a colour change from dark grey to greenish grey. In places a dark shale is present above the 'kick' and this is placed tentatively in the Fort Simpson Formation. The Horn River Formation is present in all wells north and west of the Tathlina 'high' and west of the carbonate platform in northeastern British Columbia. Here it varies from a black shale as in Gulf States Evie Lake No. 1 well to a sequence consisting of black shale, greenish grey shale, and black shale, as in Pan American et al. A-1 Snake River c-28-D well\*. In the Westerol 3A and 7A wells the name "Spence River" was given to the shales by Hunt (1954), but this name can now be dropped in favour of the older name "Horn River".

Shales of the Horn River Formation in the outcrop belt appear to be almost barren of fossils, but some of the limestone beds are richly fossiliferous. The presence of cf. Leiorhynchus castanea (Meek) and Hadorrhynchia sandersoni (Warren) in the limestone beds on Horn River, and Leiorhynchus castanea (Meek) in the limestone beds on Clive River, suggest that the exposed parts of the Horn River Formation are more or less equivalent to the upper part of the Pine Point Formation. Both of these occurrences represent strata high in the Horn River Formation.

The Middle-Upper Devonian boundary within the unfossiliferous shales is still in doubt.

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\*Since this paper was prepared, F.F. Gray and J.R. Kassube have introduced the terms "Muskwa", "Otter Park" and "Evie"—Members of the Horn River Formation in northeastern British Columbia. (See Appendix; Pan American et al. A-1 Snake River c-28-D well.)

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- APPENDIX -

LOGS OF WELLS<sup>1</sup>

Terms descriptive of size and texture refer to rock samples and core studied wet with a binocular microscope. Grain sizes determined by this method are approximate. The approximations, however, are considered adequate for this type of description in that most of the limestones are poorly sorted and include grains of more than one size-range.

Aphanitic: individual grains not visible at x 12. Synonyms: calcilutite, micrite, cryptograined and dense limestone. This group includes precipitated limestones and particulate or clastic limestones (mudstones). Coarser limestones, so tightly compressed or cemented that individual grains are not visible with the binocular microscope, may be unintentionally included.

Very fine grained: particulate limestones up to 0.01 mm. Synonyms: calcilutite, pasty or chalky limestone; like aphanitic limestones except that the particulate nature is recognizable.

Fine-grained: particulate limestones, 0.015 to 0.063 mm. Synonyms: fine calcisiltite, micrograined limestone.

Medium-grained: particulate limestones, 0.063 to 0.125 mm.  
Synonyms: fine to medium calcarenite.

Coarse-grained: particulate limestones larger than 0.125 mm; synonymous with coarse calcarenite. Most of these rocks consist of shredded skeletal material. Coarser rocks, including granules, pebble beds, and calcirudites, are described separately.

Pelletoid: grains including faecal pellets, lumps, aggregates, grains, bahamites, of silt to sand size, and apparent 'grains' caused by recrystallization of the rock. Oolites are noted where distinguishable.

Crystalline: original grain size not determinable due to recrystallization.

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<sup>1</sup>For logs of Cominco Test G-1 and Cominco Test G-4 wells, see Douglas (1959b); for log of California Standard Steen River well, see Law (1955b).

Pan American et al. A-1 Snake River c-28-D

Location: c-28-D/94-0-1                      Elevation: 953.5 feet K.B.

Completed: 1959                              Total depth: 7,614 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples stored at Geological Survey of Canada, Calgary, Alberta.

| Depth<br>(feet)               | Lithology  |
|-------------------------------|--|
| <u>Fort Simpson Formation</u> |  |
| - 6,310                       | Shale, grey, slightly calcareous   |
| 6,310                         | <u>Horn River Formation</u>  |
| Muskwa Member                 |  |
| 6,310 - 6,330                 | Shale, black with brown streak; a little black siltstone   |
| 6,330 - 6,390                 | No samples   |
| 6,390 - 6,430                 | Shale, black, with dark brown streak, some with a grey streak; limestone, buff, very fine grained, argillaceous; crinoid fragments; a little chert in basal 10 feet. |
| 6,430 - 6,440                 | No sample  |
| 6,440 - 6,450                 | Shale as above; black chert  |
| 6,450 - 6,520                 | Shale, black, dark brown streak; siltstone, grey, slightly calcareous, probably as laminae   |
| 6,520                         | Otter Park Member  |
| 6,520 - 6,570                 | Shale, grey, to dark grey; a little siltstone, grey, calcareous; pyrite  |
| 6,570 - 6,680                 | Shale, grey to dark grey; scattered pyrite   |
| 6,680 - 6,700                 | Shale, as above; a little limestone, buff to grey, fine-grained, slightly dolomitic  |
| 6,700 - 6,720                 | Shale and limestone as above; a little siltstone and chert   |
| 6,720 - 6,990                 | Shale, grey to dark grey, as above   |

| Depth<br>(feet)             | Lithology  |
|-----------------------------|--|
| 6,990                       | Evie Member  |
| 6,990 - 7,050               | Shale as above; some black shale with dark brown streak, hard; pyrite; calcite veining   |
| <u>Lonely Bay Formation</u> |  |
| 7,050 - 7,080               | Limestone, dark grey, mottled with shale; shale, black, calcareous   |
| 7,080 - 7,100               | Shale and limestone as above, but limestone content greater  |
| 7,100 - 7,210               | Limestone, grey, to dark grey-brown, black, very fine grained to aphanitic, tightly cemented   |
| 7,210 - 7,230               | Dolomite, grey, finely crystalline, slightly silty; white dolomite crystals with black material between crystals.  |
| 7,230 - 7,250               | Dolomite, white to black, mottled, fine- to medium-crystalline; pyrobitumen between crystals, also black argillaceous material   |
| 7,250 - 7,280               | Dolomite, black, very finely crystalline; black shale laminae  |
| 7,280 - 7,330               | Dolomite, dark grey to black, finely crystalline; scattered white dolomite crystals; white dolomite crystals with black material between grains                              |
| <u>Chinchaga Formation</u>  |  |
| 7,330 - 7,370               | Dolomite, light grey to buff, aphanitic to finely crystalline, tightly cemented; may be anhydritic in bottom part.   |
| 7,370 - 7,430               | Dolomite, light grey, aphanitic, soft, argillaceous, anhydritic; in part euhedral, evaporitic type; scattered pyrite   |
| 7,430 - 7,450               | Dolomite, grey-brown to buff, very finely crystalline; anhydrite, light grey, massive  |
| 7,450 - 7,460               | Dolomite, light grey, very finely to finely crystalline; scattered pyrite; sandy; sandstone, white, quartzose, fine- to coarse-grained, poorly sorted, angular to subrounded |

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| Depth<br>(feet)       | Lithology   |
|-----------------------|---|
| 7,460 - 7,510         | Dolomite, light grey, medium to coarsely crystalline, in part with intercrystalline porosity; slightly anhydritic in upper part   |
| 7,510 - 7,560         | Dolomite, grey, very finely crystalline; anhydrite, light grey, massive, dolomitic  |
| 7,560 - 7,580         | Dolomite and anhydrite as above but with less anhydrite   |
| 7,580 - 7,589         | Sandstone, white, quartzose, fine- to coarse-grained, grains up to pebble size; poorly sorted, subrounded to angular; scattered anhydrite crystals and clear anhydrite stringers at 2,681 to 2,683 feet; pyrite |
| <u>Precambrian(?)</u> |   |
| 7,589 - 7,614         | Quartzite, age unknown  |

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Gulf States Kotcho Lake d-39-J (4)

Location: d-39-J/94-I-14

Elevation: 2,011 feet K.B.

Completed: 1960

Total depth: 8,413 feet

Result: Gas well

Summary of log by H.R. Belyea from samples stored at Geological Survey of Canada, Calgary, Alberta.

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| Depth<br>(feet) | Lithology   |
|-----------------|---|
|                 | <u>Fort Simpson Formation</u>   |
|                 | Black Shale Member  |
| - 6,410         | Shale, black, with dark brown streak; abundant pyrite   |
| 6,410           | <u>Slave Point Formation</u>  |
| 6,410 - 6,450   | Limestone, buff to light brown, aphanitic to fine-grained, brittle, hackly fracture; in part mottled dark grey, almost black; cell structures suggestive of stromatoporoids and <u>Amphipora</u>        |
| 6,450 - 6,460   | Limestone, dark grey, almost black, consisting of white calcite crystals in black, argillaceous, possibly bituminous matrix; some cell structure, possibly stromatoporoids; black shale laminae         |
| 6,460 - 6,510   | Limestone, brown, aphanitic, mottled dark grey; hackly fracture; calcite eyes and veins   |
| 6,510 - 6,530   | Limestone, dark brown, almost black, aphanitic, tightly cemented; in part fine to coarse pelletoid with calcite cement; pellets round to angular in shape; cell structure suggestive of stromatoporoids |
| 6,530 - 6,550   | Limestone, brown, aphanitic, tightly cemented; black shale laminae  |
| 6,550 - 6,560   | Limestone, dark brown to black; slightly argillaceous; cell structure suggestive of stromatoporoids   |
| 6,560 - 6,600   | Limestone, buff to brown, aphanitic, hackly fracture; lithographic  |
| 6,600 - 6,655   | Limestone, as above; a little green, pyritic, waxy shale interbedded; pyrite  |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 6,655           | <u>Watt Mountain Formation</u>   |
| 6,655 - 6,665   | Shale, green, buff, grey, dark grey, waxy, pyritic; limestone, buff, very fine grained, crystalline, pyritic   |
| 6,665           | <u>Sulphur Point Formation</u>   |
| 6,665 - 6,710   | Limestone, light grey, almost white, aphanitic; tightly cemented with calcite; stromatoporoid and possibly coral structures; some pyrite at 6,680 - 6,690 feet   |
| 6,710 - 6,900   | Limestone, light grey, almost white, as above; fine- to coarse-grained; particles up to 0.25 mm common, up to 0.5 mm rare; pelletoid, oolitic, cemented by calcite, abundant cell structure, suggestive of stromatoporoids |
| 6,900 - 6,990   | Limestone, light grey to buff, very fine grained, finely crystalline; tightly cemented by calcite; in part replaced by calcite; stromatoporoid cell structure common   |
| 6,990 - 7,020   | Shale, soft, green, waxy; abundant pyrite; limestone as above; coarse white dolomite, possibly as veins  |
| 7,020           | <u>Pine Point Formation</u>  |
| 7,020 - 7,050   | Limestone, buff, very fine grained, lithographic, slightly argillaceous; hackly fracture; some dark brown limestone; stromatoporoid fragments in bottom 10 feet.   |
| 7,050 - 7,160   | Limestone as above, in part dolomitic; some white coarsely crystalline dolomite; brown dolomite mottling in bottom part; vuggy porosity  |
| 7,160 - 7,200   | Dolomite, white, very coarsely crystalline, mottled with dark brown to black, finely crystalline; disseminated pyrite in bottom 10 feet  |
| 7,200 - 7,360   | Dolomite, buff to brown, finely crystalline; some white coarsely crystalline, in part as veins; vuggy porosity   |
| 7,360 - 7,370   | Dolomite, dark brown, finely crystalline; black shale partings; some white coarsely crystalline dolomite, possibly veining   |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 7,370 - 7,410   | Dolomite, dark brown, in part mottled buff, coarsely crystalline; small vugs; some white coarsely crystalline dolomite                       |
| 7,410 - 7,420   | Dolomite, dark brown, finely crystalline, slightly argillaceous  |
| 7,420 - 7,440   | Dolomite, buff, finely crystalline   |
| 7,440 - 7,500   | Dolomite, brown, finely crystalline, finely particulate texture; possibly veined with white dolomite; black shale laminae in bottom 10 feet. |
| 7,500 - 7,590   | Dolomite, buff, fine- to medium-crystalline; even mosaic texture; vuggy porosity   |
| 7,590 - 7,670   | Dolomite, dark brown, almost black, finely crystalline; crinoid fragments; black shale laminae   |
| 7,670 - 7,680   | Dolomite, brown to dark brown, almost black; finely crystalline, argillaceous; a few crinoid fragments; black shale laminae                  |
| 7,680 - 7,710   | Dolomite, dark brown, mottled light grey, fine- to medium-crystalline; relict cell structure in light grey dolomite; black shale laminae     |
| 7,710 - 7,780   | Dolomite, brown to black, finely crystalline, the latter argillaceous; shale laminae; black chert at 7,720 - 7,730 feet; crinoids            |
| 7,780           | <u>Chinchaga Formation</u>   |
| 7,780 - 7,800   | Dolomite, brown, aphanitic, lithographic; brown chert; a little green shale  |
| 7,800 - 7,810   | Dolomite, brown, aphanitic, lithographic to very finely crystalline; anhydrite crystals and massive anhydrite                                |
| 7,810 - 7,820   | Anhydrite, grey, massive   |
| 7,820 - 7,840   | Dolomite, dark brown, very finely crystalline, in part mottled with anhydrite; black chert; dark grey mudstone, dolomitic, anhydritic        |
| 7,840 - 7,890   | Dolomite, dark grey-brown, very finely crystalline; scattered clear anhydrite crystals; black shale partings                                 |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 7,890 - 7,930   | Dolomite, light yellow-brown, aphanitic, varying to dark brown, finely crystalline; anhydrite, grey, massive   |
| 7,930 - 7,970   | Dolomite, light yellow-brown, argillaceous, earthy, very finely crystalline, grades to mudstone; slightly silty  |
| 7,970 - 7,990   | Anhydrite, grey, massive; dolomite, buff, mottled with anhydrite; aphanitic  |
| 7,990 - 8,000   | Anhydrite, light grey, silty to sandy with scattered coarse quartz grains, mostly subrounded to rounded, frosted   |
| 8,000 - 8,020   | Dolomite, buff, aphanitic; scattered sand grains up to 0.5 mm; sandstone, white, quartzose, poorly sorted, fine- to coarse-grained; pale green, pyritic, waxy shale in bottom 10 feet. |
| 8,020 - 8,040   | Limestone, buff, aphanitic; dolomite, buff, very finely crystalline; anhydrite; samples poor   |
| 8,040 - 8,090   | Anhydrite, white, massive; upper part mottled with green shale; dolomite, pale buff, aphanitic   |
| 8,090 - 8,120   | Dolomite, grey to brown, aphanitic to very fine grained, anhydritic; a little brown aphanitic limestone; anhydrite as above  |
| 8,120 - 8,210   | Anhydrite, pale buff to light brown, massive; traces of buff aphanitic limestone and dolomite  |
| 8,210           | <u>Pre-Chinchaga Beds</u>  |
| 8,210 - 8,230   | Anhydrite, buff, mottled orange and red; dolomite, buff, argillaceous, anhydritic  |
| 8,230 - 8,270   | Shale, orange-red, anhydritic; anhydrite   |
| 8,270 - 8,290   | Shale, orange-red, silty to sandy; quartz grains, angular to subrounded; vugs lined with orange-stained quartz crystals  |
| 8,290 - 8,300   | Shale, as above, mottled with anhydrite  |
| 8,300 - 8,310   | Dolomite, dark grey, very finely crystalline, argillaceous; dark grey anhydrite  |
| 8,310 - 8,320   | Dolomite as above; red shale   |

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| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 8,320 - 8,350   | Shale as above; sandstone, red, fine- to coarse-grained, angular to subrounded, poorly sorted; large grains, frosted; traces of green shaly material between grains toward base |
| 8,350           | <u>Precambrian</u>  |
| 8,350 - 8,413   | Schist; pink feldspar-rich rock; possibly granodiorite  |

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Imperial Bistcho Lake 7-7-124-2

Location: 7-7-124-2 W6th                      Elevation: 2,382 feet K.B.

Completed 1952                                  Total depth: 6,121 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples stored at Geological Survey of Canada, Calgary, Alberta, and core stored at Imperial Oil Limited warehouse, Edmonton, Alberta.

| Depth<br>(feet)               | Lithology  |
|-------------------------------|--|
| <u>Fort Simpson Formation</u> |  |
| - 4,920                       | Shale, greenish grey, slightly calcareous  |
| 4,920                         | <u>Slave Point Formation</u>   |
| 4,920 - 4,960                 | Limestone, light brown, fine- to medium-grained, particulate; scattered small to large stromatoporoids and <u>Amphipora</u> ; oil stain; stylolites                              |
| 4,960 - 4,980                 | Limestone, brown, fine- to coarse-grained, particulate; pelletoid; tightly cemented by calcite; oil stain  |
| 4,980 - 5,010                 | Limestone, brown, fine- to medium-grained; <u>Amphipora</u> and other stromatoporoid fragments; pelletoid; pin-point and intergranular porosity; oolites at 4,990 and 5,000 feet |
| 5,010 - 5,025                 | Limestone, as above, oolitic and pelletoid; pin-point porosity; black shale laminae  |
| 5,025 - 5,046                 | Limestone, brown, medium- to coarse-grained matrix with pebbles of dense brown limestone; stromatoporoids, <u>Amphipora</u> ; wispy brown shale laminae; oil stain               |
| 5,046 - 5,050                 | No core or samples   |
| 5,050 - 5,070                 | Limestone, brown, aphanitic; lithographic  |
| 5,070 - 5,080                 | Limestone as above; anhydrite crystals   |
| 5,080 - 5,100                 | Limestone, light grey, aphanitic, with medium-grained pellets tightly cemented by calcite  |
| 5,100 - 5,109                 | Limestone, buff, very fine grained, slightly argillaceous, dolomitic, sugary texture, intercrystalline porosity, silty   |

| Depth<br>(feet)              | Lithology  |
|------------------------------|--|
| <u>Fort Vermilion Member</u> |  |
| 5,109 - 5,118                | Limestone, grey, very fine grained to finely crystalline; lumps and inclusions of grey and buff dense limestones, slightly argillaceous, silty; finely disseminated pyrite; numerous <u>Amphipora</u> ; wispy shale laminae in bands |
| 5,118 - 5,135                | Limestone, buff, fine- to coarse-grained, particulate; anhydrite crystals; some grey, massive anhydrite  |
| 5,135                        | <u>Watt Mountain Formation</u>   |
| 5,135 - 5,145                | Shale, light green, waxy; limestone, light grey, aphanitic, as pebbles and pellets in the shale; some white, tightly cemented, pelletoid limestone   |
| 5,145                        | <u>Sulphur Point Formation</u>   |
| 5,145 - 5,170                | Limestone, buff, aphanitic, fine- to medium-grained, pelletoid; slight intergranular porosity; small vugs; some green shale  |
| 5,170 - 5,178                | No core or samples   |
| 5,178 - 5,191                | Limestone, buff to brown, fine- to medium-grained, particulate; scattered crinoid fragments; brown oil stain   |
| 5,191 - 5,210                | Samples poor; limestone, light yellow-brown, fine- to medium-grained; pelletoid with good intergranular porosity   |
| 5,210 - 5,225                | Limestone, as above, in part oolitic, in part aphanitic and pelletoid; varies to dolomite, buff, finely crystalline, tightly cemented; vuggy porosity  |
| 5,225 - 5,230                | Dolomite, light yellow-brown, very fine grained, evaporitic; pin-point porosity and small vugs   |
| 5,230 - 5,250                | No samples   |
| 5,250 - 5,280                | Dolomite, light yellow-brown, fine- to medium-crystalline, in part mosaic texture, in part euhedral with intercrystalline porosity; suggestion of particulate structure; scattered anhydrite; vuggy porosity                         |

| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 5, 280          | <u>Muskeg Formation</u>   |
| 5, 280 - 5, 310 | Dolomite, buff, very finely crystalline, almost aphanitic; anhydritic; pin-point porosity   |
| 5, 310 - 5, 420 | Anhydrite, grey, massive; some dolomite, buff, aphanitic in part mottling the anhydrite   |
| 5, 420 - 5, 460 | Anhydrite, as above; somewhat more dolomite, brown, finely crystalline  |
| 5, 460 - 5, 490 | Anhydrite, as above; dolomite, brown, finely crystalline, anhydritic  |
| 5, 490 - 5, 560 | Dolomite, brown, finely crystalline to aphanitic; in part euhedral with pin-point porosity; scattered anhydrite crystals and some anhydrite, grey, massive        |
| 5, 560 - 5, 570 | Dolomite, buff, with anhydrite crystals; black shale laminae  |
| 5, 570 - 5, 595 | Dolomite, yellow-brown, aphanitic to finely crystalline; resinous lustre, in part anhydritic; tight   |
| 5, 595 - 5, 624 | Dolomite, brown, finely crystalline; vugs lined with dolomite crystals  |
| 5, 624 - 5, 634 | Dolomite, light brown, finely crystalline; scattered crinoids; good vuggy porosity  |
| 5, 634 - 5, 690 | Dolomite, dark brown, fine to medium crystalline; mosaic texture; anhydrite spots; vuggy porosity   |
| 5, 690          | <u>Keg River Formation</u>  |
| 5, 690 - 5, 700 | Dolomite, mottled light and dark brown, suggestive of organic fragments   |
| 5, 700 - 5, 712 | Limestone, dark brown, aphanitic; varies to dolomite, fine- to medium-crystalline; coral fragment   |
| 5, 712 - 5, 722 | Limestone and shale interbedded; limestone, dark brown, aphanitic, with scattered stromatoporoids; shale, dark grey; abundant crinoids and other fossil fragments |
| 5, 722 - 5, 750 | Limestone, dark brown, aphanitic, as above; crinoid fragments; traces of black shale  |

| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 5,750 - 5,800   | Limestone, as above; shale, black with dark brown streak; brachiopod and ostracod fragments   |
| 5,800 - 5,820   | Limestone, buff, very fine grained matrix; stromatoporoid or algal cell structure, infilled with calcite; tightly cemented            |
| 5,820 - 5,860   | Limestone, buff to brown, aphanitic, tightly cemented   |
| 5,860 - 5,870   | Limestone, brown, fine-grained; brachiopod fragments  |
| 5,870 - 5,885   | No samples  |
| 5,885           | <u>Chinchaga Formation</u>  |
| 5,885 - 5,897   | Dolomite, buff, aphanitic, in part pelletoid, tightly cemented; scattered anhydrite crystals  |
| 5,897 - 5,899   | Anhydrite, grey, massive; limestone, buff, dense, with abundant anhydrite crystals  |
| 5,899 - 5,950   | Anhydrite, as above; dolomite, buff, earthy, very fine grained  |
| 5,950 - 5,960   | Dolomite, buff, earthy, aphanitic, relict pelletoid or particulate structure  |
| 5,960 - 5,970   | No samples  |
| 5,970 - 5,990   | Anhydrite, grey, massive  |
| 5,990 - 6,020   | Anhydrite, grey, sandy; quartz grains, fine to coarse, up to 2 mm diameter, angular to subrounded, some frosted; green shale partings |
| 6,020 - 6,050   | Sandstone, white, quartzose; quartz; feldspar; mica; grains up to 2 mm diameter; poorly sorted; angular to subrounded                 |
| 6,050           | <u>Pre-Chinchaga Beds</u>   |
| 6,050 - 6,070   | Shale, green, with coarse sand grains; red shale; anhydrite, orange-red, dolomitic, sandy   |
| 6,070 - 6,080   | Dolomite, buff, very fine grained, earthy, in part granular, anhydritic   |

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 6,080 - 6,090   | Shale, orange-red, soft; gypsum and anhydrite;<br>feldspar and quartz grains present |
| 6,090 - 6,115   | Shale, red, silty to sandy; some red sandstone;<br>quartz grains in red matrix       |
| 6,115           | <u>Precambrian</u>   |
| 6,115 - 6,121   | Granite  |

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Cored intervals: 4,930-4,956; 5,024-5,046; 5,109-5,118; 5,178-5,191;  
5,624-5,634; 5,712-5,722; 5,897-5,899

Shell Kakisa River No. 1

Location: Lat. 60°06'22"N; Long. 117°54'49"W

Elevation: 2,560 feet K.B.

Completed: 1957

Total depth: 5,704 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples stored at Geological Survey of Canada, Calgary, Alberta.

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
|                 | <u>Fort Simpson Formation</u>  |
| - 4,765         | Shale, greenish grey, pyritic; limestone, grey, fine-grained, pyritic; brachiopod and ostracod remains in bottom 10 feet   |
| 4,765           | <u>Slave Point Formation</u>   |
| 4,765 - 4,805   | Limestone, light yellow-brown, fine-grained, particulate, tightly cemented; clay to silt grain sizes; scattered pyrite and brachiopod fragments; slight porosity toward base |
| 4,805 - 4,830   | Limestone, brown, aphanitic, tightly cemented; cell structure; brown shale laminae; some pelletoid beds tightly cemented by calcite  |
| 4,830 - 4,875   | Limestone, buff to light yellow-brown, fine- to medium-grained, slightly porous; abundant cell structure, stromatoporoids, corals; pelletoid toward base                     |
| 4,875 - 4,885   | Limestone, buff, aphanitic, clotted texture, cemented with calcite   |
| 4,885 - 4,905   | Limestone, buff, fine- to medium-grained (calcarenite); black shale laminae; pelletoid beds abundant; cell structure   |
| 4,905 - 4,940   | Samples poor; limestone, buff, aphanitic, tightly cemented with calcite; calcite veinlets; light green waxy shale  |
| 4,940           | Fort Vermilion Member  |
| 4,940 - 4,960   | Limestone, buff, fine- to medium-grained; pin-point porosity; some aphanitic limestone with anhydrite  |

| Depth<br>(feet) | Lithology   |
|-----------------|---|
|                 | crystals; some pelletoid limestone with sparry calcite cement; a few brachiopod fragments   |
| 4, 960          | <u>Watt Mountain Formation</u>  |
| 4, 960 - 4, 965 | Shale, green, highly pyritic; limestone, cream-coloured, aphanitic  |
| 4, 965          | <u>Sulphur Point Formation</u>  |
| 4, 965 - 5, 015 | Limestone, light grey, aphanitic, in part lithographic; fine- to coarse-grained; pelletoid from 4, 970 to 5, 005 feet; scattered calcispheres; partings of light green waxy shale; pyrite and green shale at base |
| 5, 015 - 5, 060 | Limestone, grey to light brown, aphanitic, in part pelletoid as above; dolomite, light brown, finely crystalline with vuggy porosity  |
| 5, 060          | <u>Muskeg Formation</u>   |
| 5, 060 - 5, 065 | Dolomite, brown, medium crystalline, anhydritic   |
| 5, 065 - 5, 105 | Anhydrite, grey, massive; dolomite, yellow-brown, fine- to medium-crystalline; trace of bright green, waxy, pyritic shale at 5, 090 feet  |
| 5, 105 - 5, 130 | Dolomite, light yellow-brown, fine- to medium-crystalline; anhydritic   |
| 5, 130 - 5, 185 | Anhydrite, grey, massive; a little mottling with dolomite, brown, finely crystalline at 5, 155 to 5, 170 feet   |
| 5, 185 - 5, 285 | Dolomite, buff, finely crystalline, tightly cemented, anhydritic; some anhydrite as above; traces of light green shale  |
| 5, 285 - 5, 330 | Anhydrite, grey, massive; some dolomite as above  |
| 5, 330 - 5, 355 | Dolomite, buff to light brown, aphanitic, anhydritic; some anhydrite, grey as above   |
| 5, 355 - 5, 460 | Dolomite, brown, finely crystalline, pin-point and vuggy porosity, some infilling of vugs with white anhydrite; coarse white dolomite in bottom 15 feet   |

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 5,460           | <u>Keg River Formation</u>   |
| 5,460 - 5,515   | Limestone, brown, aphanitic to fine-grained, tightly cemented, possibly recrystallized; in part slightly argillaceous; stromatoporoid and crinoid fragments; black shale laminae |
| 5,515 - 5,550   | Limestone, as above; brachiopod, crinoid, gastropod and ostracod fragments   |
| 5,550 - 5,585   | Dolomite, buff, fine- to medium-crystalline, pin-point porosity and vugs   |
| 5,585           | <u>Chinchaga Formation</u>   |
| 5,585 - 5,610   | Dolomite, buff, fine-grained, earthy, slightly argillaceous; anhydrite, white, massive   |
| 5,610 - 5,630   | Anhydrite; mottled with buff, aphanitic dolomite   |
| 5,630 - 5,650   | Anhydrite, grey, massive; shale, light green, waxy; some dolomite, brown, finely crystalline   |
| 5,650 - 5,665   | Anhydrite, as above; shale, light green, sandy varying to sandstone, white, quartzose, in part with green argillaceous material; scattered large frosted quartz grains           |
| 5,665 - 5,675   | Sandstone, fine- to coarse-grained, poorly sorted, subangular to subrounded, largely quartz  |
|                 | <u>Precambrian</u>   |
| 5,675 - 5,704   | Granite  |

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Shell Alexandra No. 2

Location: Lat. 60° 24' 30.56"N; Long. 117° 55' 33.47"W

Elevation: 952 feet K.B.

Completed: 1959

Total depth: 3,896 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples stored at Geological Survey of Canada, Calgary, Alberta.

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| Depth<br>(feet)               | Lithology   |
|-------------------------------|---|
| <u>Fort Simpson Formation</u> |   |
| - 3, 155                      | Shale, calcareous, grey to greenish grey; bottom 5 feet black shale with abundant organic debris, white specks; pyrite  |
| 3, 155                        | <u>Slave Point Formation</u>  |
| 3, 155 - 3, 165               | Limestone, buff, fine-grained; crinoids, brachiopods; chert   |
| 3, 165 - 3, 295               | Samples poor to 3, 295 feet; mostly limestone, buff, aphanitic to fine-grained, particulate; calcite cement; black shale laminae; ostracod fragments                                      |
| 3, 295 - 3, 315               | Limestone, light grey, aphanitic, in part almost lithographic; bottom 5 feet in part pelletoid with calcite cement  |
| 3, 315 - 3, 320               | Limestone as above; some green, waxy shale  |
| 3, 320 - 3, 325               | Limestone, buff, fine- to coarse-grained matrix; cell structures suggestive of <u>Amphipora</u> , tightly cemented with calcite; in part, lime pellets give a rubbly texture to limestone |
| 3, 325                        | Fort Vermilion Member   |
| 3, 325 - 3, 345               | Limestone, grey to buff, aphanitic; scattered and clear anhydrite crystals and fragments of white anhydrite   |
| 3, 345                        | <u>Watt Mountain Formation</u>  |
| 3, 345 - 3, 355               | Shale, green, waxy, mixed with light grey limestone   |

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| Depth<br>(feet)                | Lithology  |
|--------------------------------|--|
| <u>Sulphur Point Formation</u> |  |
| 3,355 - 3,400                  | Limestone, light grey, almost white, varies to buff, aphanitic, in part slightly argillaceous; a little green waxy shale at 3,385 feet   |
| 3,400 - 3,415                  | Limestone, light grey, pelletoid, tightly cemented with calcite; a little light green shale  |
| 3,415 - 3,430                  | Limestone as above, grading to dolomite, buff, finely crystalline, euhedral to mosaic texture with some intercrystalline porosity; light green waxy shale at base  |
| 3,430                          | <u>Pine Point Formation</u>  |
| 3,430 - 3,510                  | Dolomite, buff to brown, finely crystalline; intercrystalline and vuggy porosity; angular pores, possibly due to leaching of anhydrite at 3,470 to 3,480 feet; some evaporitic type of dolomite, very fine grained, earthy |
| 3,510 - 3,530                  | Dolomite, brown, finely crystalline, mosaic texture, vuggy; black shale laminae  |
| 3,530 - 3,535                  | Dolomite, buff, anhydritic, very fine grained; some brown shale and pyrite   |
| 3,535 - 3,590                  | Dolomite, brown, finely crystalline, slightly anhydritic at top; pin-point and vuggy porosity  |
| 3,590 - 3,605                  | Dolomite, buff, mottled; vague suggestion of organic structure   |
| 3,605 - 3,670                  | Dolomite, buff to brown, fine- to medium-crystalline; in places mottled, suggestive of organic structures; black shale laminae at base   |
| 3,670 - 3,690                  | Limestone, dark brown, aphanitic to very fine grained; crinoid fragments   |
| 3,690 - 3,710                  | Limestone, buff, fine-grained; crinoid fragments   |
| 3,710 - 3,740                  | Limestone, dark brown, slightly argillaceous; shale partings; crinoids; spines   |
| 3,740 - 3,770                  | Limestone, as above; varies to dolomitic limestone and dolomite, buff, finely crystalline  |

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| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 3,770 - 3,780   | Dolomite, buff, fine-grained; slightly argillaceous or anhydritic   |
| 3,780           | <u>Chinchaga Formation</u>  |
| 3,780 - 3,810   | Dolomite, buff, fine-grained, anhydritic; a little anhydrite and anhydrite crystals; a little pale green shale at base  |
| 3,810 - 3,840   | Dolomite, as above; fragments of anhydrite and light green shale; trace of siltstone at 3,820 feet; samples poor  |
|                 | Sandstone Member  |
| 3,840 - 3,855   | Siltstone and sandstone; sandstone, quartzose, calcareous; light grey, consisting largely of quartz, grey and pink grains; a little red shale in bottom 10 feet; some dolomite, buff, fine-grained, sandy, containing angular quartz grains; siltstone, grey, quartzose |
| 3,855           | <u>Precambrian</u>  |
| 3,855 - 3,896   | Granite   |

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Briggs Rabbit Lake No. 1

Location: Lat. 60°55'50.82"N; Long. 118°47'28.72"W

Elevation: 1,068 feet K.B.

Completed: 1955

Total depth: 2,836 feet

Result: Suspended gas well

Summary of log by H.R. Belyea from samples and core stored at Geological Survey of Canada, Calgary, Alberta.

| Depth<br>(feet)               | Lithology  |
|-------------------------------|--|
| <u>Fort Simpson Formation</u> |  |
| - 2,382                       | Shale, dark grey with scattered carbonaceous specks  |
| 2,382                         | <u>Slave Point Formation</u>   |
| 2,382 - 2,393                 | Limestone, brown, very-fine- to fine-grained; abundant stromatoporoids and <u>Amphipora</u> ; some encrusted with stromatoporoidal or algal material; sharp change to...   |
| 2,393 - 2,401                 | Limestone, buff to light brown, very fine grained, in part with semi-conchoidal fracture; brown shale laminae; scattered <u>Amphipora</u> and ostracods; sharp change to...  |
| 2,401 - 2,406                 | Limestone, buff, fine- to coarse-grained; scattered grains of aphanitic limestone; sparry calcite cement; stromatoporoid and <u>Amphipora</u> fragments abundant in upper 1 foot   |
| 2,406 - 2,411                 | Limestone consisting mostly of stromatoporoids and <u>Amphipora</u> in a fine- to medium-grained matrix; sharp change to...  |
| 2,411 - 2,415                 | Limestone, brown, fine- to coarse-grained; poorly sorted calcarenites; sparry calcite cement; abundant <u>Amphipora</u> and a few stromatoporoids in bottom 2 feet   |
| 2,415 - 2,438                 | Limestone, cream to buff, very fine grained; part with semi-conchoidal fracture; abundant <u>Amphipora</u> in bands, mostly lying flat; 1 foot of medium-grained pelletoid calcarenite with sparry calcite cement from 2,424 1/2 to 2,425 1/2 feet; sharp change at base to... |
| 2,438 - 2,441                 | <u>Amphipora</u> limestone, dark brown, fine- to medium-grained matrix; <u>Amphipora</u> in bands; 1/4 inch of black shale at base   |

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 2,441 - 2,451   | Limestone, light yellow-brown, very fine grained, in part with semi-conchoidal fracture; a few stromatoporoid fragments and scattered <u>Amphipora</u>   |
| 2,452 - 2,454   | Limestone, buff, fine- to coarse-grained; some pelletoid bands with black material between the grains; sparry calcite cement   |
| 2,454 - 2,462   | Limestone with abundant stromatoporoids in a fine-grained limy mudstone to limy siltstone matrix; abundant stromatoporoids in upper 1 foot; abundant <u>Amphipora</u> and a few stromatoporoids below 2,455 feet |
| 2,462 - 2,467   | Not cored  |
| 2,467 - 2,473   | Limestone, cream-coloured; abundant <u>Amphipora</u> in bands; pores filled with black petroleum residue; bottom 1 foot with shale laminae   |
| 2,473 - 2,483   | Limestone, composed largely of stromatoporoids; scattered corals, some surrounded by encrusting algae or stromatoporoids; matrix is fine-grained limestone   |
| 2,483 - 2,492   | Limestone, brown, fine-grained, becoming darker downwards; abundant <u>Amphipora</u> and scattered stromatoporoids in upper 5 feet; black shale break at base  |
| 2,492 - 2,494   | Stromatoporoid limestone including scattered <u>Amphipora</u> ; medium-grained matrix  |
| 2,494 - 2,501   | Limestone, brown, fine- to medium-grained, some layers coarse-grained with pebbles of very fine grained limestone; in part pelletoid   |
| 2,501 - 2,507   | Limestone, brown, fine- to medium-grained; scattered <u>Amphipora</u> and corals; 6-inch band of <u>Amphipora</u> limestone at top   |
| 2,507 - 2,511   | Not cored  |
| 2,511 - 2,523   | Limestone, brown, fine-grained, in part aphanitic, in part pelletoid; good intergranular porosity  |
| 2,523 - 2,530   | Limestone, brown, fine- to medium-grained with wavy black shale laminae; scattered <u>Amphipora</u>  |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 2,530 - 2,532.5 | Stromatoporoid- <u>Amphipora</u> , limestone   |
| 2,532.5 - 2,533 | Breccia; brown limestone with <u>Amphipora</u> ; fragments of grey-brown limestone similar to that below   |
| 2,533 - 2,536   | Limestone, grey- and brown-banded, aphanitic to fine-grained; ostracods and thin-shelled brachiopods; sharp change to...   |
| 2,536 - 2,540   | Limestone, grey, aphanitic, pyritic, laminated appearance caused by fine shaly partings; bottom 2 feet mottled with greenish grey shale  |
| 2,540 - 2,550   | Limestone, brown, fine-grained, mottled with brown shale, thinner-bedded towards base  |
| 2,550 - 2,555   | Limestone, brown, fine-grained, aphanitic; scattered large fragments of very fine grained limestone; sharp break   |
| 2,555           | <u>Watt Mountain Formation</u>   |
| 2,555 - 2,563   | Breccia; limestone, grey, coarse-grained, crinoidal; boulders up to 6 inches in diameter of buff, fine-grained limestone with scattered crinoids; matrix is green, non-calcareous, pyritic shale |
| 2,563 - 2,568   | Not cored  |
| 2,568 - 2,574   | Shale, green, to grey-green, pyritic, finely laminated, crossbedded; much pyrite; scattered crinoid and brachiopod fragments; bands and pebbles of buff, crinoidal limestone                     |
| 2,574           | <u>Sulphur Point Formation</u>   |
| 2,574 - 2,591   | Limestone, light grey, aphanitic, friable; large fossil fragments  |
| 2,591           | <u>Pine Point Formation</u>  |
| 2,591 - 2,592   | Shale, black with brown streak; interbedded limestone, brown, fine-grained, oil-stained  |
| 2,592 - 2,600   | Not cored  |
| 2,600 - 2,604   | Limestone, brown, fine- to coarse-grained; abundant crinoids and brachiopods; interbanded dark brown shales with crinoids  |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 2,604 - 2,606   | Not cored  |
| 2,606 - 2,628   | Limestone and shale interbedded; limestone, brown, fine-grained, argillaceous; interbedded shale is black with dark brown streak; abundant crinoids, brachiopods and corals, a few stromatoporoids and trilobites; sharp change to...                |
| 2,628 - 2,634   | Shale, dark brown; interbedded dark brown, argillaceous limestone; crinoids, corals, small stromatoporoids or algal balls  |
| 2,634 - 2,637   | Limestone, argillaceous, brown, fine-grained, slightly porous; stromatoporoids, corals, brachiopods and crinoids   |
| 2,637 - 2,646   | Shale and limestone interbedded; shale, dark brown with brown streak as above; limestone, brown, fine- to coarse-grained, composed largely of fragmented brachiopods and crinoids; some corals   |
| 2,646 - 2,690   | Limestone, light yellow-brown to brown, fine-grained; scattered crinoid and brachiopod fragments; black shale laminae.   |
| 2,690 - 2,700   | Limestone, as above; some bright green waxy shale  |
| 2,700 - 2,720   | Limestone, light grey, aphanitic; small crystalline calcite structures of unknown origin; scattered pyrite; crinoid fragments; slightly silty with some green shale in bottom 5 feet   |
| 2,720 - 2,750   | Limestone as above; dolomite, brown, very finely crystalline, euhedral, intercrystalline porosity; in part slightly argillaceous   |
| 2,750 - 2,762   | Limestone, light grey, aphanitic, with clotted texture   |
| 2,762           | <u>Chinchaga Formation</u>   |
| 2,762 - 2,788   | Dolomite, buff, very fine grained, earthy, slightly argillaceous, fair to good porosity; salt efflorescence; brown shale laminae, green shale breaks about 1 inch thick at 2,775, 2,781, 2,783, and 2,784 feet; white anhydrite partly filling pores |
| 2,788 - 2,794   | Dolomite, as above, but with less porosity and less salt efflorescence; scattered pyrite; green sandy shale layers at 2,788.5 and 2,794 feet; sharp break  |

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| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 2,794 - 2,803   | Dolomite and shale interbedded, sandy; dolomite as above; shale, green, pyritic, sandy; scattered small to large grains and pebbles at about 2,796 feet |
| 2,803 - 2,807   | Sandstone, green, coarse-grained, composed of poorly sorted fine to coarse quartz grains; green argillaceous material between grains                    |
| 2,807 - 2,825   | Sandstone, coarse-grained, quartz, feldspar, angular to subrounded; matrix of bright green shale; pyrite  |
| 2,825 - 2,828   | Granite 'wash'—coarse quartz and granite fragments; green shale matrix  |
| 2,828           | <u>Precambrian</u>  |
| 2,828 - 2,836   | Granite   |

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Cored intervals: 2,382-2,462; 2,467-2,507; 2,511-2,563; 2,568-2,592;  
2,600-2,646; 2,768-2,807

Briggs Northeast Rabbit Lake No. 1

Location: Lat. 61° 00' 34.11"N; Long. 118° 35' 9.06"W

Elevation: 933 feet K.B.

Completed: 1959

Total depth: 2,803 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples and core stored at Geological Survey of Canada, Calgary, Alberta.

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| Depth<br>(feet) | Lithology   |
|-----------------|---|
| - 2,240         | <u>Fort Simpson Formation</u>   |
| 2,240 - 2,285   | Shale, black with brown streak, in part calcareous; interbedded shale, grey-green, to dark grey; carbonaceous specks, micaceous                                 |
| 2,285 - 2,340   | Shale, grey to greenish grey; some black fragments, may be cavings  |
| 2,340           | <u>Horn River Formation</u>   |
| 2,340 - 2,375   | Shale, black with light brown streak; in part micaceous, conodonts or scolecodonts in bottom 10 feet; scattered pyrite  |
| 2,375 - 2,410   | Shale, black; limestone, brown, fine-grained, argillaceous, some coarse-grained limestone composed of shell fragments   |
| 2,410 - 2,430   | Limestone and black shale as above; limestone, partly fine-grained, partly coarse-grained, poorly sorted; abundant fossil fragments, particularly crinoids      |
| 2,430 - 2,480   | Limestone, brown, fine- to coarse-grained, poorly sorted, fragments of crinoids and brachiopods; black shale laminae  |
| 2,480 - 2,530   | Limestone, brown, fine-grained, argillaceous; shale, black, calcareous, drills to chunky fragments; spines; brachiopods; <u>Tentaculites</u> ; scattered pyrite |
| 2,530 - 2,570   | Limestone, brown, fine-grained, in part with abundant pyrite, partly argillaceous; black shale laminae; scattered brachiopods                                   |
| 2,570 - 2,595   | Shale, dark brown to black, with brown streak; limestone as above   |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 2, 595          | <u>Lonely Bay Formation</u>  |
| 2, 595 - 2, 607 | Limestone, brown, fine-grained matrix; abundant stromatoporoid and coral fragments; a few crinoid remains toward base; sharp contact   |
| 2, 607 - 2, 608 | Shale, black, bituminous, strong sulphur odour; contains nodules of dark brown, fine-grained limestone; brachiopods, spines  |
| 2, 608 - 2, 612 | Limestone, composed largely of stromatoporoids; a few corals; fine- to medium-grained matrix; sharp contact  |
| 2, 612 - 2, 619 | Shale and limestone, thinly interbedded; limestone, dark brown, fine-grained with abundant <u>Lingula</u> , crinoids, spines, <u>Styliolina</u> (?); shale, black  |
| 2, 619 - 2, 634 | Limestone, alternating beds 4 to 5 feet thick of brown, fine- to medium-grained limestone with abundant stromatoporoids and coral fragments, and beds containing scattered brachiopod and crinoid fragments                        |
| 2, 634 - 2, 640 | Limestone, as above  |
| 2, 640 - 2, 690 | Limestone, brown, fine-grained, argillaceous; dark brown shale laminae; a few stromatoporoid fragments at 2, 670-2, 680 feet   |
| 2, 690 - 2, 710 | Shale, dark brown to black; limestone, dark brown, fine-grained, argillaceous; brachiopods, crinoids, <u>Lingula</u>   |
| 2, 710 - 2, 735 | Limestone, buff, fine- to medium-grained, with fine porosity; scattered crinoids and brachiopods; pelletoid at 2, 725 to 2, 735 feet   |
| 2, 735 - 2, 740 | Limestone, buff, fine-grained, slightly dolomitic and anhydritic   |
| 2, 740          | <u>Chinchaga Formation</u>   |
| 2, 740 - 2, 745 | Limestone, light yellow-brown, fine- to medium-grained, earthy; angular pores; scattered sand grains; slight oil-stain   |
| 2, 745 - 2, 752 | Dolomite, buff, very fine grained, earthy, gypsiferous; some infilling of pores by gypsum and anhydrite; black carbonaceous fragments; pyrite; between 2, 750 to 2, 752 feet, dolomite is laminated and beds slumped and fractured |

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 2,752 - 2,763   | Dolomite, brown, finely crystalline, earthy, gypsiferous, interbedded with black shale laminae; breccias at 2,754 to 2,763 feet; scattered large angular quartz grains at 2,752 to 2,752.3 feet; some pelletoid zones replaced by dolomite |
| 2,763 - 2,770   | Dolomite and sandstone; dolomite as above, in part sandy; lenses and layers of sandstone, quartzose, angular to subangular, poorly sorted, medium- to coarse-grained; salt efflorescence; fine porosity                                    |
| 2,770 - 2,780   | Dolomite, cream-coloured, limy, argillaceous, very fine grained, sandy   |
| 2,780 - 2,800   | Sandstone, grey, coarse-grained, angular grains and granules; green waxy shale; abundant pyrite; light green mineral   |
| 2,800           | <u>Precambrian</u>   |
| 2,800 - 2,803   | Dark green basement rock   |

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Cored intervals: 2,605-2,634; 2,748-2,765

Imperial Triad Davidson Creek P-2

Location: Lat. 62°11'45"N; Long. 118°15'05"W

Elevation: 2,085 feet K.B.

Completed: 1960

Total depth: 2,737 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples stored at Geological Survey of Canada, Calgary, Alberta, and core stored at Imperial Oil Limited warehouse, Dawson Creek, British Columbia.

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| Depth<br>(feet)               | Lithology  |
|-------------------------------|--|
| <u>Fort Simpson Formation</u> |  |
| - 1,480                       | Shale, greenish grey, pyritic; abundant pyrite nodules, in part cemented with calcite  |
| 1,480                         | <u>Horn River Formation</u>  |
| 1,480 - 1,620                 | Shale, black, with brown streak, probably some greenish grey shale interbedded   |
| 1,620 - 1,710                 | Shale, black with dark brown streak; abundant pyrite, disseminated and in nodules  |
| 1,710                         | <u>Lonely Bay Formation</u>  |
| 1,710 - 1,754                 | Limestone, buff, fine-grained, rhythmically interbedded with grey, fine-grained limestone containing abundant crinoid fragments; irregular partings of dark brown shale with scattered silt-size quartz grains; in places limestone consists of nodules of very fine grained limestone in matrix of coarse crinoidal limestone; brachiopods rare; pyrite |
| 1,754 - 1,758                 | Limestone, buff, very fine grained; scattered rhombs, probably anhydrite; rare fossils and pyrite nodules; sharp change to...  |
| 1,758 - 1,763                 | Limestone, brown, fine-grained, slightly argillaceous; scattered brown shale partings  |
| 1,763 - 1,778                 | Limestone, light yellow-brown, fine-grained, slightly porous, bioclastic matrix with scattered stromatopoids in part replaced by white chert   |

| Depth<br>(feet)   | Lithology   |
|-------------------|---|
| 1,778 - 1,791     | Limestone, brown, very fine grained, crypto-crystalline, tightly cemented with sparry calcite, laminated with dark brown to black shale below 1,786 feet; scattered ostracods   |
| 1,791 - 1,804     | Limestone, light yellow-brown, pelletoid; interbedded with buff aphanitic limestone; pellets consist of very fine grained limestone, tightly cemented with calcite, some layers even-sized, others fine- to coarse-grained, poorly sorted   |
| 1,804 - 1,806     | Limestone, buff, consisting of fragments of buff and brown limestone and lenses of buff limestone in brown, argillaceous limestone matrix   |
| 1,806 - 1,809.5   | Limestone, brown, fine- to coarse-grained, slightly dolomitic, coarsely pelletoid grains, in part conglomeratic; grains consist of very fine grained limestone, rounded to irregular, tightly cemented with calcite, black "petroleum residue" between grains; oil stain and odour  |
| 1,809.5 - 1,810.5 | Dolomite, buff, finely crystalline, euhedral; with intercrystalline porosity; wavy shale banding  |
| 1,810.5 - 1,828.5 | Limestone, interbedded brown pelletoid and aphanitic limestone; pelletoid beds are fine to medium grained, consisting of very fine grained limestone grains; upper 1 foot has thin irregular bedding suggestive of ripple-marks; calcite cement; aphanitic limestone beds contain calcite eyes and fine veinlets  |
| 1,828.5 - 1,832.5 | Dolomite, buff, mottled light brown, argillaceous, fine-grained, laminated; some mottling may be intraclasts; fractures, suggestive of mud-cracks; calcite infill; brown shale laminae  |
| 1,832.5 - 1,848   | Limestone and dolomite mottled and interbedded; limestone, brown, aphanitic, stylolitic, with thin wavy black shale layers up to 1/4 inch thick; scattered brachiopods and ostracods near top; 1/2 inch of white chert at 1,837.5 feet; dolomite, buff, argillaceous, very fine grained, with fine euhedral crystals giving sugary texture; thinly laminated with shale; in part has salty efflorescence; scattered anhydrite crystals between 1,845 and 1,847 feet; irregular contact at base of this unit |
| 1,848 - 1,851     | Dolomite, brown, fine-grained, argillaceous, porous; oil stain and odour  |

| Depth<br>(feet)   | Lithology   |
|-------------------|---|
| 1,851 - 1,855     | Limestone, and dolomite interbedded, same as from 1,832.5 to 1,848 feet   |
| 1,855 - 1,858     | Dolomite, buff, very finely crystalline with sugary texture, porous, layered; some beds contain large grains (intraclasts) of very fine grained buff dolomite; black shale at base; sharp contact   |
| 1,858 - 1,861     | Dolomite, grey-buff, finely crystalline with sugary texture; less porous than above; dark grey pyrite patches and streaks, grades to more porous dolomite at base; sharp contact  |
| 1,861 - 1,876.5   | Limestone and dolomite in rhythmic repetition; limestone dark grey to brown, dolomitic; mottled and layered with black shale; grades down to buff, porous dolomite; poorly preserved brachiopods at 1,861 to 1,865 feet; intraclasts of brown fine-grained dolomite at 1,869 to 1,870 feet; scattered anhydrite rhombs and patches at 1,870 to 1,873 feet |
| 1,876.5 - 1,876.7 | Shale, black, encloses buff sugary dolomite nodules; much pyrite  |
| 1,876.7           | <u>Chinchaga Formation</u>  |
| 1,876.7 - 1,913   | Dolomite, buff, very finely crystalline, sugary texture, slightly argillaceous, similar to that at 1,861 - 1,876.5 feet, laminated with black shale; some beds show brecciation, offsetting of laminae and slump structures; scattered patches and lenses of anhydrite; scattered relict pelletoid layers   |
| 1,913 - 1,940     | Samples very poor; probably dolomite and anhydrite as in core above and below   |
| 1,940 - 1,969     | Dolomite and anhydrite, interbedded and mottled; beds 1 foot to 3 feet thick; dolomite is buff with very fine grained, sugary texture, porous; some beds contain scattered large pellets or pebbles of very fine grained dolomite; black shale laminae; anhydrite, massive bedded; in part clear crystalline anhydrite replaces dolomite                  |
| 1,969 - 1,970     | Shale, light green, waxy, non-calcareous, in part mottled with dolomite; scattered pyrite   |

| Depth<br>(feet)     | Lithology   |
|---------------------|---|
| 1, 970 - 1, 990     | Dolomite and anhydrite, banded and mottled; dolomite, buff, very fine grained to aphanitic and in part slightly argillaceous; anhydrite, brown, massive; sharp irregular contacts common between anhydrite and dolomite |
| 1, 990 - 2, 010     | Samples poor; mostly anhydrite and dolomite, as above   |
| 2, 010 - 2, 012.5   | Anhydrite as above; sharp contact   |
| 2, 012.5 - 2, 025   | Claystone, grey, slightly greenish to slightly brownish; dolomitic, massive; scattered patches of clear anhydrite   |
| 2, 025 - 2, 027     | Anhydrite and shale, interlayered; slump structures and minute folding; sharp contact   |
| 2, 027 - 2, 048     | Anhydrite, massive; scattered buff argillaceous layers and shale bands  |
| 2, 048 - 2, 126     | Samples poor; dolomite, brown, finely crystalline, anhydritic; anhydrite, light grey, massive   |
| 2, 126 - 2, 129     | Dolomite, light yellow-brown, argillaceous, anhydritic, very fine grained   |
| 2, 129 - 2, 130     | Dolomite, as above, mottled red   |
| 2, 130 - 2, 137.5   | Dolomite, argillaceous, as above, mottled with anhydrite; strongly contorted in bottom 2 feet   |
| 2, 137.5            | <u>Mirage Point(?) Formation</u>  |
| 2, 137.5 - 2, 138.5 | Shale, red to brownish red, dolomitic; gypsum crystals and veinlets   |
| 2, 138.5 - 2, 146   | Dolomite, argillaceous, grades to dolomitic mudstone, mottled with anhydrite; scattered gypsum crystals; considerable brecciation in bands  |
| 2, 146 - 2, 156     | Shale, light orange-red, dolomitic; bottom 5 feet consists of lumps of mudstone in shale matrix suggesting brecciation of shale and re-cementation; much gypsum; salt efflorescence                                     |
| 2, 156 - 2, 173     | Salt  |
| 2, 173 - 2, 174     | Anhydrite, brown, massive   |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 2,174 - 2,175   | Shale, orange-red with orange salt   |
| 2,175 - 2,176   | Anhydrite  |
| 2,176 - 2,410   | Poor samples; salt   |
| 2,410 - 2,502   | Samples poor; may consist of interbedded salt and red shale and dolomite; dolomite is light yellow-brown, finely crystalline to euhedral with good intercrystalline porosity, in part replaced by anhydrite; orange-red shale with salt casts; anhydrite |
| 2,502 - 2,550   | Anhydrite, grey, finely crystalline; salty dolomite with salt efflorescence; bed of salt at 2,525 feet 4 inches to 2,529 feet  |
| 2,550 - 2,580   | Samples poor; probably salt and anhydrite, as above  |
| 2,580 - 2,590   | Shale, orange-red, dolomitic, sandy, containing coarse quartz grains   |
| 2,590 - 2,610   | Shale, maroon and green, slightly calcareous; dolomite, maroon, euhedral, non-porous   |
| 2,610 - 2,620   | Shale, orange-red, mottled with gypsum; anhydrite, grey; contains salt casts and orange carbonate crystals   |
| 2,620 - 2,630   | Anhydrite, grey; salt  |
| 2,630 - 2,650   | Salt and anhydrite; bright green waxy shale  |
| 2,650 - 2,660   | Shale, green, waxy; salt; anhydrite  |
| 2,660 - 2,690   | Shale, as above; dolomite, buff, very finely crystalline, sugary texture, porous; possibly salt and anhydrite; dolomite, light brown, finely crystalline   |
| 2,690 - 2,705   | Sandstone, white, quartzose, fine- to coarse-grained, poorly sorted, angular to subrounded, in part frosted quartz grains; grades downward to sandstone, coarse, almost conglomeratic, grains mainly feldspar and quartz                                 |
| 2,705           | <u>Precambrian</u>   |
| 2,705 - 2,731   | Granite  |

Cored intervals: 1,724-1,913; 1,940-1,990; 2,010-2,048;  
2,126-2,176; 2,502-2,550; 2,705-2,731

Briggs Foetus Lake No. 1

Location: Lat. 60°55'12.84"N; Long. 118°31'48.84"W

Elevation: 1,086 feet K.B.

Completed: 1956

Total depth: 2,744 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples and core stored at Geological Survey of Canada, Calgary, Alberta.

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| Depth<br>(feet)   | Lithology  |
|---|--|
| <u>Fort Simpson Formation</u><br>(Basal Black Shale Member) |  |
| - 2,252   | Shale, black with dark brown streak; abundant pyrite   |
| <u>Slave Point Formation</u>                                |  |
| 2,252 - 2,260   | Limestone, shale, interbedded; limestone, light brown, fine-grained; scattered stromatoporoids and <u>Amphipora</u> . Limestone occurs as irregular inclusions in black shale          |
| 2,260 - 2,261   | Limestone, brown, fine- to medium-grained, pelletoid in part; stromatoporoid fragments   |
| 2,261 - 2,263   | Limestone, composed largely of stromatoporoids and/or <u>Amphipora</u> ; bands of fine- to medium-grained limestone; ostracods   |
| 2,263 - 2,281   | Limestone, brown, fine- to medium-grained; small rod-like stromatoporoids; <u>Amphipora</u> ; ostracods; 1 foot of buff aphanitic limestone with calcite 'eyes' at 2,270 to 2,271 feet |
| 2,281 - 2,284   | Limestone, light grey, aphanitic, calcite 'eyes'   |
| 2,284 - 2,299   | Limestone, brown; matrix is fine- to medium-grained, shredded organic fragments; stromatoporoids   |
| 2,299 - 2,301   | Limestone, light grey, aphanitic, veined with calcite  |
| 2,301 - 2,305   | Limestone, grey to brown, fine-grained; scattered stromatoporoid fragments; black shale laminae towards base   |

| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 2,305 - 2,318   | Limestone, grey, aphanitic, tight; conchoidal fracture; calcite 'eyes', interbedded <u>Amphipora</u> -stromatoporoid limestone laminated with black shale in layers up to 6 inches thick at 2,306, 2,309, 2,313, and 2,314 feet; scattered small stromatoporoids; black shale laminae |
| 2,318 - 2,321   | Limestone, brown, fine- to coarse-grained; scattered pebbles of aphanitic limestone; interbeds of fine-grained, brown limestone; stromatoporoid fragments; slight porosity, sharp change to...  |
| 2,321 - 2,323   | Limestone, light grey, fine- to medium-grained, tightly cemented with calcite; black 'petroleum residue' in pores at top; bands of shale intermixed with limestone; sharp break   |
| 2,323 - 2,331   | Limestone, brown, fine- to medium-grained; abundant rod-like stromatoporoids or <u>Amphipora</u> ; thin-shelled brachiopods and ostracods   |
| 2,331 - 2,332   | Limestone, light grey, aphanitic; ostracods; limestone-pebble zone at base, contains limestone from below   |
| 2,332 - 2,339   | Limestone, brown, aphanitic to fine-grained; interbedded with <u>Amphipora</u> limestone; beds 1 inch to 18 inches thick  |
| 2,339 - 2,358   | Limestone, light grey, buff, brown interbedded, aphanitic, lithographic, calcite 'eyes'; black shale laminae; 6-inch band of calcirudite at 2,346 feet; stromatoporoids at 2,344 feet; <u>Amphipora</u> and other stromatoporoids at 2,356 and 2,357 feet                             |
| 2,358 - 2,361   | Limestone, matrix: buff, fine-grained; abundant corals, a few stromatoporoids   |
| 2,361 - 2,363   | Limestone, light grey, aphanitic, same as above 2,358 feet; sharp break   |
| 2,363 - 2,372.5 | Limestone with corals in a fine-grained matrix, same as at 2,358 to 2,361 feet; sharp break with brown shale laminae and <u>Amphipora</u> at base   |
| 2,372.5 - 2,375 | Limestone, light grey, aphanitic, same as at 2,361 to 2,363 feet  |
| 2,375 - 2,377   | Coral limestone, same as above  |

| Depth<br>(feet)   | Lithology   |
|-------------------|---|
| 2,377 - 2,435     | Limestone, grey to buff, aphanitic; some beds of interbedded limestone with wispy shale laminae; calcite crystals and aggregates; stylolites; a few stromatoporoids at 2,406, 2,408, and 2,415 to 2,421 feet; <u>Amphipora</u> near base; ostracods at 2,424 feet; 6 inches of brown limestone with shale laminae, corals, and stromatoporoids at top; sharp change at base to... |
| 2,435 - 2,442     | Limestone, fine- to medium-grained matrix composed of shredded organic debris; stromatoporoids and <u>Amphipora</u> abundant to 2,439 feet; bottom 3 inches with wispy brown shale; sharp break at base   |
| 2,442 - 2,458     | Limestone, light grey, aphanitic; lithographic, calcite 'eyes' and veinlets; stylolites; a little grey shale between 2,451.5 and 2,452 feet   |
| 2,458 - 2,470.5   | Limestone, same as above, in beds from 1 foot to 3 feet thick; interbedded grey and buff fine-grained limestone, irregularly laminated with green and brown shale; green shale laminae in bottom 3 feet   |
| 2,470.5           | <u>Watt Mountain Formation</u>  |
| 2,470.5 - 2,471.5 | Limestone and shale; limestone, grey, aphanitic as lenses or large pebbles in dark green shale  |
| 2,471.5 - 2,473   | Breccia: limestone and green shale; has leached, rubbly appearance; limestone pebbles, rounded and angular; bright green shale, waxy; pyrite  |
| 2,473 - 2,476     | Breccia: large fragments and lenses of grey to buff, fine-grained limestone; matrix fine-grained breccia of limestone and green shale; pyrite   |
| 2,476             | <u>Sulphur Point Formation</u>  |
| 2,476 - 2,478     | Limestone, light brown, fine- to medium-grained; small fossil fragments; crinoids; <u>Amphipora</u> ; abrupt change to...   |
| 2,478 - 2,483     | Limestone and shale interbedded; limestone, brown, very fine grained, argillaceous; shale, dark brown, bituminous, foetid odour; brachiopods, crinoids, spines, <u>Tentaculites</u> , and a few corals  |

| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 2,483 - 2,488   | Limestone and shale interbedded; limestone, brown, fine- to medium-grained; abundant corals and brachiopods; <u>Amphipora</u> in bands; dark brown shale partings           |
| 2,488 - 2,494   | Limestone, brown, fine- to medium-grained; fragments of crinoids and brachiopods; sharp break   |
| 2,494           | <u>Pine Point Formation</u>   |
| 2,494 - 2,498   | Shale, black with dark brown streak; lenses and nodules of limestone, brown, medium-grained; ostracods, crinoids, brachiopods; foetid odour; pyrite                         |
| 2,498 - 2,499.5 | Limestone, brown, fine- to medium-grained; abundant corals  |
| 2,499.5 - 2,501 | Limestone, brown, fine-grained, pelletoid; sparry calcite cement; irregular break with black shale at base  |
| 2,501 - 2,515   | Limestone, buff, fine- to medium-grained (calcarenite); chalky texture; scattered granules, mostly organic up to 0.25 inch in diameter                                      |
| 2,515 - 2,518   | Limestone, buff; matrix fine-grained; corals, stromatoporoids, and brachiopod fragments; limestone pebbles and granules form pebble bed 3 inches thick at base; sharp break |
| 2,518 - 2,519   | Limestone, brown, fine- to coarse-grained, pebbly; pebbles of brown, aphanitic limestone  |
| 2,519 - 2,524   | Limestone and shale interbedded; limestone, brown, fine- to coarse-grained; shredded organic material; crinoids and brachiopods; black shale, intermixed and as partings    |
| 2,524 - 2,542   | Limestone, brown, fine-grained; scattered crinoids; shale, black with dark brown streak; scattered crinoids; brachiopods, forming a coquina at 2,530.5 to 2,531.5 feet      |
| 2,542 - 2,549   | Limestone, buff, fine- to medium-grained, intergranular porosity; brachiopods and corals; sharp break   |

| Depth<br>(feet)   | Lithology   |
|-------------------|---|
| 2,549 - 2,577     | Limestone and shale interbedded; limestone, brown, fine-grained, in part argillaceous, varying to dark brown, limy shale; black shale with brown streak; scattered crinoids and brachiopods; vugs from interior of brachiopod shells bleeding black oil, foetid odour |
| 2,577 - 2,591     | Shale, dark brown, bituminous; <u>Lingula</u> ; other brachiopods; scattered limestone bands as above   |
| 2,591 - 2,595     | Limestone, brown, fine-grained; in part with abundant brachiopods and crinoids  |
| 2,595 - 2,612     | Shale, dark brown, calcareous; limestone layers between 2,603 and 2,605 feet; black oil stain; sharp break at base  |
| 2,612 - 2,618     | Limestone, brown, fine- to medium-grained (calcareous); wavy shale partings with nodules of limestone; crinoids; ostracods; abundant pyrite at top  |
| 2,618 - 2,641     | Limestone, as above, but more argillaceous; bands of crinoidal limestone; wispy shale stringers suggestive of ripple-marks  |
| 2,641 - 2,644     | Limestone, buff, fine- to medium-grained, intergranular porosity and oil stain  |
| 2,644 - 2,651     | Limestone, brown, fine-grained; wispy shale stringers; large crinoids abundant in shaly layers; stromatopora at base  |
| 2,651 - 2,655     | Limestone, buff, medium-grained (calcareous), porous; oil stain   |
| 2,655 - 2,657     | Limestone, brown, fine-grained; shale laminae at base   |
| 2,657 - 2,661     | Dolomite, buff, fine-grained, argillaceous, with wavy brown shale laminae (evaporitic type); interbedded with limestone, brown, fine-grained  |
| 2,662 - 2,666.5   | Limestone, brown, mottled grey, aphanitic, tightly cemented; pyrite stringers and black shale laminae; sharp change to...   |
| 2,666.5 - 2,669.3 | Dolomite, light buff, fine-grained, in part brecciated; pyrite abundant at base; sharp break  |

| Depth<br>(feet)            | Lithology  |
|----------------------------|--|
| 2,669.3 - 2,674            | Limestone, brown, aphanitic, fine-grained; scattered pyrite; shale laminae at base   |
| <u>Chinchaga Formation</u> |  |
| 2,674 - 2,675.5            | Dolomite, buff, fine-grained, laminated (evaporitic type); pyrite  |
| 2,675.5 - 2,675.75         | Shale, dark green, pyritic   |
| 2,675.75 - 2,681           | Dolomite, buff, argillaceous, very fine grained (evaporitic type); in part contorted; weathered, leached appearance; brown shale laminae; anhydrite crystals at 2,676-2,678 feet   |
| 2,681 - 2,686              | Dolomite, buff, very finely crystalline; argillaceous; anhydrite stringers; weathered appearance at top; bottom 1 foot has crystals of galena, pyrite, and sphalerite(?); sharp break at base                                    |
| 2,686 - 2,689              | Anhydrite and dolomite, mottled; dolomite, buff, fine-grained, euhedral; grey shale partings   |
| 2,689 - 2,690              | Anhydrite, grey, massive   |
| 2,690 - 2,712              | Dolomite, buff, fine-grained, earthy, leached appearance, mottled with anhydrite; bands of dark grey and black shale, the latter with crystals of galena; 1/2 inch of green shale with large angular quartz grains at 2,708 feet |
| 2,712 - 2,713              | Shale and dolomite; shale, dark grey-green, non-calcareous, sandy, with quartz grains, many larger than 0.5 mm in diameter; interbedded dolomite, buff, earthy, pyritic; abundant pyrite in layer at 2,712 feet                  |
| 2,713 - 2,715              | Dolomite, buff, earthy, mottled with anhydrite; grey shale laminae   |
| 2,715 - 2,720              | Dolomite and shale; dolomite, buff, earthy, as above; shale dark green, pyritic; abundant quartz grains varying from sand- to pebble-size  |
| 2,720 - 2,722              | Dolomite as above, mottled with anhydrite  |
| 2,722 - 2,730              | Dolomite and shale interbedded; dolomite as above; shale, dark green, non-calcareous; scattered sand grains; pyrite  |

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| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 2,730 - 2,732   | Shale, green, grading to red, sandy, quartz sand to pebble size, subangular |
| 2,732 - 2,733   | Weathered granite   |
| 2,733           | <u>Precambrian</u>  |
| 2,733 - 2,744   | Granite   |

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Cored interval: 2,252-2,744

Briggs Northeast Tathlina Lake 9

Location: Lat. 60°43'12"N; Long. 117°22'17"W

Elevation: 919 feet K.B.

Completed: 1959

Total depth: 2,928 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples and cores stored at Geological Survey of Canada, Calgary, Alberta.

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
|                 | <u>Hay River Formation</u>   |
| - 2,175         | Shale, greyish green, slightly calcareous  |
| 2,175 - 2,180   | Shale, dark brown, calcareous; siltstone, white, calcareous, micaceous; abundant pyrite  |
| 2,180 - 2,185   | Limestone, light grey, fine- to coarse-grained; brachiopod fragments abundant; interlaminated light green shale; abundant pyrite   |
| 2,185           | <u>Slave Point Formation</u>   |
| 2,185 - 2,205   | Limestone, buff to light brown, fine- to medium-grained; calcite cement; abundant stromatoporoid fragments and cell structure suggestive of corals   |
| 2,205 - 2,215   | Limestone, brown, aphanitic to fine-grained (calcsiltite); tightly cemented; brown shale laminae; scattered pyrite   |
| 2,215 - 2,240   | Limestone, buff to light brown, fine-grained; scattered cell structure; in part pelletoid, cemented with calcite   |
| 2,240 - 2,255   | Limestone, buff, fine- to coarse-grained, slightly dolomitic, some calcite cement; pin-point and intergranular porosity  |
| 2,255 - 2,265   | Limestone, light grey, aphanitic, 'clotted' texture; calcite 'eyes' and veinlets   |
| 2,265 - 2,285   | Limestone, light brown, fine- to coarse-grained; some light grey aphanitic pelletoid limestone; pebbles of brown aphanitic limestone in fine-grained matrix; in part with sparry calcite cement, in part with pin-point porosity |

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| Depth<br>(feet)   | Lithology   |
|-------------------|---|
| 2, 285 - 2, 295   | Limestone, light brown, aphanitic to very fine grained  |
| 2, 295 - 2, 340   | Limestone, light yellow-brown, fine- to coarse-grained; in part pelletoid; intergranular and pin-point porosity; some sparry calcite cement; brown shale laminae towards base   |
| 2, 340 - 2, 370   | Limestone, light grey, aphanitic, tightly cemented with calcite   |
| 2, 370 - 2, 386   | Limestone, light brown to light grey, fine-grained; fossil fragments  |
| 2, 386 - 2, 389   | Limestone, light yellow-brown; aphanitic; calcite 'eyes'; scattered small shell fragments, brachiopods, gastropods, ostracods, coral fragments, <u>Amphipora</u> ; black shale laminae at base; sharp contact   |
| 2, 389            | <u>Watt Mountain Formation</u>  |
| 2, 389 - 2, 390.5 | Limestone breccia; limestone, light grey, aphanitic; crystalline; contains spheres filled with calcite, probably charophytes; limestone occurs as large fragments and blocks, outlined by pyrite and green waxy shale; green waxy shale laminated with limestone in bottom 1 foot; 1/4 inch of green shale at base; sharp contact |
| 2, 390.5          | <u>Sulphur Point Formation</u>  |
| 2, 390.5 - 2, 393 | Limestone, white, crystalline; composed of rounded fragments of <u>Amphipora</u> , corals, stromatoporoids or algae, and large angular limestone fragments cemented with white coarsely crystalline calcite (seems to be organic conglomerate); breccia with green shale grades to limestone below; scattered vugs                |
| 2, 393 - 2, 397   | Limestone, same as above, mostly large pebbles of organic remains, white; pebbles coated with calcite show radiating structure; matrix is part grains and part small pebbles; sparry calcite cement   |
| 2, 397 - 2, 401   | Limestone, white, fine- to coarse-grained, crystalline; structure poorly visible; scattered fragments of <u>Amphipora</u> ; stylolites with green shale; sparry calcite cement  |

| Depth<br>(feet)   | Lithology  |
|-------------------|--|
| 2,401 - 2,411     | Limestone similar to above; in part oolitic; scattered stromatoporoids; <u>Amphipora</u> , gastropods, brachiopods; vugs; fractures  |
| 2,412 - 2,415.5   | Limestone, white, composed mainly of large stromatoporoids, infilled with crystalline calcite; matrix mostly coarse limestone grains; stylolites with pale green-grey shale; sharp change to...                              |
| 2,415.5 - 2,416   | Limestone breccia: matrix—green shale; pebbles—rounded fragments of fine-grained limestone, rounded fragments of stromatoporoids and <u>Amphipora</u> ; sparry calcite cement; grades down with decreasing brecciation to... |
| 2,416 - 2,425     | Limestone, white, crystalline, partly recrystallized; stromatoporoids, corals, <u>Amphipora</u> ; matrix coarse-grained limestone; green shale at 2,419 feet   |
| 2,425 - 2,441     | Limestone as above; large stromatoporoids and corals, partly crystallized; matrix in part fine- to coarse-grained, shredded organic fragments; green shale as irregular partings from 2,425 to 2,435 feet                    |
| 2,442 - 2,445.5   | Stromatoporoid limestone (stromatoporoids probably in position of growth); matrix fine- to coarse-grained, shredded shell-debris (lime sand), sparry calcite cement; green shale and stylolites at base                      |
| 2,445.5 - 2,447.5 | Limestone and green shale brecciated; stromatoporoids, fractured, filled with green waxy shale; sharp contact  |
| 2,447.5 - 2,459   | Limestone, white, aphanitic (calclutite); clotted structure; sparry calcite; a few large brachiopods and brachiopod fragments; stromatoporoids in bottom 1 foot  |
| 2,459 - 2,460     | Breccia; grey, aphanitic limestone, fractured and filled with green waxy shale; some stromatoporoid and possibly coral fragments   |
| 2,460 - 2,466     | Limestone, white, aphanitic; one stromatoporoid at 2,465 feet  |
| 2,466 - 2,470     | Limestone, light grey, aphanitic; stylolites   |

| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 2,471 - 2,481   | Limestone, white, aphanitic to fine-grained; clotted texture; in part pelletoid; sparry calcite cement; spots of coarse, white, crystalline calcite in bottom 2 feet; stylolites with green shale; pyrite; sharp contact with 2 inches of green, waxy, non-calcareous, pyritic shale at base  |
| 2,481 - 2,483.5 | Limestone, light grey to pinkish grey, fine-grained, finely crystalline; green shale partings; scattered pyrite and pyrite nodules  |
| 2,483.5 - 2,490 | Limestone, white, crystalline, composed largely of stromatoporoids, corals, <u>Amphipora</u> ; some slumping of stromatoporoids, some seem to be fragmented, others seem to be in place; grades down to limestone, fine-grained with scattered stromatoporoids and corals; more abundant organisms in bottom 1 foot; stylolites with green shale at base; sharp contact |
| 2,490 - 2,493.5 | Breccia: limestone and green shale; shale, green, pyritic, non-calcareous, forms matrix; fragments—limestone, corals, stromatoporoids, pinkish buff, filled with calcite; abundant pyrite   |
| 2,493.5 - 2,500 | Limestone, white, very fine grained, aphanitic; fragments of corals; sharp break with green shale at base   |
| 2,500           | <u>Pine Point Formation</u>   |
| 2,500 - 2,530   | Dolomite, brown, finely crystalline, euhedral, intercrystalline porosity, becoming less porous towards base; a few stromatoporoids  |
| 2,530 - 2,590   | Limestone, brown, aphanitic, slightly dolomitic at top; slightly argillaceous; crinoid and brachiopod fragments   |
| 2,590 - 2,610   | Limestone, as above; shale laminae, black, bituminous; brachiopod fragments   |
| 2,610 - 2,650   | Limestone, brown, very fine grained, slightly argillaceous; black shale laminae   |
| 2,650 - 2,670   | Limestone as above; more shale; brachiopod fragments  |
| 2,670 - 2,740   | Limestone, yellow-brown, very fine grained; black shale laminae; brachiopod fragments; slightly argillaceous at base  |

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 2,740 - 2,790   | Dolomite, brown, very fine grained, euhedral, argillaceous, varies to dolomitic mudstone; brown oil-stain  |
| 2,790 - 2,820   | Dolomite, buff, finely crystalline, tightly cemented, mosaic texture with vugs; brachiopod and crinoid fragments   |
| 2,820           | <u>Chinchaga Formation</u>   |
| 2,820 - 2,830   | Dolomite, buff, fine-grained to aphanitic, earthy; slightly argillaceous   |
| 2,830 - 2,880   | Dolomite as above; anhydrite, grey, massive, in part mottling dolomite, in part probably as interbeds  |
| 2,880 - 2,890   | Anhydrite and dolomite as above; shale, light green, waxy. much pyrite; sandstone, quartzose, orange-red   |
| 2,890 - 2,900   | Anhydrite and dolomite, as above   |
| 2,900 - 2,910   | Anhydrite and dolomite, as above; green shale; quartz grains, coarse, frosted, angular to subrounded; probably sandstone loosely cemented  |
| 2,910 - 2,915   | Dolomite, buff, very fine grained, anhydritic; anhydrite; green shale, in part sandy   |
| 2,915 - 2,925   | Sandstone, white, quartzose, fine- to coarse-grained; grains up to 0.5 mm towards base, may be conglomeratic, with large pink feldspar grains; some orange-red sandstone, fine-grained |
| 2,925           | <u>Precambrian</u>   |
| 2,925 - 2,929   | Granite  |

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Cored interval: 2,386-2,519

Shell Alexandra No. 5

Location: Lat. 60° 34' 15" N; Long. 116° 44' 39.4" W

Elevation: 942 feet K.B.

Completed: 1958

Total depth: 2,802 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples stored at Geological Survey of Canada, Calgary, Alberta.

| Depth<br>(feet)            | Lithology  |
|----------------------------|--|
| <u>Hay River Formation</u> |  |
| - 1,810                    | Shale, grey, fissile, with abundant pyrite cubes; a little black shale with dark brown streak in bottom 10 feet  |
| 1,810                      | <u>Slave Point Formation</u>   |
| 1,810 - 1,830              | Limestone, buff, fine- to medium-grained; abundant fossil fragments, including brachiopods; coarse-grained, pyritic at top; black shale laminae; some chert                                    |
| 1,830 - 1,870              | Limestone, buff to light brown; fine- to medium-grained matrix; abundant stromatoporoid or algal and coral remains, probably <u>Amphipora</u> ; matrix slightly dolomitic; black shale laminae |
| 1,870 - 1,900              | No samples   |
| 1,900 - 1,920              | Limestone, brown, aphanitic, in part pelletoid with grains of very fine-grained limestone tightly cemented with calcite; scattered pyrite  |
| 1,920 - 1,940              | Limestone, light grey, aphanitic, grading down to brown aphanitic; calcite 'eyes'; some pelletoid limestone  |
| 1,940 - 1,950              | Limestone, as above, fine-grained, pelletoid; sparry calcite cement  |
| 1,950 - 1,980              | Limestone, light grey to light buff, aphanitic; <u>Amphipora</u> at 1,960 to 1,970 feet  |
| 1,980                      | Fort Vermilion Member  |
| 1,980 - 1,985              | Anhydrite, white   |

| Depth.<br>(feet) | Lithology   |
|------------------|---|
| 1, 985 - 1, 990  | Limestone, light grey, very fine grained; anhydrite crystals  |
| 1, 990 - 1, 995  | Dolomite, light grey, slightly silty, anhydritic, fine-grained  |
| 1, 995           | <u>Watt Mountain Formation</u>  |
| 1, 995 - 2, 000  | Shale, light green, waxy  |
| 2, 000           | <u>Presqu'ile Formation</u>   |
| 2, 000 - 2, 125  | Dolomite, light grey, coarsely crystalline  |
| 2, 125           | <u>Pine Point Formation</u>   |
| 2, 125 - 2, 170  | Dolomite, buff and grey, finely to coarsely crystalline, vuggy  |
| 2, 170 - 2, 190  | Limestone, brown, fine-grained, dolomitic; dolomite buff to light brown, finely crystalline, tightly cemented, in part vuggy with black material lining vugs; black argillaceous material, probably laminae |
| 2, 190 - 2, 235  | Dolomite, light to dark brown, fine- to medium-crystalline, in part with mosaic texture, in part euhedral with intercrystalline porosity  |
| 2, 235 - 2, 245  | Dolomite, buff, medium- to coarsely-crystalline; relict cell structure, in part filled with calcite; scattered vugs   |
| 2, 245 - 2, 260  | Dolomite, light yellow-brown, finely crystalline, euhedral with intercrystalline porosity   |
| 2, 260 - 2, 290  | Dolomite, light yellow-brown, fine- to medium-crystalline; vugs; suggestion of cell structure   |
| 2, 290 - 2, 390  | Dolomite, buff, finely crystalline, vuggy porosity  |
| 2, 390 - 2, 415  | Dolomite, as above, but without vugs  |
| 2, 415 - 2, 500  | Dolomite, brown, tightly cemented; brown shale laminae in places; vugs or fractures lined with dolomite rhombs near top; scattered crinoid fragments  |
| 2, 500 - 2, 510  | Dolomite, brown, fine- to coarsely-crystalline, vuggy   |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 2,510 - 2,525   | Dolomite, as above; relict structures, suggestive of organic remains, possibly calcarenite; crinoids; black shale laminae  |
| 2,525 - 2,540   | Limestone, dark brown, fine-grained; dark brown shale; some dolomite as above  |
| 2,540 - 2,580   | Limestone, dark brown, fine-grained; crinoids; cell structure, possibly coral; a few ostracods; brachiopod fragments towards base; brown shale laminae               |
| 2,580 - 2,600   | Limestone, light yellow-brown, fine-grained to aphanitic; brown shale laminae; crinoids; slight porosity   |
| 2,600 - 2,620   | Dolomite, light yellow-brown, finely crystalline; some limestone as above, pin-point porosity  |
| 2,620           | <u>Chinchaga Formation</u>   |
| 2,620 - 2,655   | Anhydrite, grey, massive; some dolomite, brown, dense, argillaceous, anhydritic  |
| 2,655 - 2,685   | Anhydrite, as above; mudstone, brown, dolomitic; brown shale laminae; dolomite, buff, dense, earthy, argillaceous, anhydritic, finely silty                          |
| 2,685 - 2,705   | Anhydrite as above; shale, grey, soft, dolomitic   |
| 2,705 - 2,715   | Shale, grey to buff, dolomitic, massive, grades to dolomite; shale, green, waxy, silty to sandy  |
| 2,715 - 2,720   | Shale, green, chocolate-brown, waxy; dolomite, buff, aphanitic, with anhydrite mottling  |
| 2,720           | <u>Mirage Point Formation(?)</u>   |
| 2,720 - 2,725   | Shale, red, green; anhydrite as above; sandstone, grey, fine- to coarse-grained, poorly sorted; abundant large, subangular, frosted quartz grains.                   |
| 2,725 - 2,750   | Sandstone, light grey, in part mottled red, fine- to coarse-grained, poorly sorted; angular to subrounded, consists of quartz, probably feldspar; red shale partings |
| 2,750 - 2,765   | Sandstone, white to purplish red; quartz, feldspar, poorly sorted, angular to subrounded   |

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| Depth<br>(feet)    | Lithology   |
|--------------------|---|
| 2,765 - 2,775      | Sandstone, conglomeratic, coarse-grained, angular quartz, feldspar; probably a granite 'wash' |
| <u>Precambrian</u> |   |
| 2,775 - 2,802      | Granite   |

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Imperial Yates River 16-18-126-14

Location: 16-18-126-14-W5

Elevation: 1,020 feet K.B.

Completed: 1952

Total depth: 3,148 feet

Result: Abandoned

Summary of log by H.R. Belyea from samples stored at Geological Survey of Canada, Calgary, Alberta, and core stored at Imperial Oil Limited warehouse, Edmonton, Alberta.

| Depth<br>(feet)            | Lithology   |
|----------------------------|---|
| <u>Hay River Formation</u> |   |
| - 1,952                    | Shale, greenish grey with nodules of grey, dense shaly limestone; irregular wavy green shale partings; brachiopods and crinoids; pyrite-stained pebbles; breccia of limestone and shale, pyrite at base |
| 1,952                      | <u>Slave Point Formation</u>  |
| 1,952 - 1,971              | Limestone, buff, fine- to medium-grained matrix; abundant stromatoporoid fragments; wavy brown shale laminae and stylolites; pin-point porosity   |
| 1,971 - 1,979              | Limestone, as above, fine- to medium-grained; scattered small stromatoporoid fragments in bands; chert, white, replacing limestone  |
| 1,979 - 1,986              | Limestone, brown, fine-grained; black shale partings; scattered stromatoporoid fragments; black chert nodules, and white chert replacing organic fragments  |
| 1,986 - 1,990              | Limestone, brown, fine-grained, tightly cemented; carbonaceous specks   |
| 1,990 - 2,020              | Limestone, brown, fine- to medium-grained; abundant stromatoporoid fragments; pelletoid with calcite cement in bottom 10 feet   |
| 2,020 - 2,030              | Limestone, light brown, fine-grained, tight   |
| 2,030 - 2,050              | Limestone, buff, fine- to medium-grained; brachiopod fragments; chert; in part pelletoid with calcite cement  |
| 2,050 - 2,060              | Limestone, brown, fine- to medium-grained, slightly dolomitic; pelletoid; anhydrite crystals  |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 2,060 - 2,070   | Dolomite, brown, medium- to coarsely-crystalline; pin-point porosity   |
| 2,070 - 2,080   | Limestone, brown, aphanitic; anhydrite crystals  |
| 2,080           | Fort Vermilion Member  |
| 2,080 - 2,140   | Anhydrite, white to buff, massive; some green shale at top, waxy, slightly silty; limestone buff to brown anhydritic   |
| 2,140           | <u>Watt Mountain Formation</u>   |
| 2,140 - 2,155   | Shale, green, waxy; contains pebbles of limestone, brown, aphanitic; anhydrite, as above   |
| 2,155           | <u>Sulphur Point Formation</u>   |
| 2,155 - 2,181   | Limestone, white, fine- to coarse-grained, in part pelletoid, with calcite cement, in part with pin-point and intergranular porosity   |
| 2,181 - 2,183   | Limestone breccia; limestone, brown, fine-grained, tight, as large blocks and small rounded fragments; matrix white anhydrite and bright green waxy shale; sharp break at base with green shale, dolomite and abundant pyrite at contact |
| 2,183 - 2,186   | Dolomite, brown, fine- to medium-crystalline, tightly cemented; large anhydrite crystals and inclusions of white crystalline anhydrite; some bright green shale at top   |
| 2,186 - 2,188   | Breccia, dolomite, grey, finely crystalline; anhydrite and bright green and greenish grey shale matrix; pyrite   |
| 2,188 - 2,191   | Limestone, brown, very finely crystalline, tightly cemented; scattered anhydrite crystals; bright green shale inclusions   |
| 2,191           | Muskeg Formation   |
| 2,191 - 2,270   | Anhydrite, grey, massive; dolomite, buff, very fine grained, earthy, anhydritic, slightly argillaceous   |
| 2,270 - 2,287   | Dolomite, brown, finely crystalline, anhydritic  |

| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 2, 287 - 2, 296 | Dolomite, brown, finely crystalline, mottled with clear anhydrite crystals; bed of anhydrite with green shale partings at 2, 288 1/2 and 2, 290 1/2 feet; black shale laminae; heavy black oil-stain in bottom 2 feet |
| 2, 296 - 2, 340 | Anhydrite, grey, massive; dolomite, dark brown, tightly cemented, anhydritic  |
| 2, 340 - 2, 350 | Dolomite, brown, finely crystalline, euhedral; vugs; anhydrite  |
| 2, 350 - 2, 390 | Dolomite, as above; anhydrite, grey, massive; black shale laminae   |
| 2, 390 - 2, 410 | Dolomite, brown, finely crystalline, tightly cemented; black shale laminae  |
| 2, 410 - 2, 440 | Anhydrite, grey, massive; dolomite as above   |
| 2, 440 - 2, 460 | Dolomite, buff, brown, aphanitic to very finely crystalline; anhydrite as above   |
| 2, 460 - 2, 490 | Dolomite, brown, fine- to medium-crystalline; mosaic to euhedral texture; spots of anhydrite  |
| 2, 490 - 2, 610 | Dolomite, buff to brown, finely crystalline, slightly anhydritic; scattered black shale partings  |
| 2, 610          | <u>Keg River Formation</u>  |
| 2, 610 - 2, 690 | Dolomite, dark brown, fine- to medium-crystalline; black shale laminae, tightly cemented  |
| 2, 690 - 2, 710 | Dolomite, buff to brown, fine- to medium-crystalline, mottled; white dolomite crystals abundant, probably veinlets  |
| 2, 710 - 2, 910 | Dolomite, light yellow-brown, very-fine- to finely-crystalline, tightly cemented; becomes slightly euhedral and argillaceous in bottom 10 feet.   |
| 2, 910          | <u>Chinchaga Formation</u>  |
| 2, 910 - 3, 000 | Anhydrite, buff, massive, dolomite, buff, finely crystalline, euhedral, to very fine grained, tightly cemented, anhydritic; some mottling of dolomite and anhydrite   |
| 3, 000 - 3, 010 | No sample   |

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| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 3,010 - 3,030   | Anhydrite, buff to grey, massive  |
| 3,030 - 3,050   | Anhydrite, as above; dolomite, buff to brown, fine- to medium-crystalline; green shale, probably as laminae   |
| 3,050 - 3,060   | Anhydrite, as above; dolomite, brown, finely crystalline; some green shale with quartz grains   |
| 3,060 - 3,070   | Anhydrite, as above   |
| 3,070 - 3,075   | Anhydrite, grey, sandy; shale, green, pyritic, silty; some grey sandstone, fine- to coarse-grained, poorly sorted   |
| 3,075           | <u>Mirage Point Formation</u>   |
| 3,075 - 3,090   | Sandstone, white to light green, fine- to coarse-grained, poorly sorted, angular to subrounded, frosted grains; a little red shale and shaly sandstone              |
| 3,090 - 3,120   | Anhydrite, grey to orange-red, silty, dolomitic, in part silty to sandy; red and green shale; becomes more sandy towards base                                       |
| 3,120 - 3,140   | Sandstone, buff, fine- to coarse-grained, poorly sorted, dolomitic, varies to sandy dolomite; grains angular to subrounded; large coarse quartz-sandstone fragments |
| 3,140           | <u>Precambrian</u>  |

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Cored intervals: 1,933-1,990; 2,181-2,191; 2,287-2,296

Northwest Territories Escarpment Lake No. 1

Location: Lat. 60°35'43"N; Long. 116°13'W

Elevation: 896 feet K.B.

Completed: 1954

Total depth: 2,085 feet

Result: Suspended

Summary of log by H.R. Belyea from samples and core stored at Geological Survey of Canada, Calgary, Alberta.

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| Depth<br>(feet) | Lithology   |
|-----------------|---|
|                 | <u>Hay River Formation</u>  |
| - 1,310         | Shale, greenish grey, calcareous; limestone in bottom 20 feet, brown, tightly cemented; abundant fossil fragments; spines, fragments of stromatoporoids; dark brown shale     |
| 1,310           | <u>Slave Point Formation</u>  |
| 1,310 - 1,330   | Limestone, brown; fragments of stromatoporoids; dark brown shale  |
| 1,330 - 1,364   | Limestone, brown, fine-grained, in part slightly argillaceous; ostracods, brachiopods, crinoids; upper part speckled, fossiliferous; brown shale laminae and scattered pyrite |
| 1,364 - 1,376   | Limestone, dark brown, fine-grained; lenses of lighter brown, slightly coarser limestone, tightly cemented; irregular black shale partings; brachiopods and crinoids          |
| 1,376 - 1,394   | No samples  |
| 1,394 - 1,440   | Limestone, yellow-brown, fine-grained, pelletoid in upper 10 feet; brown shale laminae; brachiopods; organic structure at 1,430 to 1,440 feet, possibly <u>Amphipora</u>      |
| 1,440 - 1,480   | Limestone, yellow-brown, fine- to medium-grained; scattered dolomite rhombs and anhydrite crystals  |
| 1,480 - 1,490   | Dolomite, yellow-brown, fine- to medium-crystalline, euhedral, slightly argillaceous and anhydritic; some organic fragments   |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 1,490 - 1,500   | Limestone and dolomite, yellow-brown, fine- to medium-crystalline; fragments with organic structure, possibly corals and stromatoporoids                         |
| 1,500 - 1,509   | Dolomite, buff, slightly limy; finely crystalline, euhedral texture, in part earthy; dark grey streaks; vertical fractures with sulphur                          |
| 1,509 - 1,513   | Limestone, buff, aphanitic, pyritic; irregular light green shale laminae   |
| 1,513 - 1,514   | Dolomite, buff, fine-grained, earthy; dark pyritic streaks   |
| 1,514           | <u>Watt Mountain Formation</u>   |
| 1,514 - 1,522   | Shale, dark grey and green, charophytes; limestone, light yellow-brown, argillaceous, grades to...   |
| 1,522           | <u>Sulphur Point Formation</u>   |
| 1,522 - 1,535   | Limestone, light grey to buff, fine-grained to aphanitic; light green shale, probably as partings; becomes dolomitic in bottom 5 feet                            |
| 1,535           | <u>Presqu'ile Formation</u>  |
| 1,535 - 1,590   | Dolomite, grey, buff, coarsely crystalline, in part very coarsely crystalline, recrystallized white dolomite; trace black shale and stylolites in bottom 10 feet |
| 1,590           | <u>Pine Point Formation</u>  |
| 1,590 - 1,630   | Dolomite, buff to brown, finely crystalline, mosaic to euhedral texture; pin-point, intercrystalline and vuggy porosity  |
| 1,630 - 1,640   | Dolomite, yellow-brown, finely crystalline, anhydritic; anhydrite crystals throughout dolomite   |
| 1,640 - 1,660   | Dolomite, buff to brown, fine- to coarsely-crystalline, in part recrystallized; vuggy porosity in part lined with dolomite crystals; some anhydrite in vugs      |
| 1,660 - 1,680   | Dolomite, buff to light brown, finely crystalline; pin-point porosity; white anhydrite spots   |

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 1,680 - 1,720   | Dolomite, buff to light brown, finely crystalline, tightly cemented, in part slightly argillaceous; black shale laminae or stylolites                  |
| 1,720 - 1,780   | Dolomite, as above; some anhydrite, grey to pale buff, massive; scattered anhydrite crystals in places   |
| 1,780 - 1,820   | Dolomite, brown, fine- to medium-crystalline; small vugs; scattered anhydrite crystals and blebs   |
| 1,820 - 1,880   | Dolomite, brown, finely crystalline; scattered pin-point porosity; anhydrite blebs; some white massive anhydrite                                       |
| 1,880 - 1,900   | Dolomite, buff, fine- to medium-crystalline, vuggy   |
| 1,900 - 1,990   | Dolomite, brown to dark brown, finely crystalline, tightly cemented; local pin-point porosity; scattered anhydrite crystals in places                  |
| 1,990 - 2,085   | Dolomite, dark brown, fine- to medium-crystalline, in part spotted with light brown, possibly after organisms; pin-point porosity; black shale laminae |

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Cored intervals: 1,364-1,394; 1,504-1,514

Frobisher Hay River Test No. 8

Location: Lat. 60°42'N; Long. 115°52'W

Elevation: 580 feet Gr.

Completed: 1946

Total depth: 1,072 feet

Result: Abandoned

Summary of log by H.R. Belyea from core and core chips stored at Geological Survey of Canada, Calgary, Alberta.

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| Depth<br>(feet)            | Lithology  |
|----------------------------|--|
| <u>Hay River Formation</u> |  |
| - 582.5                    | Shale, grey, calcareous, fossil fragments; grey, argillaceous, fine-grained limestone with brachiopod fragments at base  |
| 582.5                      | <u>Slave Point Formation</u>   |
| 582.5 - 604                | Limestone, buff to yellow-brown, fine-grained, vuggy porosity; oil stain; speckled chert; calcite veining; black bituminous partings   |
| 604 - 620                  | Limestone, brown, slightly argillaceous, very-fine- to fine-grained; black, bituminous laminae; chert at 615-617 feet  |
| 620 - 630                  | Limestone, brown, fine- to medium-grained, intergranular porosity; calcite inclusions  |
| 630 - 635                  | Limestone, dark brown, very fine grained, as lenses in brown fine-grained limestone, slightly earthy in part; calcite veining  |
| 635 - 655                  | Limestone, light brown, aphanitic to fine-grained, in part earthy, argillaceous; slight oil stain  |
| 655 - 660                  | Limestone, light brown, aphanitic; black bituminous partings; slight oil stain   |
| 660 - 680                  | Limestone, light and dark brown, mottled, fine-grained; traces of black 'petroleum residue'  |
| 680 - 700                  | Limestone, buff, very fine grained, in part with small vugs, in part fragments of dark brown limestone enclosed in light brown, earthy limestone matrix; some shaly bituminous partings; trace of pyrite at base; fine calcite veining |

| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 700 - 705       | Dolomite, brown to dark brown, fine- to coarsely-crystalline, the latter with intergranular porosity lined with black 'petroleum residue'        |
| 705             | <u>Watt Mountain Formation(?)</u>  |
| 705 - 710       | Shale, light green; dolomite, buff, coarsely crystalline in part with coarse white dolomite  |
|                 | <u>Presqu'ile Formation</u>  |
| 710 - 900       | Dolomite, buff to white, coarsely crystalline, in part extremely coarse (probably recrystallized); vuggy porosity; light green shale at 900 feet |
| 900             | <u>Pine Point Formation</u>  |
| 900 - 914       | Dolomite, dark brown, finely crystalline   |
| 914 - 926       | Dolomite, dark brown, finely crystalline; speckled brown and white chert; possible cell structure at 920 to 926 feet                             |
| 926 - 930       | Dolomite, dark brown, finely crystalline, argillaceous   |
| 930 - 945       | Dolomite, dark grey-brown, argillaceous; chert, white to grey, speckled; quartz and pyrite in vugs; quartz crystals                              |
| 945 - 950       | Dolomite, brown, crystalline; scattered vugs   |
| 950 - 960       | Dolomite, brown, crystalline, granular texture; scattered vugs; chert  |
| 960 - 968       | Poor sample; shale, grey; some calcite; some dolomite  |
| 968 - 1,019     | Dolomite, brown to dark brown, finely crystalline; black bituminous shale partings; trace of pyrite  |
| 1,019 - 1,029   | Limestone, dark grey-brown, very fine grained, argillaceous, large brachiopods   |
| 1,029 - 1,032   | Dolomite, dark brown, finely crystalline; in part argillaceous; calcite veining  |
| 1,032 - 1,040   | Limestone, dark brown, fine-grained, argillaceous, grades to shale, black with brown streak  |

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 1,040 - 1,052   | Limestone and shale; limestone dark brown, very fine grained; shale, black with brown streak; brachiopods and crinoids |
| 1,052 - 1,072   | Limestone, dark brown, fine-grained, in part argillaceous; shale partings; brachiopods                                 |

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Cored interval: 58-1,072

Amco Test No. 14

Location: Lat. 60°43'N; Long. 115°01'W

Elevation: 686 feet Gr.

Completed: 1949?

Total depth: 828 feet

Result: Abandoned

Summary of log by H.R. Belyea from core stored at Geological Survey of Canada, Calgary, Alberta.

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| Depth<br>(feet)              | Lithology  |
|------------------------------|--|
| <u>Slave Point Formation</u> |  |
| 93 - 118                     | Limestone, fine- to medium-grained matrix; abundant stromatoporoids and corals; fine intergranular porosity in matrix; oil stain   |
| 118 - 143                    | Limestone, light brown, fine- to medium-grained matrix; slight mottling with dolomite rhombs; stromatoporoids; bands of <u>Amphipora</u> or ramose stromatoporoids; bands of oolitic and pelletoid limestone; dark brown, wavy shale laminae |
| 143 - 168                    | Limestone, light brown, fine-grained, mottled with dolomite rhombs; banded with dark brown shale laminae; a few stromatoporoids at 146 to 147 feet; scattered <u>Amphipora</u>   |
| 168 - 178                    | Limestone, brown, fine-grained, dolomitic; grades downwards to dolomite, brown, finely crystalline, some with banded appearance; intercrystalline and pin-point porosity; oil stain  |
| 178 - 188                    | Limestone, brown, fine-grained to aphanitic; shale laminae   |
| 194 - 195                    | Limestone, buff and dark brown, fine-grained   |
| 195 - 199                    | Limestone, brown, fine- to medium-grained (calcarenite); brown shale laminae; fine intergranular porosity; scattered brachiopod fragments and <u>Amphipora</u> (?)   |
| 199 - 201                    | Limestone as above, with inclusions of buff, fine-grained, cemented limestone; fragments of corals, brachiopods, stromatoporoids (calcirudite)   |
| 201 - 207                    | Limestone, light brown, fine- to medium-grained, mottled with light buff, fine-grained limestone; shale laminae in upper 6 inches; band of <u>Amphipora</u> at 204.5 feet; crystalline calcite inclusions; thin-shelled brachiopods          |

| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 207 - 212       | Limestone, brown and buff, interlaminated, both fine-grained; laminations seem to be the result of slight differences in grain size and porosity  |
| 212 - 213       | Limestone, laminated with black shale; inclusions of buff, fine-grained, argillaceous limestone   |
| 213 - 214       | Limestone, buff, fine-grained, mottled with coarsely crystalline calcite; vugs; sulphur   |
| 214 - 219       | Dolomite, brown, finely crystalline, euhedral, slightly argillaceous; fine intercrystalline porosity; thin shale laminae  |
| 219 - 221       | Limestone, cream-coloured, aphanitic; bands of dolomite; calcite and sulphur crystals   |
| 221 - 223       | Dolomite, brown, laminated, in part finely crystalline; layers of sulphur   |
| 223 - 224       | Limestone, buff, aphanitic, contorted, mottled with sulphur   |
| 224 - 254       | Dolomite, brown, fine-grained, finely crystalline, euhedral, in part laminated; evaporitic type; slightly limy in places; dark brown shale laminae; fine intercrystalline porosity with scattered small vugs lined with calcite and sulphur |
| 254 - 259       | Dolomite, same as above; some dark grey shaly dolomite at base; grades down to dolomite, grey, finely sugary, argillaceous, with inclusions of grey, shaly dolomite   |
| 259 - 269       | Dolomite, greenish grey, argillaceous, or dolomitic mudstone; inclusions of greenish grey shale, possibly ripple-marked (Amco Marker)   |
| 269 - 279       | Dolomite, buff to brown, finely crystalline, argillaceous, mottled with light grey dolomite; fine intercrystalline porosity; patches of white anhydrite and sulphur;<br><u>Amphipora</u>  |
| 279 - 285       | Dolomite, buff, finely crystalline, euhedral, with intercrystalline porosity; dark grey streaks; shale laminae  |
| 285 - 286       | Dolomitic mudstone, light grey-green  |
| 286 - 289.5     | Dolomite, light buff, fine- to medium-crystalline;<br><u>Amphipora</u> ; sharp break  |
| 289.5 - 290     | Dolomite, dark brownish grey, almost black; finely crystalline, euhedral, argillaceous  |

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 290 - 295       | Limestone, dark brown, fine-grained, argillaceous; fractured and veined with calcite; dolomite as above  |
| 295             | <u>Watt Mountain(?) Formation</u>  |
| 295 - 298       | Dolomite, composed largely of dolomitized crinoids mixed with bright green waxy shale, with grains of coarse crystalline calcite and dolomite  |
| 298             | <u>Presqu'ile Formation</u>  |
| 298 - 317.5     | Dolomite, grey, medium- to coarsely-crystalline; some coarse white crystalline dolomite veining; vugs, sulphur   |
| 317.5 - 318     | Dolomite as above; bright green shale  |
| 318 - 342       | Dolomite, light grey to buff, medium- to coarsely-crystalline; small vugs, some lined with black 'petroleum residue'; some replacement by coarse white crystalline dolomite  |
| 342 - 396       | Dolomite, light grey, medium crystalline, in part replaced by white coarsely crystalline dolomite; small vuggy porosity, some vugs lined with black 'petroleum residue'; scattered remnants of organisms showing structures suggestive of <u>Amphipora</u> and stromatoporoids |
| 396 - 400       | Dolomite, brown, fine- to medium-crystalline; vuggy porosity; black shale partings; suggestion of organic remains  |
| 400 - 405       | Dolomite, grey to buff, largely replaced by crystalline dolomite   |
| 405 - 407       | Dolomite, composed largely of <u>Amphipora</u> ; matrix, dark brown, finely crystalline  |
| 407 - 423       | Dolomite, buff to light grey; medium-crystalline; vuggy porosity; some replacement by coarse white crystalline dolomite; <u>Amphipora(?)</u> abundant in bottom 6 inches   |
| 423             | <u>Pine Point Formation</u>  |
| 423 - 428       | Dolomite, brown to dark brown, fine- to medium-crystalline, resinous lustre; vuggy porosity; oil stain; remains of celled organisms, possibly stromatoporoids, <u>Amphipora</u> or algae   |

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| Depth<br>(feet) | Lithology   |
|-----------------|---|
| 428 - 441       | Dolomite, brown, finely crystalline, euhedral; pin-point porosity; dark brown shale laminae abundant in bottom 1 foot   |
| 441 - 480       | Dolomite, buff to light grey, fine- to medium-crystalline; a few shale partings and stylolites; small vugs; suggestion of cell structure, possibly stromatoporoids or algae in upper 1 foot |
| 480 - 481       | Dolomite, dark grey, argillaceous; organisms replaced by dolomite   |
| 481 - 509       | Dolomite, buff, fine- to medium-crystalline; pin-point and small vuggy porosity; some intercrystalline porosity; possible remains of organisms such as stromatoporoids or corals            |
| 509 - 512       | Dolomite, brown, finely crystalline, with bituminous resinous appearance; dark brown shale laminae  |
| 512 - 518       | Dolomite, buff to grey, fine- to medium-crystalline, in part euhedral, slightly argillaceous; scattered small vugs  |
| 518 - 527       | Dolomite as above; brown shale laminae in bands   |
| 527 - 536       | Dolomite, light grey, fine- to medium-crystalline; vuggy porosity   |
| 536 - 536.5     | Dolomite, greenish grey, argillaceous   |
| 536 - 601       | Dolomite, light grey, finely crystalline; small vuggy porosity; much of core missing  |
| 601 - 648       | Dolomite, buff to light brown, fine- to medium-crystalline; abundant stromatoporoids and corals; some porosity  |
| 648 - 651       | Core missing  |
| 651 - 665       | Dolomite, buff, fine- to medium-crystalline, euhedral with intercrystalline porosity  |
| 665 - 671       | Dolomite, buff, finely crystalline; scattered corals and stromatoporoids; core broken and partly missing  |
| 671 - 676       | Core missing  |
| 676 - 678       | Dolomite, buff, finely crystalline; small vugs  |
| 678 - 686       | Core missing  |

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| Depth<br>(feet) | Lithology  |
|-----------------|--|
| 686 - 710       | Dolomite as above with corals and stromatoporoids; core partly missing   |
| 710 - 780       | Dolomite, buff, crystalline; some intercrystalline porosity; suggestion of stromatoporoids; much of core missing       |
| 780 - 787       | Dolomite, buff, finely crystalline, euhedral; carbonaceous specks; small fossil fragments; white crystalline anhydrite |
| 787 - 828       | Dolomite, buff, finely crystalline, in part euhedral; carbonaceous specks; white anhydrite spots                       |

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